US Army Corps
of Engineers

DESIGN SPECIFICATIONS

Cornell – Dubilier Electronics Superfund Site Operable Unit 4:

Phase 1 - Capacitor Debris Area

Phase 2 - Water Line Replacement

South Plainfield, New Jersey

August 2018

Prepared by:

ARCADIS Design & Consultancy for natural and built assets

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Cornell – Dubilier Electronics Superfund Site
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LIST OF DRAWINGS
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PART 1 GENERAL

1.1 SUMMARY

This section lists the Drawings for the project pursuant to contract clause "DFARS 252.236-7001, Contract Drawings, Maps and Specifications."

1.2 DRAWINGS

DRAWING NUMBER	**DRAWING TITLE**
--	COVER SHEET
G-101	INDEX OF DRAWINGS, LEGEND, ABBREVIATIONS
G-102	EXISTING SITE PLAN
G-103	TOPOGRAPHIC SITE PLAN
G-104	BEDROCK CONTOUR PLAN
G-105	LIMITS OF CONTAMINATION
G-106	PROPOSED CONTRACTOR LAYDOWN/STAGING AREA
G-107	STAGING AREA PROTECTION DETAILS
G-201	EROSION AND SEDIMENT CONTROL PLAN
G-202	EROSION AND SEDIMENT CONTROL NOTES AND DETAILS
G-203	EROSION AND SEDIMENT CONTROL DETAILS
G-301	EXCAVATION PLAN
G-302	REMEDIAL EXCAVATION CONTOUR PLAN
G-303	OVERALL EXCAVATION CONTOUR PLAN
G-304	EXCAVATION QUANTITY DETAILS - 1
G-305	EXCAVATION QUANTITY DETAILS - 2

DRAWING NUMBER	DRAWING TITLE
G-306	EXCAVATION ELEVATION CONFIRMATION LOCATION PLAN (SHEET 1)
G-307	EXCAVATION ELEVATION CONFIRMATION LOCATION PLAN (SHEET 2)
G-308	EXCAVATION ELEVATION CONFIRMATION LOCATION TABLES
G-401	OVERALL CONSTRUCTION SEQUENCING
G-402	CONSTRUCTION SEQUENCING PLAN - STAGE 1
G-403	CONSTRUCTION SEQUENCING PLAN - STAGE 2
G-404	CONSTRUCTION SEQUENCING PLAN - STAGE 3 (SEGMENTS 1 AND 2)
G-405	CONSTRUCTION SEQUENCING PLAN - STAGE 3 (SEGMENTS 3 AND 4)
G-406	CONSTRUCTION SEQUENCING PLAN - STAGE 4
G-407	CONSTRUCTION SEQUENCING PLAN - STAGE 5 (SEGMENTS 1 AND 2)
G-408	STREAM DIVERSION NOTES AND DETAILS
G-501	EXCAVATION SUPPORT PLAN CELLS S12 TO 106
G-502	EXCAVATION SUPPORT PLAN CELLS 107 TO 111
G-503	EXCAVATION SUPPORT NOTES AND DETAILS
G-601	FINAL GRADING PLAN
G-701	DISTURBANCE TO REGULATED AREAS - FLOOD HAZARD AREA AND RIPARIAN ZONE
G-702	DISTURBANCE TO REGULATED AREAS - WETLANDS AND REGULATED WATERS
G-703	RESTORATION PLAN
G-704	BOUND BROOK RESTORATION
G-705	WETLAND-IN-TRANSITION DETAILS
G-706	WETLAND-IN-TRANSITION PLANTING AND RESTORATION DETAILS NOTES
G-801	CROSS SECTIONS - 1

DRAWING NUMBER	DRAWING TITLE
G-802	CROSS SECTIONS - 2
G-803	TEMPORARY WATER TREATMENT PROCESS FLOW DIAGRAM
W-001	WATER LINE INDEX OF DRAWINGS, LEGENDS, ABBREVIATIONS, AND GENERAL NOTES
W-002	WATER LINE EXISTING SITE CONDITIONS PLAN
W-003	WATER LINE PROJECT OVERVIEW SHEET
W-004	WATER LINE SOIL EROSION & CONTROL PLAN - 1
W-005	WATER LINE SOIL EROSION & CONTROL PLAN - 2
W-006	NEW 36-INCH WATER LINE PLAN AND PROFILE STA. 0+00 TO STA. 6+00
W-007	NEW 36-INCH WATER LINE PLAN AND PROFILE STA. 6+00 TO STA. 12+00
W-008	NEW 36-INCH WATER LINE PLAN AND PROFILE STA. 12+00 TO STA. 18+00
W-009	NEW 36-INCH WATER LINE PLAN AND PROFILE STA. 18+00 TO STA. 25+06
W-010	NEW 8-INCH WATER LINE PLAN AND PROFILE STA. 0+00 TO STA. 4+00
W-011	NEW 8-INCH WATER LINE PLAN AND PROFILE STA. 4+00 TO STA. 8+02
W-012	WATER LINE CONSTRUCTION DETAILS - 1
W-013	WATER LINE CONSTRUCTION DETAILS - 2
W-014	WATER LINE CONSTRUCTION DETAILS - 3
W-015	WATER LINE CONSTRUCTION DETAILS - 4
W-016	WATER LINE CONSTRUCTION DETAILS - 5
W-017	WATER LINE CONSTRUCTION DETAILS - 6

1.3 REFERENCE DATA

Reference data can be found in the following documents:

Arcadis. 2017. Pre-Design Investigation Summary Report Cornell - Dubilier Electronics Superfund Site Operable Unit 4: Phase I -

Capacitor Debris Area.

Arcadis, 2018. Design Analysis Report - Cornell-Dubilier Electronics Superfund Site Operable Unit 4: Phase 1 - Capacitor Debris Area.

Louis Berger, 2017b. Final Quality Assurance Project Plan for Phase 2: Water Line Replacement, Operable Unit 04 (Bound Brook) - Cornell-Dubilier Electronics Superfund Site, South Plainfield, New Jersey.

Louis Berger, 2014a. Final Remedial Investigation Report Operable Unit 4: Bound Brook. Cornell-Dubilier Electronics Superfund Site, South Plainfield, NJ.

Louis Berger, 2014b. Final Feasibility Study Report Operable Unit 4: Bound Brook. Cornell-Dubilier Electronics Superfund Site, South Plainfield, NJ.

Louis Berger, 2012. Final Remedial Investigation Report Operable Unit 3: Groundwater. Cornell-Dubilier Electronics Superfund Site, South Plainfield, NJ.

Malcolm Pirnie, Inc., 2007. Final Soils Pre-Design Investigation Report Operable Unit 2. August, 2007

1.4 SUPPLEMENTARY INFORMATION

Supplementary information in provided in Appendix A: Supplementary Information

-- End of Document --

SECTION 01 11 00

SUMMARY OF WORK
08/15

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

1.1.1 Site History

The Spicer Manufacturing Company operated a manufacturing plant on the property now known as the former Cornell-Dubilier Electronics (CDE) facility from 1912 to 1929 manufacturing universal joints, drive shafts, clutches, and other parts for the automotive industry.

The former (CDE) facility, most recently known as the Hamilton Industrial Park, was occupied by CDE from 1936 to approximately 1962 for manufacturing electronic components including capacitors. Polychlorinated biphenyls (PCBs) were used in the manufacturing process, and the company disposed of PCB-contaminated material directly on the facility soils leading to contamination at the facility, as well as migration of contaminants to off-site areas near the facility.

After CDE departed the property in 1962, the site was operated as a rental property, most recently known as the Hamilton Industrial Park, with numerous buildings and various commercial and light industrial tenants.

Environmental conditions at the CDE Site were first investigated by the New Jersey Department of Environmental Protection (NJDEP) in 1986. As a result of these investigations, the U.S. Environmental Protection Agency (USEPA) included the CDE Site on the National Priorities List in 1998 under the CERCLIS ID No. NJD981557879. The USEPA is the lead agency in the cleanup effort with the NJDEP listed as the support agency. The USEPA divided the CDE Site into four separate Operable Units:

a. Operable Unit 1 (OU1) includes a number of residential and commercial properties near the former CDE facility. In September 2003, USEPA signed a Record of Decision (ROD) for OU1. Remediation has been completed.
b. Operable Unit 2 (OU2) is the former CDE facility itself. In September 2004, USEPA signed a ROD for OU2. Remediation has been completed.
c. Operable Unit 3 (OU3) consists of the observed extent of CDE Site-related volatile organic compounds found in groundwater, and encompasses approximately 825 acres of land area. In September 2012, USEPA signed a ROD for OU3. A Technical Impracticability Waiver was later issued for the bedrock groundwater plume and monitoring of groundwater is ongoing.
d. Operable Unit 4 (OU4) addresses contaminated sediment and soils in Bound Brook, Green Brook, and several tributaries to Bound Brook; associated floodplain areas; buried capacitor debris near the former CDE facility; contaminated groundwater discharges to Bound Brook; and replacement of a water line crossing the former CDE facility property. In May 2015, USEPA signed a ROD for OU4. The work outlined in this contract is being performed under the OU4 ROD.

The ROD for OU4 describes the proposed remedy in four distinct components, which includes excavation and off-site disposal of PCB-containing

floodplain soils and Bound Brook sediments, excavation and off-site disposal of an area where PCB-contaminated capacitors are present (i.e., Capacitor Debris Area), hydraulic containment of groundwater discharging to Bound Brook, relocation of a water line that traverses the former CDE facility, and institutional controls. For the Remedial Design, the Capacitor Debris Area was expanded to include Bound Brook and its floodplain areas from the culvert under the railroad spur north of the former CDE facility property, upstream to the eastern/upstream extent of OU4. This work focuses on the activities to be completed in the expanded Capacitor Debris Area of OU4 and the Water Line Replacement, located adjacent to OU2.

1.1.2 Location

The site is located in proximity to mixed residential, light industrial, township and commercial properties in the Borough of South Plainfield, New Jersey as indicated on the Drawings. The former CDE facility is a 26-acre property bounded on the northeast by Bound Brook and the former Lehigh Valley Railroad, Perth Amboy Branch (presently owned by Conrail); on the southeast by Bound Brook, a property used by the Borough of South Plainfield Department of Public Works and single family residential properties on Spicer Avenue; on the southwest by single family residential properties along Spicer Avenue and former CDE facility.

1.1.3 Terminology

Throughout the Contract Documents there are number of terms used to reference portions of the work:

a. 'Phase 1' refers to the removal of contaminated soil and sediment in the Capacitor Debris area in a segment of Bound Brook and the associated floodplain areas. This area is defined in Drawings as OU4: Phase 1 Boundary

b. 'Remediation work' refers to work within the limits of the Phase 1 area and defined in the Drawings and Design Documents as Remediation Work Area and/or Phase 1 Remediation Area.

c. 'Phase 2' refers to the replacement and relocation of the 36-inch water line that currently crosses the former CDE facility property.

d. 'Water line work' refers to the activities associated with the water line installation including relocation of existing utilities. A portion of the water line work will be performed within the limits of the remediation work.

e. 'OU2' and 'OU-2' refer to the former CDE facility property at 333 Hamilton Blvd.

1.1.4 Project Scope

The United States Army Corps of Engineers (USACE; Contracting Officer) has elected to combine the designs for Phase 1 and Phase 2 into one design package to facilitate procurement and utilization of a single prime remedial action contractor, designating Phase 1 as the primary project with Phase 2 incorporated within the Phase 1 design package.

1.1.4.1 Phase 1

Phase 1 involves the removal of sediment and debris from Bound Brook as well as the removal of contaminated soil (containing greater than or equal to 1 milligram per kilogram (mg/kg) PCBs) from the floodplains in areas immediately north and east of the former CDE facility (OU-2 Area). After the soil and sediment have been removed, the nearby stream and wetlands areas will be restored and stabilized. The removal of the twin culverts and portions of the older railroad spur is also included in this phase. This Phase 1 design package describes the remedial activities to be completed in the OU4: Phase 1 Boundary, and the sediments and floodplain soils immediately adjacent to the OU-2 Area.

1.1.4.2 Phase 2

Phase 2 involves the replacement of the existing 36-inch municipal water line currently traversing the OU-2 Area and the OU4: Phase 1 Boundary in a new easement along New Market Avenue Extension, Spicer Avenue, and across the Phase 1 remediation area.

1.2 OCCUPANCY OF PREMISES

Property owned by others shall not be occupied during performance of work under this Contract. Excluded Areas (areas not to be disturbed within the work area) are identified in the Drawings.

Before work is started, the Contractor shall arrange with the Contracting Officer a sequence of procedures, means of access, space for storage of materials and equipment, and use of approaches, corridors, and stairways for work on the site.

1.3 EXISTING WORK

In addition to "FAR 52.236-9, Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements," the Contractor Shall:

a. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.

b. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work must be in a condition equal to or better than that which existed before new work started.

c. All care will be taken as necessary to protect and preserve existing facilities currently located on the property including but not limited to overhead and below ground utilities, on-site monitoring and extraction wells, groundwater transfer lines, groundwater treatment system discharge line, gauging system, groundwater treatment facility, stormwater collection system and retention basin, asphalt capping system, fencing, and water tower.

1.4 TEMPORARY FACILITIES

The Contractor shall provide all temporary facilities, as needed, in accordance with the requirements of Section 01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS.

1.5 WORK HOURS

a. Work can be performed onsite Monday through Friday. Construction activities will be limited to 7 a.m. to 5 p.m. for any heavy machinery or outside noises in accordance with Borough of South Plainfield ordinances. Alternative work hours must be communicated and approved by the Contracting Officer and Borough of South Plainfield.

b. Coordinate deliveries for trucks entering and leaving site to mitigate impacts to nearby schools including students, workers, and other visitors, whether on-foot or in vehicles. In the traffic control plan, the Contractor shall propose traffic control measures for trucks accessing the site, such as routing traffic away from Hamilton Boulevard or providing additional crossing guards, subject to the approval of the Contracting Officer.

1.6 LOCATION OF UNDERGROUND UTILITIES

Contractor shall obtain digging permits prior to start of excavation. Contact local utility companies and notify the New Jersey One-Call-System locating service a minimum of 48 hours prior to excavating, to mark utilities, and within sufficient time required if work occurs on a Monday or after a Holiday. Verify existing utility locations indicated on the Drawings, within area of work.

Contractor shall identify and mark all other utilities not managed and located by the local utility companies using a private utility locating company. Scan the construction site with Ground Penetrating Radar (GPR), electromagnetic, or sonic equipment, and mark the surface of the ground or paved surface where existing underground utilities are discovered. Verify the elevations of existing piping, utilities, and any type of underground or encased obstruction not indicated, or specified to be removed, that is indicated or discovered during scanning, in locations to be traversed by new water lines. Notify the Contracting Officer if obstructions that will impact the water line alignment are encountered. Contractor shall verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

1.6.1 Notification Prior to Excavation

Contractor shall notify the Contracting Officer at least 48 hours prior to starting excavation work.

1.7 WEEKLY PROGRESS MEETINGS

Contractor shall attend all meeting and conferences and perform all activities associated with such meetings and conferences in accordance with the requirements of Sections 01 31 19 PROJECT MEETINGS and 01 32 01.00 10 PROJECT SCHEDULE.

1.8 CONTRACTOR QUALITY CONTROL

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system as specified in Section 01 45 00.00 10 QUALITY CONTROL.

1.9 ENVIRONMENTAL PROTECTION

Contractor shall protect human and natural environments during demolition,

excavation, and restoration. Environmental protection requires consideration of air, water, and land resources and involves noise, solid waste management, vibration and management of other pollutants. Prevent, abate, and control all environmental pollution arising from the construction activities in performance of this contract. Contractor shall comply with all federal, state, and local laws and regulations. Contractor shall perform all work in such a manner as to minimize the pollution of air, water, or land, and, within reasonable limits, control noise and disposal of solid waste materials, as well as other pollutants. Do not remove, cut, deface, injure, or destroy trees or shrubs, except in areas to be cleared, without the Contracting Officer's permission.

1.10 PHASE 1 - CAPACITOR DEBRIS AREA

1.10.1 Description of Work

The completed Work will include activities associated with the excavation and off-site disposal of PCB-containing floodplain soils and Bound Brook sediments. The major project components include:

1. Mobilization.
2. Provision of temporary construction facilities and temporary site controls to minimize impact to the environment and neighboring property, including establishment of work zones, ingress and egress, laydown area(s), dust control, and vehicle decontamination area.
3. Installation and recordkeeping associated with air and sound monitoring.
4. Installation of stormwater controls necessary to prevent the flow of uncontaminated runoff into excavations and minimize the quantity of water to be treated and disposed.
5. Installation and operation of water treatment system to ensure all water to be discharged is in compliance with applicable state and local requirements.
6. Preparation and implementation of a Traffic Control Plan for the protection of public roads adjacent to the Site. Additional controls may include the use of signs to advise of construction ahead, flagmen, and temporary barriers, and use of alternate routes to minimize the impacts on local traffic.
7. Site clearing and grubbing of all trees, brush, and other above-grade vegetation. Application of herbicide to areas designated in the Drawings.
8. Provision of necessary personnel and equipment to establish and maintain work site reference and survey control points to be used to confirm and record all required spatial documentation.
9. Preparation and implementation of Excavation Support Installation Plan to provide the means and methods necessary for shoring of sidewalls in excavations greater than 4 feet in depth in accordance with Occupational Safety and Health Administration (OSHA) requirements, Drawings, and Specifications.
10. Design, installation, and operation of temporary stream bypass system for use during excavation of Bound Brook sediments
11. Installation of staging areas for excavated material.
12. Excavation and handling of material within designated limits.
13. Collection and analysis of soil and water samples for applicable compliance and confirmatory purposes.
14. Waste characterization and offsite disposal of excavated material.
15. Site restoration, including three major components: backfill, stream restoration, and ecological restoration.
16. Demobilization and project closeout.
17. Specific tasks not mentioned or not completely described that are

necessary to perform tasks described as "Work" shall also be considered part of the work.

1.10.2 Sequence of Work

The excavation of soil and sediment for the Site will be implemented in five stages. Excavation will begin in the most upstream area of the site and proceed downstream in a manner as to prevent recontamination of restored areas during implementation. The excavation area is divided into distinct soil excavation areas (Stages 1, 2, and 4) and mixed sediment and soil removal stages (Stages 3 and 5). It is anticipated that sediment removal will be accomplished using a bypass pumping system for discrete sections of Bound Brook. The brook sections will be isolated using cofferdams that can be removed in the event of a high flow event to reduce flooding in surrounding areas.

1.10.3 Management of Soil and Groundwater

Excavated materials will be moved from the excavation areas to a staging area where material in the waste categories will be segregated (TSCA, PCB >1 and <50 mg/kg and PCB <1 mg/kg). Waste disposal characterization samples from excavated soil and debris will be collected and analyzed in accordance with disposal facility sampling requirements. The analytical results obtained by the Contractor shall be sufficient to address all requirements of the selected disposal facility.

All water that encounters contaminated soils/sediments will be considered impacted and treated before disposal. The Contractor is to address and dispose of treated water in accordance with the approved Dewatering Work Plan. All water will be discharged in compliance with all applicable state permits or permit equivalencies.

1.11 PHASE 2 - WATER LINE REPLACEMENT

1.11.1 Description of Work

The completed Work will relocate the existing New Jersey American Water (NJAW) 36-inch water line that currently crosses the former CDE property. The major project components include:

1. Mobilization.
2. Installation of approximately 2,500 linear feet of 36-inch water line including all 36-inch butterfly valves, fittings, tie-ins and thrust restraints.
3. In-situ capping and grouting of existing 36-inch water line.
4. Installation of approximately 800 linear feet of 8-inch water line including all valves, fittings, tie-ins, thrust restraints and water service connections.
5. Removal and disposal of existing 8-inch water line.
6. Provision of temporary facilities and temporary controls including establishment of work zones, ingress and egress, laydown area(s), dust control, and vehicle decontamination area.
7. Installation of line stops, hot taps and temporary bypass for the 36-inch water line.
8. Installation of temporary bypass for the 8-inch water line.
9. On-site temporary storage of and management with extracted groundwater associated with dewatering activities.
10. Installation of a new air/vacuum release valve.
11. Installation of a new fire hydrant along Spicer Avenue.

12. Removal and storage (as required), protection, upkeep, and re-installation (as required) of all landscaping.
13. Removal and replacement of permanent fencing.
14. All temporary construction fencing required to protect the site and the work areas.
15. Sedimentation and erosion controls.
16. Protection of existing utilities.
17. All labor, materials, and equipment required for constructing the water lines and appurtenances, including, but not limited to, saw cutting, excavation, disposal of excess materials, pipe bedding, backfill, compaction, surface restoration (paving and cross-country), restrained joints, couplings, tracer tape, testing and disinfection, and all other appurtenances required to complete the intent of the work.
18. Demobilization and project closeout.
19. Specific tasks not mentioned or not completely described that are necessary to perform tasks described as "Work" shall also be considered part of the work.

1.11.2 Sequence of Work

Work will be divided into the following stages and performed in coordination with the Phase 1 remediation work. Work in different stages may be performed concurrently.

1. Stage 1 - Installation of new fire hydrant, installation and activation of the new 8-inch water line along Spicer Avenue including installation and removal of temporary bypass, installation of new fire hydrant, and reconnection of water service connections impacted by construction.
2. Stage 2 - Creation of a clean corridor around the portion of the water line located on the former CDE facility property by removing contaminated overburden soils and weathered bedrock down to the top of competent bedrock. The clean corridor shall extend from where the existing water line enters the former CDE facility property to Sta. 0+81, as shown on the Drawings.
3. Stage 3 - Installation of cast-in-place thrust blocks at connection points on 36-inch water line. A temporary asphalt cap shall be installed in the clean corridor area.
4. Stage 4 - Installation of the new 36-inch water line along New Market Avenue Extension and Spicer Avenue from Sta. 0+81 to Sta. 14+58. Test and disinfect.
5. Stage 5 - Restoration of Spicer Avenue and adjacent landscaped areas.
6. Stage 6 - Installation of 36-inch water line from Sta. 14+58 to Sta. 24+67. Test and disinfect.
7. Stage 7 - Installation of temporary bypass for 36-inch water line.
8. Stage 8 - Installation of 36-inch water line from Sta. 24+67 to Sta. 24+84.
9. Stage 9 - Installation of 36-inch water line from Sta. 0+22 to Sta. 0+81 including connection to existing water line.
10. Stage 10 - Test and disinfect new 36-inch water line.
11. Stage 11 - Remove temporary bypass for 36-inch water line. Cut and cap existing 36-inch water line. Abandon in place using controlled density fill between new connections.
12. Stage 12 - Site restoration and final capping and paving.

1.11.3 Management of Soil and Groundwater

Contaminated soil and groundwater are present on the former CDE facility

property under the asphalt cap and within the Phase 1 remediation area. In handling all soils and groundwater during the water line installation, the following shall apply:

1. From Sta. 0+00 to Sta. 0+81 (former CDE facility property), all soil within the clean corridor area shall be excavated to the top of competent bedrock. Prior to excavation, the soil within the clean corridor shall be characterized in-situ for disposal parameters using a direct push rig or other acceptable method. This material shall be considered TSCA waste unless characterization proves otherwise. Following excavation, the soil shall be transported and disposed of off-site in accordance with characterization results and all applicable regulations.

2. Soil excavated within the limits of the trench from Sta. 0+81 to Sta. 14+58 (public right of way) shall be placed back in the trench if it meets physical requirements. The material shall be placed in shallow lifts and compacted to meet the Borough of South Plainfield's specifications for road construction. Any excess material may be used for backfill in the Phase 1 remediation area if it complies with all chemical and physical requirements for imported backfill listed in Table 1 of Section 01 35 45 CHEMICAL DATA QUALITY CONTROL. All remaining material shall be characterized for off-site disposal.

3. From Sta. 14+58 to Sta. 25+06 (Phase 1 remediation area), prior to the start of water line installation, soil shall be excavated to the Phase 1 remedial cut line shown on the Contract Drawings and contaminated materials removed. The Government will confirm this activity has occurred prior to the start of water line construction. Upon Government acceptance of the completion of Phase 1 remediation excavation within the water line trenching area limits, additional excavation shall be performed as necessary to meet the grades required for the water line construction. Material excavated in this portion of the site shall be characterized for off-site disposal.

4. All soil to be disposed off-site shall be characterized and handled in accordance with all applicable state and federal regulations.

5. Groundwater encountered during excavation shall be assumed to be hazardous and containerized for characterization, treatment, and off-site disposal.

6. Dust controls and soil erosion controls will apply throughout water line construction.

7. Storm water shall be diverted from the water line trench and handled in accordance with local and state storm water regulations. Stormwater generated on the former CDE facility property within the water line exclusion zone will be assumed to be contaminated and handled accordingly.

1.12 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

If during construction the Contractor discovers any archaeological or historical items, the Contractor shall address as specified Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS. Potentially Sensitive Areas for Cultural

Resources are defined in the Drawings.

1.13 CLOSEOUT SUBMITTALS

Prepare as-built drawings, record drawings, and Remedial Action Report (RAR) in accordance with Section 01 78 00 CLOSEOUT SUBMITTALS.

1.14 PERMITS AND PERMIT EQUIVALENCIES

1.14.1 Contractor Responsibilities

Contractor is responsible for complying with all local, state, and federal permit and approval requirements necessary to perform the work defined in this contract including, but not limited to:

1. Middlesex County Utilities Authority (MCUA)/ Borough of South Plainfield Non-Domestic Wastewater Discharge Permit
2. Local approvals for work in the right of way, traffic controls, after hours work and other activities
3. NJDEP Well Abandonment Reports (for wells to be removed or damaged beyond repair)
4. NJDEP New Jersey Pollutant Discharge Elimination System Permit
5. General Construction Stormwater Discharge Permit
6. Soil Erosion and Sediment Control Plan Certification (Chapter 251) from Freehold Soil Conservation District
7. Trucking and Waste Hauler Permits

1.14.2 Government Responsibilities

The Government is responsible for preparing and providing the following permits necessary to perform the work defined in this contract.

1. NJDEP DLUR Freshwater Wetlands General Permit #4 - Hazardous Site Investigation and Cleanup
2. NJDEP DLUR Flood Hazard Area Individual Permit

1.14.3 Other

New Jersey American Water holds a Master Permit from NJDEP Bureau of Water Systems and Well Permitting for Construction/Modification/Operate Permit. All work on the water line installation shall comply with the requirements of this permit.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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SECTION 01 14 00

WORK RESTRICTIONS
11/11

PART 1 GENERAL

1.1 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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

List of Contact Personnel; G

1.2 OU2 ASPHALT CAP

During soil remediation activities performed under OU2, soils containing PCBs were left on site under an asphalt cap. The concentration of PCBs in the soil varies from non-detect to less than 499 mg/kg. The contaminants that have been detected in the soil and groundwater at the site include metals, volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, and dioxins. All soils below the asphalt cap shall be considered TSCA waste and handled accordingly.

Protect the integrity of the existing asphalt paving which serves as an infiltration barrier for contaminated soils present at the Site. All soil beneath the asphalt cap shall be treated as a hazardous/TSCA waste unless indicated otherwise through characterization.

During periods when portions of the asphalt cap have been removed, access to those areas of the site shall be controlled and limited to HAZWOPER trained personnel in accordance with Section 01 35 29.13, HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES. Appropriate work zones (Exclusion Zone, Contaminant Reduction Zone, and Support Zone) and decontamination procedures shall apply to all personnel and equipment entering those portions of the Site.

1.3 CONTRACTOR ACCESS AND USE OF PREMISES

All activities associated with the project shall be restricted to the site boundaries described in the Drawings and Specifications. Measures shall be taken such that no property outside of work boundaries is disturbed.

1.3.1 Activity Regulations

Ensure that Contractor personnel employed on the Activity become familiar with and obey Activity regulations including safety, fire, traffic and security regulations. Keep within the limits of the work and avenues of ingress and egress. Wear hard hats in designated areas. Do not enter any restricted areas unless required to do so and until cleared for such entry. Mark Contractor equipment for identification.

1.3.1.1 Subcontractors and Personnel Contacts

Provide a list of contact personnel of the Contractor and subcontractors including addresses and telephone numbers for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

1.3.1.2 No Smoking Policy

Smoking is prohibited within and outside of all buildings on the site, except in designated smoking areas. This applies to all work areas, existing buildings, buildings under construction and buildings under renovation. Discarding tobacco materials other than into designated tobacco receptacles is considered littering and is subject to fines. The Contracting Officer will identify designated smoking areas.

1.3.2 Working Hours

Regular working hours must consist of an 9 hour period established by the Contracting Officer, between 7 a.m. and 5 p.m., Monday through Friday, excluding Government holidays. Intrusive-noise-generating activities shall not commence prior to 8 a.m. Coordinate deliveries according to Traffic Control Plan as described in 01 11 00 SUMMARY OF WORK.

1.3.3 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Make application 15 calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress, giving the specific dates, hours, location, type of work to be performed, contract number and project title. Based on the justification provided, the Contracting Officer may approve work outside regular hours. During periods of darkness, the different parts of the work must be lighted in a manner approved by the Contracting Officer. Make utility cutovers after normal working hours or on Saturdays, Sundays, and Government holidays unless directed otherwise.

1.3.4 Utility Cutovers and Interruptions

a. Make utility cutovers and interruptions after normal working hours or on Saturdays, Sundays, and Government holidays. Conform to procedures required in Subpart 1.3.3 WORK OUTSIDE REGULAR HOURS.

b. Ensure that new utility lines are complete, except for the connection, before interrupting existing service.

c. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, air conditioning, heating, fire alarm, compressed air, are considered utility cutovers pursuant to the paragraph WORK OUTSIDE REGULAR HOURS.

1.4 SECURITY REQUIREMENTS

Security requirements on site will be addressed in accordance with Section 01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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SECTION 01 22 00

PRICE AND PAYMENT PROCEDURES
05/18

PART 1 GENERAL

1.1 PAYMENT ITEMS

1.1.1 Single Job Payment Items

Payment items for the work of this contract for which contract job payments will be made are listed in the BID SCHEDULE and described below. All costs for items of work, which are not specifically mentioned to be included in a particular job or unit price payment item, are included in the listed job item most closely associated with the work involved. The job price and payment made for each item listed constitutes full compensation for furnishing all labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

1.1.2 Unit Price Payment Items

Payment items for the work of this contract on which the contract unit price payments will be made are listed in the BID SCHEDULE and described below. The unit price and payment made for each item listed constitutes full compensation for furnishing all labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for each of the unit price items.

1.2 PHASE 1 REMEDIATION EXCAVATION - GENERAL REQUIREMENTS (WORK ITEMS G-01)

1.2.1 Work Plans (Work Item G-01A)

1.2.1.1 Payment

Payment will be made for costs associated with the preparation and submission of the initial project schedule and the work plans or work plan amendments as specified. This will include any modifications required for final approval as requested in writing by the Contracting Officer following review of the DRAFT deliverables.

1.2.1.2 Unit of Measure

Unit of measure: lump sum.

1.2.2 General Conditions (Work Item G-01B)

1.2.2.1 Payment

Payment will be made for costs associated with all of the Items required under these Contract Documents but not covered under other work Items, including but not limited to the following: the Contractor's cost for insurance, fees, permits, and other similar expenses directly related to and required by these Contract Documents; project signs and warning signs; site security; environmental protection and spill control/emergency

response; and any submittals not included under the Item for Work Plans.

1.2.2.2 Unit of Measure

Unit of measure: lump sum.

1.2.3 Project Management (Work Item G-01C)

1.2.3.1 Payment

Payment will be made for costs associated with project-dedicated supervisory staff; home office support; compliance with specified regulatory requirements; construction period planning; administration; coordination with municipalities, subcontractors, disposal facilities, as necessary; Contractor quality control; site health and safety; project photographs and videotaping; and updated project schedules.

1.2.3.2 Measurement

The duration for which Project Management services are performed.

1.2.3.3 Unit of Measure

Unit of measure: month.

1.2.4 Mobilization and Demobilization (Work Item G-01D)

1.2.4.1 Payment

Payment will be made for costs associated with the mobilization and demobilization of the personnel and equipment required to complete the work.

1.2.4.2 Unit of Measure

Unit of measure: lump sum

1.2.5 Site Preparation (Work Item G-01E)

1.2.5.1 Payment

Payment will be made for costs associated with temporary environmental controls; decontamination facilities; furnishing all requirements associated with the staging areas; as well as the erosion and sediment controls identified in the approved permit equivalency and required by the appropriate authority, including inspections, documentation, repairs and maintenance for the duration of the Project.

1.2.5.2 Unit of Measure

Unit of measure: lump sum.

1.2.6 Temporary Facilities (Work Item G-01F)

1.2.6.1 Payment

Payment will be made for costs associated with the operation of all required construction trailers, including associated amenities and all utilities.

1.2.6.2 Measurement

The duration of the project with which the temporary facilities are operational.

1.2.6.3 Unit of Measure

Unit of measure: month.

1.2.7 Air Monitoring (Work Item G-01G)

1.2.7.1 Payment

Payment will be made for costs associated with air monitoring services as required and specified.

1.2.7.2 Measurement

The duration for which air monitoring services are performed.

1.2.7.3 Unit of Measure

Unit of measure: month.

1.3 PHASE 1 REMEDIATION EXCAVATION - EXCAVATION (WORK ITEMS G-02)

1.3.1 Upland Clearing and Grubbing (Work Item G-02A-1)

1.3.1.1 Payment

Payment will be made for costs associated with clearing and grubbing the upland areas as specified and as shown on the Drawings.

1.3.1.2 Measurement

The total upland area for which clearing and grubbing is performed.

1.3.1.3 Unit of Measure

Unit of measure: acre.

1.3.2 Wetland Clearing and Grubbing (Work Item G-02A-2)

1.3.2.1 Payment

Payment will be made for costs associated with clearing and grubbing the wetland areas as specified and as shown on the Drawings.

1.3.2.2 Measurement

The total wetland area for which clearing and grubbing is performed.

1.3.2.3 Unit of Measure

Unit of measure: acre.

1.3.3 Herbicide Application (Work Item G-02A-3)

1.3.3.1 Payment

Payment will be made for costs associated with the treatment of the wetland areas not being excavated via application of herbicides as specified.

1.3.3.2 Unit of Measure

Unit of measure: lump sum.

1.3.4 Excavation, Handling, Staging, And Loading Of Material Located Within Excavation Limits (Work Item G-02B)

1.3.4.1 Payment

Payment will be made for costs associated with excavation of PCB-contaminated soil and sediment within the excavation limits as shown on the Drawings, which will include pre- and post-excavation surveys and incidentals required for excavation, temporary stockpiling, on-site handling, and loading for disposal, as directed by Contracting Officer and as specified.

1.3.4.2 Measurement

The total quantity of excavated material for which payment will be made will be the actual quantity between the ground surface and post-excavation surface, as required by the Drawings, and as determined by the respective surveys. Unless identified on the Drawings or otherwise authorized, no allowance will be made for overdepth excavation or for the removal of any material outside the required slope lines.

1.3.4.3 Unit of Measure

Unit of measure: cubic yard.

1.3.5 Secondary Excavation Potentially Required Based on Analytical Confirmatory Sampling (Work Item G-02B-A)

1.3.5.1 Payment

Payment will be made for costs associated with secondary excavation of PCB-contaminated soil beyond the initial excavation limits potentially required based on the analytical results of confirmation samples shown on the Drawings. These costs, if determined to be necessary by the Contracting Officer, will include the additional excavation, post-excavation surveys and incidentals required for excavation, temporary stockpiling, on-site handling, and loading for disposal, as directed by Contracting Officer and as specified.

1.3.5.2 Measurement

The total quantity of excavated material for which payment will be made will be the quantity between the initial cut surface as determined by a post-excavation survey and the final cut surface accepted by the Contracting Officer (based on confirmation sample results) as determined by a final post-excavation survey. No allowance will be made for overdepth excavation or for the removal of any material outside the required slope lines unless authorized.

1.3.5.3 Unit of Measure

Unit of measure: cubic yard

1.3.6 Geotechnical Excavation Support Along Excavation Limits (Work Item G-02C)

1.3.6.1 Payment

Payment will be made for costs associated with the excavation support necessary for excavation adjacent to the OU-2 Area and adjacent properties as specified and as shown on the Drawings.

1.3.6.2 Unit of Measure

Unit of measure: lump sum.

1.3.7 Bound Brook Shoreline Protection During Soil Excavation (Not Including Sediment Excavation) (Work Item G-02D)

1.3.7.1 Payment

Payment will be made for costs associated with the appropriate shoreline protection necessary for excavation of soil adjacent to Bound Brook as specified and as shown on the Drawings.

1.3.7.2 Unit of Measure

Unit of measure: lump sum.

1.3.8 Diversion of Bound Brook Associated with Sediment Excavation (Work Item G-02E)

1.3.8.1 Payment

Payment will be made for costs associated with the appropriate diversion necessary for excavation of sediment within Bound Brook as specified and as shown on the Drawings.

1.3.8.2 Unit of Measure

Unit of measure: lump sum.

1.3.9 Water Quality Monitoring Associated with Excavation (Both Shoreline and Sediment) (Work Item G-02F)

1.3.9.1 Payment

Payment will be made for costs associated with the appropriate water quality monitoring during the excavation of soil adjacent to and sediment within Bound Brook as specified and as shown on the Drawings.

1.3.9.2 Measurement

The total quantity for which payment will be made will be based on the actual number of days for which the work is performed.

1.3.9.3 Unit of Measure

Unit of measure: month.

1.3.10 Drying Agent (Work Item G-02G)

1.3.10.1 Payment

Payment will be made for costs associated with the drying agent obtained to sufficiently dewater staged material as required prior to off-site transportation and disposal.

1.3.10.2 Measurement

The measurement for this unit cost Item will be based on the actual tonnage of material utilized on-site.

1.3.10.3 Unit of Measure

Unit of measure: ton (2,000 pounds).

1.3.11 Post-Excavation Analytical Confirmatory Sampling (Work Item G-02H)

1.3.11.1 Payment

Payment will be made for costs associated with collection and PCB analysis of post-excavation confirmatory samples as directed by Contracting Officer and as specified.

1.3.11.2 Measurement

The measurement for this unit cost Item will be per sample for post excavation sidewall and floor samples as required and indicated on the Drawings.

1.3.11.3 Unit of Measure

Unit of measure: each.

1.3.12 Post-Excavation Surveying (Work Item G-02I)

1.3.12.1 Payment

Payment will be made for costs associated with the Post-Excavation Survey as specified.

1.3.12.2 Unit of Measure

Unit of measure: lump sum.

1.3.13 Utility Protection During Excavation (Work Item G-02J)

1.3.13.1 Payment

Payment will be made for costs associated with utility protection during excavation. Specific utility protection work includes, but is not limited to:

a. Protection of existing water mains

b. Protection of existing drainage/storm lines

c. Protection of existing gas mains, if applicable

d. All required coordination with public utilities

e. Temporary utility bypasses if necessary

f. Utility test pits

g. Total cost of any and all repairs and loss-of-services expenses for impacted parties to any utilities negatively impacted by work performed under this contract

1.3.13.2 Unit of Measure

Unit of measure: lump sum.

1.3.14 Railroad Protection/Access (Flagmen) (Work Item G-02K)

1.3.14.1 Payment

Payment will be made for costs associated with coordination with the railroad company and implementation of railroad and worker protection during all work conducted along the OU4: Phase 1/railroad boundary.

1.3.14.2 Measurement

The duration for which railroad protection is provided.

1.3.14.3 Unit of Measure

Unit of measure: day.

1.3.15 Dewatering of Excavated Areas and Liquid Treatment (Work Item G-02L)

1.3.15.1 Payment

Payment will be made for costs associated with dewatering activities required within the excavated areas, the collection of water generated within the staging area from decontamination activities and dewatering stockpiles (if applicable), and the associated liquid treatment as specified.

1.3.15.2 Measurement

The total quantity for which payment will be made will be based on the actual number of days for which the work is performed and duration of necessary equipment rental.

1.3.15.3 Unit of Measure

Unit of measure: month.

1.4 PHASE 1 REMEDIATION EXCAVATION - BACKFILL/RESTORATION (WORK ITEMS G-03)

1.4.1 Imported Subgrade Backfill (Work Item G-03A)

1.4.1.1 Payment

Payment will be made for costs associated with the importation, placement, and compaction of subgrade backfill as specified and as shown on the Drawings. The contract unit price for Imported Subgrade Backfill includes the cost of physical and chemical analytical sampling of proposed sources of material. Imported backfill shall have contaminant concentrations below the cleanup criteria specified in the ROD and shall be in conformance with NJDEP Residential/Non-Residential Direct Contact Cleanup Criteria.

1.4.1.2 Measurement

The total quantity of imported subgrade backfill for which payment will be made will be the actual, compacted quantity between the post-excavation surface and prepared subgrade surface, as required by the Specifications, Drawings, and as determined by the respective surveys. Unless otherwise authorized, no allowance will be made for excess material imported and/or placed above the required subgrade elevations.

1.4.1.3 Unit of Measure

Unit of measure: compacted cubic yard.

1.4.2 Imported Topsoil (Work Item G-03B)

1.4.2.1 Payment

Payment will be made for costs associated with the importation and placement as specified and as shown on the Drawings. The contract unit price for Imported Topsoil includes the cost of analytical sampling of proposed sources of material. Imported topsoil shall have contaminant concentrations below the cleanup criteria specified in the ROD and shall be in conformance with NJDEP Residential/Non-Residential Direct Contact Cleanup Criteria.

1.4.2.2 Measurement

The total quantity of imported topsoil for which payment will be made will be the actual quantity between the prepared subgrade surface and final restoration surface, as required by the Specifications, Drawings, and as determined by the respective surveys. Unless identified on the Drawings or otherwise authorized, no allowance will be made for excess material imported and/or placed above the required restoration elevations.

1.4.2.3 Unit of Measure

Unit of measure: compacted cubic yard.

1.4.3 Imported Sediment Fill (Work Item G-03C)

1.4.3.1 Payment

Payment will be made for costs associated with the importation, placement, and compaction of sediment fill as specified and as shown on the Drawings. The contract unit price for Imported Sediment Fill includes the cost of

analytical sampling of proposed sources of material. Imported topsoil shall have contaminant concentrations below the cleanup criteria specified in the ROD and shall be in conformance with NJDEP Residential/Non-Residential Direct Contact Cleanup Criteria.

1.4.3.2 Measurement

The total quantity of imported sediment fill for which payment will be made will be the actual quantity between the post-excavation surface and final restoration surface, as required by the Specifications, Drawings, and as determined by the respective surveys within Bound Brook. Unless identified on the Drawings or otherwise authorized, no allowance will be made for excess material imported and/or placed above the required restoration elevations.

1.4.3.3 Unit of Measure

Unit of measure: compacted cubic yard.

1.4.4 Seeding & Planting (Work Item G-03D)

1.4.4.1 Payment

Payment will be made for costs associated with the complete and satisfactory installation of the seeding and planting schedule(s) as specified and as shown on the Drawings. The Contracting Officer will determine satisfactory installation.

1.4.4.2 Measurement

The total wetland area for which seeding and planting is performed.

1.4.4.3 Unit of Measure

Unit of measure: acre.

1.4.5 Wetland O&M (Work Item G-03D-A)

1.4.5.1 Payment

Payment will be made for costs associated with maintenance and upkeep.

1.4.5.2 Measurement

The measurement for this unit cost Item will be per year of wetland maintenance as required by NJDEP and as dictated by the Contracting Officer.

1.4.5.3 Unit of Measure

Unit of measure: year.

1.4.6 Vegetated Bank Restoration (Work Item G-03E)

1.4.6.1 Payment

Payment will be made for costs associated with furnishing, transporting, stockpiling (if applicable), placing, and constructing the vegetated stream banks as specified and as shown on the Drawings.

1.4.6.2 Measurement

The total quantity for which payment will be made will be the measured as-built stream bank surface covered by vegetated bank restoration, in square yards.

1.4.6.3 Unit of Measure

Unit of measure: square yard.

1.4.7 Armored Bank Restoration (Work Item G-03F)

1.4.7.1 Payment

Payment will be made for costs associated with furnishing, transporting, stockpiling (if applicable), placing, and constructing the armored stream banks as specified and as shown on the Drawings.

1.4.7.2 Measurement

The total quantity for which payment will be made will be the measured as-built stream bank surface covered by armored bank restoration, in square yards.

1.4.7.3 Unit of Measure

Unit of measure: square yard.

1.4.8 Final Restoration Survey (Work Item G-03G)

1.4.8.1 Payment

Payment will be made for costs associated with the Final Restoration Survey as specified.

1.4.8.2 Unit of Measure

Unit of measure: lump sum.

1.5 PHASE 1 REMEDIATION EXCAVATION - TRANSPORTATION AND DISPOSAL (WORK ITEMS G-04)

The payment for each of the following items will be made for the analytical sampling (as necessary to facilitate off-site disposal), transportation, and off-site disposal as appropriate and as specified.

The total quantity for which payment will be made will be based on the actual number of tons of material disposed off-site. Payment will not be made until Contractor submits all weight tickets and required documentation indicating the actual tonnage of material disposed off-site. Payment will be made upon receipt of the certificate of disposal by the Contracting Officer.

Unit of measure: ton (2,000 pounds).

1.5.1 TSCA, RCRA Material (Work Item G-04A)

The total quantity of TSCA-regulated, RCRA-hazardous material for which payment will be made will be based on the actual tonnage of material

disposed off-site as material containing PCBs greater than or equal to 50 ppm and exhibiting RCRA-Hazardous characteristics.

1.5.2 Non-TSCA, RCRA Material (Work Item G-04B)

The total quantity of non-TSCA-regulated, RCRA-hazardous material for which payment will be made will be based on the actual tonnage of material disposed off-site as material containing PCBs<50 ppm and exhibiting RCRA-Hazardous characteristics.

1.5.3 Non-TSCA, RCRA, Other Material (Work Item G-04C)

The total quantity of non-TSCA-regulated, RCRA-hazardous material for which payment will be made will be based on the actual tonnage of material disposed off-site as material containing PCBs<1 ppm and exhibiting RCRA-Hazardous characteristics.

1.5.4 TSCA, Non-RCRA Material (Work Item G-04D)

The total quantity of TSCA-regulated, non-RCRA-hazardous material for which payment will be made will be based on the actual tonnage of material disposed off-site as non-RCRA-hazardous material containing PCBs greater than or equal to 50 ppm.

1.5.5 Non-TSCA, Non-RCRA Material (Work Item G-04E)

The total quantity of non-TSCA-regulated, non-RCRA-hazardous material for which payment will be made will be based on the actual tonnage of material disposed off-site as non-RCRA-hazardous material containing PCBs<50 ppm.

1.5.6 Non-TSCA, Non-RCRA, Other Material (Work Item G-04F)

The total quantity of non-TSCA-regulated, non-RCRA-hazardous material for which payment will be made will be based on the actual tonnage of material disposed off-site as non-RCRA-hazardous material containing PCBs<1 ppm.

1.6 PHASE 2 WATER LINE INSTALLATION

1.6.1 Work Plans (Work Item W-01)

1.6.1.1 Payment

Payment will be made for costs associated with the preparation and submission of the work plans or work plan amendments as specified for the water line work. This will include any modifications required for final approval as requested in writing by the Contracting Officer following review of the DRAFT deliverables.

1.6.1.2 Unit of Measure

Unit of measure: lump sum.

1.6.2 General Conditions (Work Item W-02)

1.6.2.1 Payment

Payment will be made for costs associated with all of the items required under these Contract Documents but not covered under other work items, including but not limited to the following: the Contractor's cost for

insurance, fees, permits, and other similar expenses directly related to and required by these Contract Documents; costs associated with compliance with specified regulatory requirements; project-dedicated supervisory staff, field personnel and equipment; home office support and administrative expenses; preconstruction documentation; coordination with NJAW, municipalities, subcontractors, and disposal facilities, as necessary; site health and safety; surveying; and any submittals not included under the Item for Work Plans.

1.6.2.2 Unit of Measure

Unit of measure: lump sum.

1.6.3 Mobilization & Demobilization (Work Item W-03)

1.6.3.1 Payment

Payment will be made for labor, equipment, materials and incidental costs associated with: relocating all personnel, equipment, trailers, storage facilities to and from the site; cleaning the site at the completion of construction; construction project close out documentation related to the installation of water lines; record drawings for the clean corridor, 8-inch and 36-inch water lines; and other reporting and documentation required in Contract Documents.

1.6.3.2 Unit of Measure

Unit of measure: lump sum.

1.6.4 Temporary Facilities and Controls (Work Item W-04)

1.6.4.1 Payment

Payment will be made for labor, equipment, materials and incidental costs associated with: furnishing and installing support trailer(s)and storage container(s) for equipment, chemicals and other supplies; furnishing and installing temporary controls; frac tanks for storm water management in clean corridor area; soil stockpile management; dust management; periodic pavement sweeping on- and off-site; set up and maintenance of temporary bypass lines during installation and connection of both the 8-inch and 36-inch water lines including wet tapping of the existing lines as required; linestops for the 36-inch water line; temporary water lines during construction; traffic controls and worker protection systems for work within the public right of way including warning lights; lighting systems for nighttime work (if required); concrete barriers for worker protection; fencing for pedestrian control; signs; and flaggers and police support.

1.6.4.2 Unit of Measure

Unit of measure: lump sum.

1.6.5 Clean Corridor Soil Removal and Backfill (Work Item W-05)

1.6.5.1 Payment

Payment will be made for labor, equipment, materials and incidental costs associated with: in-situ characterization and delineation of soil within the clean corridor; marking the corridor on the ground surface; saw cutting

pavement along perimeter of corridor; removal of asphalt pavement; characterizing the removed pavement for off-site disposal; transport to and disposal of the asphalt at a Government permitted and approved facility; excavating soil within the limits of the clean corridor as shown on the Contract Drawings; installing any shoring or other trench support systems as necessary; removal and segregation of debris encountered in excavated soil; stockpiling of soil and debris in locations designated in the planning documents; management of all stockpiles in accordance with Contract Documents; protection of existing water line during excavation; backfilling and compacting within corridor with clean backfill including backfill and compaction required within the water line trench.

Excavation costs shall be based on soil and rippable bedrock excavation for the entire depth of the excavation. The incremental cost for bedrock excavation is covered in Paragraph 1.6.17.

1.6.5.2 Measurement

The total quantity of excavated material for which payment will be made will be the actual quantity between the ground surface and top of competent bedrock based on the layout as shown on the Contract Drawings and determined in the field by the respective surveys. Unless identified on the Contract Drawings or otherwise authorized, no allowance will be made for overdepth excavation or for the removal of any material outside the required slope lines.

1.6.5.3 Unit of Measure

Unit of measure: cubic yard.

1.6.6 OU2 Asphalt Cap Restoration (Work Item W-06)

1.6.6.1 Payment

Payment will be made for labor, equipment, materials and incidental costs associated with: labor, equipment, materials and incidentals required to reestablish the asphalt cap across the former CDE facility property within the limits of the clean corridor, including but not limited to, testing and final compaction of top layer of structural fill materials; placement and compaction of crushed stone layer; placement of base and surface courses of asphalt; removal of asphalt berm installed for stormwater control and repair of any damage to the asphalt cap; repairs to asphalt cap related to other water line construction activities.

1.6.6.2 Measurement

The total quantity of asphalt cap restoration for which payment will be made will be the actual disturbed area measured in the field by survey.

1.6.6.3 Unit of Measure

Unit of measure: square foot.

1.6.7 36-Inch Water Line Installation: Sta. 0+00 to Sta. 0+81 (Work Item W-07)

1.6.7.1 Payment

Payment will be made for labor, equipment, materials and incidental costs

associated with: subgrade preparation; installation of 36-inch pipeline located within the limits of the former CDE facility property; all fittings and associated appurtenances for the 36-inch water line; pressure testing of all lines and connections; placement of pipe bedding and select or clean granular fill. Additional potholing or test pits at Contractor's discretion within this pipeline segment shall be considered incidental to this cost item.

Excavation costs shall be based on soil and rippable bedrock excavation for the entire depth of the excavation. The incremental cost for bedrock excavation is covered in Paragraph 1.6.17.

1.6.7.2 Measurement

The total quantity of the 36-inch water line installed for which payment will be made will be the actual distance measured in the field.

1.6.7.3 Unit of Measure

Unit of measure: linear foot.

1.6.8 36-Inch Water Line Installation: Sta. 0+81 to Sta. 14+58 (Work Item W-08)

1.6.8.1 Payment

Payment will be made for labor, equipment, materials and incidental costs associated with: marking the corridor on the ground surface; saw cutting pavement along perimeter of corridor; removing and characterizing the removed pavement for off-site disposal; transport to and disposal of the asphalt at a Government permitted and approved facility; excavation of soil to the specified limits; installing any shoring or other trench support systems as necessary; removal and segregation of debris and cobbles encountered in excavated soil; stockpiling of soil and debris in locations designated in the planning documents; management of all stockpiles in accordance with Contract Documents; removal and disposal of existing 8-inch water line; subgrade preparation; installation of pipe restraint components; installation of 36-inch water line; all fittings and associated appurtenances for the 36-inch water line; pressure testing of all lines and connections; backfilling and compacting within trench limits with pipe bedding, select granular fill and excavated soil. Material removed during trench excavation shall be reused as backfill as feasible, in accordance with the Contract Documents. Additional potholing or test pits at Contractor's discretion within this pipeline segment shall be considered incidental to this cost item.

Excavation costs shall be based on soil and rippable bedrock excavation for the entire depth of the excavation. The incremental cost for bedrock excavation is covered in paragraph 1.6.17.

1.6.8.2 Measurement

The total quantity of the 36-inch water line installed for which payment will be made will be the actual distance measured in the field.

1.6.8.3 Unit of Measure

Unit of measure: linear foot.

1.6.9 36-Inch Water Line Installation: Sta. 14+58 to Sta. 25+06 (Work Item W-09)

1.6.9.1 Payment

Payment will be made for labor, equipment, materials and incidental costs associated with: excavation of soil below the Phase 1 remedial cut line to the specified excavation limits; installing any shoring or other trench support systems as necessary; removal and segregation of debris and cobbles encountered in excavated soil; stockpiling of soil and debris in locations designated in the planning documents; management of all stockpiles in accordance with Contract Documents; subgrade preparation; installation of pipe restraint components; installation of 36-inch water line in this portion of the site; all fittings and associated appurtenances for the 36-inch water line; air-vacuum release valve assembly; marking posts; pressure testing of all lines and connections; backfilling and compacting within trench limits with pipe bedding, select fill, and clean fill to the Phase 1 remedial cut line. Additional potholing or test pits at Contractor's discretion within this pipeline segment shall be considered incidental to this cost item.

Excavation costs shall be based on soil and rippable bedrock excavation for the entire depth of the excavation. The incremental cost for bedrock excavation is covered in paragraph 1.6.17

1.6.9.2 Measurement

The total quantity of the 36-inch water line installed for which payment will be made will be the actual distance measured in the field.

1.6.9.3 Unit of Measure

Unit of measure: linear foot.

1.6.10 Preparation for Service of 36-Inch Water Line (Work Item W-10)

1.6.10.1 Payment

Payment will be made for labor, equipment, materials and incidental costs associated with: clean, disinfect,and activation of the new 36-inch water line; management of water used in cleaning and disinfecting the 36-inch water line. Contractor shall be responsible for supplying and paying for water used for cleaning and disinfecting purposes.

1.6.10.2 Unit of Measure

Unit of measure: lump sum.

1.6.11 Water Line Connections: Tie-In #1 and Tie-In #2 (Work Item W-11)

1.6.11.1 Payment

Payment will be made for labor, equipment, materials and incidental costs associated with: excavating two test pits (one at each of the connection points of the 36-inch water line) to assess the condition of the existing 36-inch water line at tie-in locations; excavating and managing soil within the limits of Tie-In #1 and #2 as shown on the Contract Drawings to the specified limits; installing any shoring or other trench support systems as necessary; subgrade preparation; construction of cast-in-place thrust

blocks; installation of hot taps and linestops; installation of tie-in structures; installation of butterfly valves for the 36-inch water line at each connection point; removal and segregation of debris encountered in excavated soil; stockpiling of soil and debris in locations designated in the planning documents; management of all stockpiles in accordance with Contract Documents; backfilling and compacting excavation with suitable soil; restoration of any erosion control systems disturbed during construction.

1.6.11.2 Measurement

The number of locations where the existing 36-inch water line connects to the new 36-inch water line.

1.6.11.3 Unit of Measure

Unit of measure: each.

1.6.12 8-Inch Water Line Relocation (Work Item W-12)

1.6.12.1 Payment

Payment will be made for labor, equipment, materials and incidental costs associated with: saw cutting pavement along alignment; removing and characterizing the removed pavement for off-site disposal; transport to and disposal of the asphalt at a Government permitted and approved facility; excavation of soil to the specified limits; installing any shoring or other trench support systems as necessary; removal and segregation of debris encountered in excavated soil; stockpiling of soil and debris in locations designated in the planning documents; management of all stockpiles in accordance with Contract Documents; subgrade preparation; installation of pipe restraint components (thrust blocks and/or mechanical restraints); installation of 8-inch water line; installation of new fire hydrant; all valves and associated appurtenances for the 8-inch water line; potholing or test pits at points of connection to the existing 8-inch water line and utility crossings; abandonment of existing residential service lines and installation of new connections as necessary; pressure testing of all lines and connections; connection to existing 8-inch water line as indicated on the Contract Drawings; backfilling and compacting within trench limits with pipe bedding and excavated soil; cleaning, disinfection and activation of the new 8-inch water line. Material removed during trench excavation shall be reused as backfill as feasible, in accordance with the Contract Documents.

Excavation costs shall be based on soil and rippable bedrock excavation for the entire depth of the excavation. The incremental cost for bedrock excavation is covered in paragraph 1.6.17.

1.6.12.2 Unit of Measure

Unit of measure: lump sum.

1.6.13 Pavement and Surface Restoration (New Market Ave. Extension and Spicer Ave.)(Work Item W-13)

1.6.13.1 Payment

Payment will be made for labor, equipment, materials and incidental costs associated with: restoration pavement in public roadways disturbed by

construction activities associated with both the 8-inch and 36-inch water lines including testing, compaction, and placement of crushed stone layer and base and surface courses of asphalt; installation of temporary pavement; grinding and installation of 2" overlay; restoration of curbs, sidewalks, and driveways disturbed through construction to their preconstruction condition; restoration of all vegetation and plantings disturbed through construction on public and private properties, excluding that in the Phase 1 remediation work area (Sta. 14+58 to Sta. 25+06); restoration of all pavement markings in the public right of way disturbed by construction activities. Revegetation in the Phase 1 remediation area is covered under a separate CLIN.

1.6.13.2 Unit of Measure

Unit of measure: lump sum.

1.6.14 Existing Water Line Abandonment (Work Item W-14)

1.6.14.1 Payment

Payment will be made for labor, equipment, materials and incidental costs associated with: providing access to the water line at four or more intermediate locations by saw cutting pavement along perimeter of each access point; removing and containerizing asphalt pavement removed; characterizing the removed pavement for disposal; transport to and disposal of the asphalt at a Government permitted and approved facility; excavating soil as required to access the existing water line to be abandoned; installing any shoring or other trench support systems as necessary; pipe cutting; injecting controlled density fill (grout) into the existing 36-inch water line to fill the pipe to its full volume; removal and segregation of debris encountered in excavated soil; stockpiling of soil and debris in locations designated in the planning documents; management of all stockpiles in accordance with Contract Documents; backfilling and compacting within excavated areas with clean backfill; testing and final compaction of top layer of structural fill materials; placement and compaction of crushed stone layer; placement of base and surface courses of asphalt; restoring the asphalt cap related to construction activities; establishing any required environmental controls; and decontamination of all equipment exposed to contaminated soil.

1.6.14.2 Unit of Measure

Unit of measure: lump sum.

1.6.15 Cost For Off-Site Disposal Of Soil And Debris As Non-Hazardous/Non-TSCA Waste (Work Item W-15)

1.6.15.1 Payment

Payment will be made for labor, equipment, materials and incidental costs associated with: characterization, removal, transportation and disposal of excess non-hazardous soil/non-TSCA soil, rock, and debris off-site at a Government permitted and approved facility in accordance with Section 02 81 00.99 HANDLING, TRANSPORT AND DISPOSAL OF WASTE MATERIALS. Cost is for bidding purposes only; actual disposal requirements will be based on waste characterization results.

1.6.15.2 Measurement

The total quantity of excess non-hazardous/non-TSCA material that is transported and disposed off-site for which payment will be made will be the actual tonnage disposed off-site. Payment will not be made until Contractor submits all weight tickets and required documentation indicating the actual tonnage of material disposed off-site. Payment will be made upon receipt of the certificate of disposal by the Contracting Officer.

1.6.15.3 Unit of Measure

Unit of measure: ton.

1.6.16 Incremental Cost for Off-site Disposal of Soil and Debris as Hazardous and/or TSCA Waste (Work Item W-16)

1.6.16.1 Payment

Payment will be made for incremental labor, equipment, materials and incidental costs associated with: characterization, removal, transportation and disposal of contaminated soil and debris off-site at a Government permitted and approved Subtitle C or TSCA landfill as appropriate based on characterization results. Cost is for bidding purposes only; actual disposal requirements will be based on waste characterization results.

1.6.16.2 Measurement

The total quantity of excess hazardous and/or TSCA material that is transported and disposed off-site for which payment will be made will be the actual tonnage disposed off-site. Payment will not be made until Contractor submits all weight tickets and required documentation indicating the actual tonnage of material disposed off-site. Payment will be made upon receipt of the certificate of disposal by the Contracting Officer.

1.6.16.3 Unit of Measure

Unit of measure: ton.

1.6.17 Incremental Cost for Trenching and Disposal of Bedrock (Work Item W-17)

1.6.17.1 Payment

Payment will be made for incremental labor, equipment, materials and incidental costs associated with: excavation, characterization, and disposal of competent bedrock and boulders that need to be removed for execution of the work. Structural fill to replace any voids left as a result of rock and boulder excavation shall be considered incidental to the excavation costs.

This section covers only competent bedrock that cannot be excavated/ripped using suitably sized standard excavation equipment such as an Excavator Cat 345 or similar equipment. Rippable materials are not considered bedrock for purposes of this specification. During trench excavation, when rock or boulders are encountered (defined as more than 1 cubic yard in volume), the material shall be uncovered and the Contracting Officer notified prior to excavation/removal and the Contracting Officer will prepare cross sections of the rock surface. Weathered rock that is readily removed with soil excavation equipment will not be measured for this pay item. If the

Contractor fails to notify the Contracting Officer in a timely manner to allow ample time for cross sectioning the undisturbed material, the Contractor shall have no right of claim to any classification other than that allowed by the Government. The quantity of rock and boulder excavation to be paid for will be the number of cubic yards of rock or boulders measured in place, as directed by the Government, within the limits herein specified.

The base cost for bidding purposes should be based on all excavation material being soil or rippable bedrock. This pay item represents the incremental cost for bedrock removal, over and above the cost for the excavation of soil or rippable bedrock.

Bedrock is assumed to be a contaminated but non-hazardous/non-TSCA waste for bidding purposes.

1.6.17.2 Measurement

The total quantity of bedrock removed and disposed off-site for which payment will be made will be the volume measured in the field by the Contracting Officer. Payment will not be made until Contractor submits all weight tickets and required documentation indicating the actual tonnage of material disposed off-site. Payment will be made upon receipt of the certificate of disposal by the Contracting Officer.

1.6.17.3 Unit of Measure

Unit of measure: ton.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 CONTRACT COST BREAKDOWN

The Contractor must furnish within 30 days after the date of Notice to Proceed, and prior to the submission of its first partial payment estimate, a breakdown of its single job pay item or items which will be reviewed by the Contracting Officer as to propriety of distribution of the total cost to the various accounts. Any unbalanced items as between early and late payment items or other discrepancies will be revised by the Contracting Officer to agree with a reasonable cost of the work included in the various items. This contract cost breakdown will then be utilized as the basis for progress payments to the Contractor.

-- End of Section --

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SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS
08/15

PART 1 GENERAL

The Contractor shall provide all services required to ensure site safety, site security, site communication, project management, recordkeeping, and individual additional task performance. These services shall include the provision of qualified personnel, to be accepted by the Government, and all equipment necessary to perform such tasks.

1.1 REFERENCES

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

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

View Location Map; G

Progress and Completion Pictures; G

Project Organizational Chart

1.3 VIEW LOCATION MAP

Submit, prior to or with the first digital photograph submittals, a sketch or drawing indicating the required photographic locations. Update as required if the locations are moved.

1.4 PROGRESS AND COMPLETION PICTURES

Photographically document site conditions prior to start of construction operations showing the sequence and progress of work as described herein. Take a minimum of 20 digital photographs each week throughout the entire project from a minimum of ten views from points located by the Contracting Officer. Submit with the monthly invoice two sets of digital photographs, each set on a separate compact disc (CD) or data versatile disc (DVD), cumulative of all photos to date. Indicate photographs demonstrating environmental procedures. Provide photographs for each month in a separate monthly directory and name each file to indicate its location on the view location sketch. Also provide the view location sketch on the CD or DVD as

a digital file. Include a date designator in file names. Cross reference submittals in the appropriate daily report. Photographs provided are for unrestricted use by the Government.

1.5 MINIMUM INSURANCE REQUIREMENTS

Provide the minimum insurance coverage required by FAR 28.307-2 LIABILITY, during the entire period of performance under this contract. Employer's liability coverage of $100,000, except in States where workers compensation may not be written by private carriers. Provide other insurance coverage as required by State law.

1.6 SUPERVISION

The Contractor shall provide a project management team including a Project Manager and administrative personnel qualified and capable to manage the project, including supervising construction, expediting labor relations, staffing, and recordkeeping. The Contractor shall submit a detailed Project Organizational Chart showing the individuals directly involved in the project.

1.6.1 Minimum Communication Requirements

Have at least one qualified superintendent, or competent alternate, capable of reading, writing, and conversing fluently in the English language, on the job-site at all times during the performance of contract work. In addition, if a Quality Control (QC) representative is required on the contract, then that individual must also have fluent English communication skills.

1.6.2 Superintendent Qualifications

The project superintendent must have a minimum of 10 years experience in construction with at least 5 of those years as a superintendent on projects similar in size and complexity. The individual must be familiar with the requirements of EM 385-1-1 and have experience in the areas of hazard identification and safety compliance. The individual must be capable of interpreting a critical path schedule and construction drawings. The qualification requirements for the alternate superintendent are the same as for the project superintendent. The Contracting Officer may request proof of the superintendent's qualifications at any point in the project if the performance of the superintendent is in question.

1.6.3 Project Manager

Assign a Project Manager with the responsibility for the overall management of the project. The Contracting Officer may request proof of the Project Manager's qualifications at any point in the project if the performance of the Project Manager is in question.

1.6.3.1 Project Manager Qualifications

The Project Manager must have a minimum 10 years experience as a Project Manager or Superintendent on projects of similar size and complexity.

The Project Manager shall have overall responsibility for conducting the work and for ensuring that the work is conducted in accordance with the requirements of the Contract Documents. The Project Manager shall be responsible for communication with the Government and shall officially

represent the Contractor in all project-related activities. The Project Manager shall have the authority to sign payments and change orders. The Contractor shall provide the name and experience of the Project Manager.

1.6.4 Contractor Quality Control (CQC) Manager

A dedicated Contractor Quality Control (CQC) Manager is required to prepare and maintain CQC Plan as established in Section 01 45 00.00 10 QUALITY CONTROL. The superintendent is not permitted to also serve as the CQC Manager.

1.6.5 Non-Compliance Actions

The Project Superintendent and CQC Manager is subject to removal by the Contracting Officer for non-compliance with requirements specified in the contract and for failure to manage the project to insure timely completion. Furthermore, 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 is acceptable as the subject of claim for extension of time for excess costs or damages by the Contractor.

1.7 PRECONSTRUCTION CONFERENCE

After award of the contract but prior to commencement of any work at the site, the Contractor may be required to meet with the Contracting Officer, Borough of South Plainfield engineers, and stakeholders with permission from the Government, and, in the presence of the Environmental Protection Agency (EPA), to discuss the planned construction approach. to discuss and develop a mutual understanding relative to the administration of the value engineering and safety program, preparation of the schedule of prices or earned value report, shop drawings, and other submittals, scheduling programming, prosecution of the work, and clear expectations of the "Interim DD Form 1354" Submittal. Major subcontractors who will engage in the work must also attend.

1.8 ELECTRONIC MAIL (E-MAIL) ADDRESS

Establish and maintain electronic mail (e-mail) capability along with the capability to open various electronic attachments as text files, pdf files, and other similar formats. Within 10 days after contract award, provide the Contracting Officer a single (only one) e-mail address for electronic communications from the Contracting Officer related to this contract including, but not limited to contract documents, invoice information, request for proposals, and other correspondence. The Contracting Officer may also use e-mail to notify the Contractor of site conditions when emergency conditions warrant, such as hurricanes or terrorist threats. Multiple e-mail addresses are not allowed.

It is the Contractor's responsibility to make timely distribution of all Contracting Officer initiated e-mail with its own organization including field office(s). Promptly notify the Contracting Officer, in writing, of any changes to this e-mail address.

1.9 OU-2 AREA ASPHALT CAP

During staging operations in the OU-2 Area, protect the integrity of the existing asphalt paving which serves as an infiltration barrier for contaminated soils present at the Site.

Following the completion of construction, damage to the cap will be repaired. This will include all gouges, scrapes, depressions, or other damage that would impact the effectiveness of the barrier or result in ponding of water on the surface of the cap.

1.10 UTILITY NOTIFICATION AND COORDINATION

Coordinate the Work with the various utilities within Project limits. Notify applicable utilities prior to commencing Work, if damage occurs, or if conflicts or emergencies arise during the Work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXAMINATION

a. Contractor and Contracting Officer shall make a thorough examination of pre-existing conditions of the work area, including all structures; road, curb, and sidewalks; utility lines and access points including utility manholes, valves, fire hydrants,and stormwater inlets; fencing and landscaping; monitoring wells; benchmarks (both related to the project and others); and all other improvements in vicinity of Work which could be damaged by construction operations including truck traffic. The examination shall attempt to include information from affected property owner, Borough of South Plainfield, and utility owners.

b. Periodic reexamination shall be jointly performed to include, but not be limited to, cracks in structures, fencing, roadways, sidewalks and curbs; settlement and damage to asphalt cap; leakage, and similar conditions.

c. Record and submit documentation of observations made on examination inspections in accordance with Subpart 3.3 Project Documentation.

d. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of Contractor's operations, and is for the protection of adjacent property owners, Contractor, and Government.

3.2 CUTTING, FITTING, AND PATCHING OF EXISTING WORK

Cut, fit, adjust, or patch Work and work of others, including excavation, backfilling, and paving as required, to make Work complete.

Obtain prior written authorization of Contracting Officer before commencing Work to cut or otherwise alter existing structures including but not limited to:

a. Structural members, grounding grids, or buried utilities.

b. Weather-resistant or moisture-resistant elements, including asphalt cap.

c. Efficiency, maintenance, or safety of element.

d. Work of others.

Refinish surfaces to provide an even finish.

Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and fill voids.

Remove specimens of installed work for testing when requested by Government.

3.3 PROJECT DOCUMENTATION

The Contractor shall provide a data retrieval recordkeeping system approved by the Government, which will make available in a timely manner records of all site activity, quantities of materials delivered to the Site, quantities of materials utilized, quantities of materials excavated, quantities of treated water discharged, quantities of waste produced, laboratory results, waste transportation information, and all other information required to support requests for payment.

3.3.1 Pre- and Post-Construction Documentation

The Contractor shall furnish all labor, materials and equipment required to provide color, high-quality video/audio of the project site recording the site features prior to the commencement of work and after the work has been completed, and any important site features during construction. Under no circumstances shall construction begin until the Government has received and accepted the pre-construction video recording. This recording will be used for reference during restoration, and as a record of pre-existing conditions should disputes or litigation arise. The Government reserves the right to reject the recording because of poor quality, unintelligible audio or uncontrolled pan or zoom. Any recording rejected by the Government shall be re-recorded at no cost to the Government. Progress photographs shall illustrate condition and location of work and the state of progress. The Contractor shall submit compact discs containing electronic files of digital photographs a minimum of once weekly during photographic sessions.

Pre- and post-construction video and photo documentation of site conditions and any associated areas such as haul roads. Coverage shall include, but not be limited to, all existing roadways, structures, aboveground utilities, landscaping, trees, signage, fencing, and other physical features located within the construction limits and any other adjacent properties.

3.3.1.1 Video

Video coverage shall extend a minimum of 500 feet in each direction from the site entrance. In addition, the video will cover the entire water line route in the public right of way, curb to curb showing the condition of sidewalks and curbs. The coverage may be expanded based on discussions with the Government team.

3.3.1.2 Pre-Construction Photographs

Before work begins, the Contractor shall take digital photographs depicting existing site conditions. Coverage shall include, but not be limited to, property boundary lines, entire water line route in public right of way,

all existing roadways and haul roads, aboveground utilities, structures, landscaping, trees, signage and other physical features located within the zone of influence of the construction. The coverage may be expanded if directed by the Government.

3.3.1.3 Electronic Files for Digital Photographs

At a minimum, the Contractor shall download digital photographs from the digital camera to a personal computer daily during photographic sessions for transfer to an electronic file format. The electronic file shall be in JPEG format, with minimum compression applied.

The Contractor shall rename each downloaded electronic file at the time of download with a distinct filename following the format defined below:

yyyy-mm-dd_hhnn_xxx

a. "yyyy" is the year the photograph was taken
b. "mm" is the month the photograph was taken
c. "dd" is the day the photograph was taken
d. "hh" is the hour the photograph was taken using military time
e. "nn" is the minute the photograph was taken using military time
f. "xxx" is a three-digit sequential number, starting with 001, for each photograph taken during a given time period

An example of the above filename format is 2017-07-15_1845_002. This example photograph filename would have been applied to the second photo taken at 6:45 p.m. on July 15, 2017.

The Contractor shall copy the electronic files to a compact disc after renaming each file as described in the paragraph above. The compact disc shall be "CD-R" format. All digital photographs/videos and related electronic files are U. S. Government property and shall not be released by the Contractor to the public or news media.

-- End of Section --

SECTION 01 31 19

PROJECT MEETINGS
09/17

PART 1 GENERAL

1.1 GENERAL

This section describes the minimum requirements for conducting Project Progress Meetings during execution of the construction work.

1.1.1 Pre-Construction Conference

A Pre-Construction Conference will be held to discuss the contract and project schedules including: submittals, health and safety, payrolls, labor relations, environmental protection, work plan and schedules, schedule of values, payment procedures, and procurement of materials as well as the principal features of Work.

A. At least 7 days prior to the Preconstruction Conference, Contractor shall provide the following information in accordance with the General Conditions:

1. Preconstruction Meeting Agenda
2. Project Schedule
3. Schedule of Submittals
4. Schedule of Values

B. Preconstruction Conference will be held prior to the start of any work at the Site at a time to be arranged. The Contractor is responsible for setting up the meeting, attending, and preparing minutes of the meeting for distribution to all attendees. At a minimum, the Contractor shall be prepared to discuss the following subjects:

1. Status of Bonds and insurance.
2. Required schedule elements.
3. Sequencing of critical path work items.
4. Progress payment procedures.
5. Project changes and clarification procedures
6. Use of Site, access, office and storage areas, security and temporary facilities.
7. Major product delivery and priorities.
8. Contractor's safety plan and representative.

C. Attendees shall include:

1. Government's representatives.
2. Contractor's project manager.
3. Contractor's office representative.
4. Contractor's resident superintendent.
5. Contractor's quality control representative.
6. Contractor's health and safety officer.
7. Water line Subcontractor Project Manager, Superintendent, and others as appropriate.
8. Other subcontractors' representatives whom Contractor may desire or Government may request to attend.
9. Testing and inspection agencies, as appropriate.

10. New Jersey American Water Representative.
11. Others as appropriate.

C. Contractor shall bring copies of the following to the conference in a sufficient number of copies for all attendees.

1. Preliminary Progress Schedule.
2. Preliminary Schedule of Submittals.
3. Preliminary Schedule of Values.
4. List of emergency contacts information for Project Manager, Superintendent, Foreman, Health and Safety Officer including office, field, cellular and home phone numbers. This information shall be posted in the field offices and updated as necessary.

1.1.2 Preliminary Schedules Review Meeting

A Preliminary Schedules Review Meeting will be held to discuss the preliminary schedule for Work.

1.1.3 Progress Meetings

Progress meetings will be held regularly throughout the project at a time and date agreed to.

The Contractor shall schedule and administer Project Progress Meetings at a minimum of one per week and such additional meetings as required. Meetings shall be scheduled when requested by either the Contracting Officer or the Contractor during any stage of this project when it is deemed necessary to raise any significant questions, establish new guidelines, introduce a new aspect to the project, or any other items that will affect the progress of work. The Contractor shall attend these meetings with all necessary personnel as determined by the Contracting Officer for the duration of this contract.

Meetings and conferences shall take place at the project site or some other location that is satisfactory to both the Government and the Contractor

The Contractor shall administer the following general requirements for the Progress Meetings:

1. Prepare and distribute the agenda and related attachments for meetings.
2. Make physical arrangements for meetings.
3. Preside at meetings.
4. Record the minutes, including a detailed description of proceedings and decisions.

The Contractor shall be responsible for recording the minutes of all Progress Meetings and including any significant proceedings and decisions. The Contractor shall reproduce and submit to the Government an electronic copy of the minutes of the meeting within 2 business days. After the Government's review and approval, the Contractor shall distribute copies to each participant in the meeting and to parties affected by decisions made at the meeting.

At a minimum the following information shall be addressed at progress meetings:

1. Review and approval of the minutes of the previous meeting
2. Review of health and safety issues

3. Review of work progress
4. Permit/permit equivalency activities
5. Field observations, problems, and conflicts
6. Review and revision of the project schedule, including:

    a. Review of problems and proposed changes for their effect on construction, completion date, and other contracts of the project, and corrective actions proposed to regain the projected schedule
    b. Review of offsite delivery schedules
    c. Coordination of schedules, including review and expedition, as required, of submittal schedules
    d. Planned progress during the succeeding work period based on the current project schedule
    e. Milestone dates
    f. Estimate percent complete versus accepted schedule planned percent complete

7. Review of transmittals submitted to USACE, submittals returned from USACE, transmittals pending re-submittal, and Requests for Information (RFIs)
8. Review of quality control, including all completed inspections (Preparatory Phase, Initial Phase, Follow-Up Phase, Pre-Final, and Final), scheduled inspections, and the deficiency tracking system
9. Pending and proposed changes and substitutions
10. Progress payment
11. Remedial Action Report development
12. Community relations issues
13. Review of old business
14. Review of new business

1.1.4 Other Meetings

Other meetings may be held as required for the progress of the Work and in accordance with the Specification sections and as may be required by Contracting Officer. These may include, but are not limited to:

1. Quality Control Meetings
2. Startup Meetings
3. Construction and Demolition Waste Management Meeting(s)
4. Coordination Meeting(s)
5. Other meetings, as detailed in individual Specification sections

1.1.5 Attendance

The following persons shall attend the Progress Meetings:

1. Contracting Officer or its representative
2. Contractor's Site Superintendent
3. Contractor's Project Manager
4. Contractor's Quality Control Manager and/or Key Quality Control Staff
5. Contractor's Safety and Health Manager and/or Safety and Health Officer
6. Water line Subcontractor as appropriate to the agenda
7. New Jersey American Water representatives as appropriate to the agenda
8. Subcontractors as appropriate to the agenda
9. Suppliers as appropriate to the agenda
10. Others as requested by the Contracting Officer or as appropriate to the agenda

1.1.6 Contractor Responsibilities

Contractor shall schedule physical arrangements for meetings throughout progress of the Work, prepare meeting agenda with regular participant input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute copies of minutes. Contractor shall provide 1 conference telephone with extension and intercom connection for meetings.

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Preconstruction Meeting Agenda

Project Schedule; G

Schedule Of Submittals; G

Schedule Of Values; G

1.3 QUALITY CONTROL MEETINGS

A. Quality Control Meetings will be held in accordance with Section 01 45 00.00 10, QUALITY CONTROL.

B. Attendees shall include the following:

1. Contractor's Project Manager, Superintendent.
2. Contractor's designated quality control representative.
3. Subcontractors and Suppliers, as necessary.
4. Government's representatives.
5. Others as requested.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 32 01.00 10

PROJECT SCHEDULE
02/15

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 within the text by the basic designation only.

AACE INTERNATIONAL (AACE)

AACE 29R-03	(2011) Forensic Schedule Analysis
AACE 52R-06	(2006) Time Impact Analysis - As Applied in Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1-1-11	(1995) Administration -- Progress, Schedules, and Network Analysis Systems

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Project Scheduler Qualifications; G

Preliminary Project Schedule; G

Initial Project Schedule; G

Periodic Schedule Update; G

1.3 PROJECT SCHEDULER QUALIFICATIONS

Designate an authorized representative to be responsible for the preparation of the schedule and all required updating and production of reports. The authorized representative must have a minimum of 2-years experience scheduling construction projects similar in size and nature to this project with scheduling software that meets the requirements of this specification. Representative must have a comprehensive knowledge of CPM scheduling principles and application.

PART 2 PRODUCTS

2.1 SOFTWARE

The scheduling software utilized to produce and update the schedules required herein must be capable of meeting all requirements of this specification.

2.1.1 Government Default Software

The Government intends to use Primavera P6.

2.1.2 Contractor Software

Scheduling software used by the contractor must be commercially available from the software vendor for purchase with vendor software support agreements available. The software routine used to create the required sdef file must be created and supported by the software manufacturer.

2.1.2.1 Primavera

If Primavera P6 is selected for use, provide the "xer" export file in a version of P6 importable by the Government system.

2.1.2.2 Other Than Primavera

If the contractor chooses software other than Primavera P6, that is compliant with this specification, provide for the Government's use two licenses, two computers, and training for two Government employees in the use of the software. These computers will be stand-alone and not connected to Government network. Computers and licenses will be returned at project completion.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Prepare for approval a Project Schedule, as specified herein, pursuant to FAR Clause 52.236-15, SCHEDULE FOR CONSTRUCTION CONTRACTS. Show in the schedule the proposed sequence to perform the work and dates contemplated for starting and completing all schedule activities. The scheduling of the entire project is required. The scheduling of construction is the responsibility of the Contractor. Contractor management personnel must actively participate in its development. Subcontractors and suppliers working on the project must also contribute in developing and maintaining an accurate Project Schedule. Provide a schedule that is a forward planning as well as a project monitoring tool. Use the Critical Path Method (CPM) of network calculation to generate all Project Schedules. Prepare each Project Schedule using the Precedence Diagram Method (PDM).

3.2 BASIS FOR PAYMENT AND COST LOADING

The schedule is the basis for determining contract earnings during each update period and therefore the amount of each progress payment. The aggregate value of all activities coded to a contract CLIN must equal the value of the CLIN.

3.2.1 Activity Cost Loading

Activity cost loading must be reasonable and without front-end loading. Provide additional documentation to demonstrate reasonableness if requested by the Contracting Officer.

3.2.2 Withholdings / Payment Rejection

Failure to meet the requirements of this specification may result in the disapproval of the preliminary, initial or periodic schedule updates and subsequent rejection of payment requests until compliance is met.

In the event that the Contracting Officer directs schedule revisions and those revisions have not been included in subsequent Project Schedule revisions or updates, the Contracting Officer may withhold 10 percent of pay request amount from each payment period until such revisions to the project schedule have been made.

3.3 PROJECT SCHEDULE DETAILED REQUIREMENTS

3.3.1 Level of Detail Required

Develop the Project Schedule to the appropriate level of detail to address major milestones and to allow for satisfactory project planning and execution. Failure to develop the Project Schedule to an appropriate level of detail will result in its disapproval. The Contracting Officer will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

3.3.2 Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities may have Original Durations (OD) greater than 20 work days or 30 calendar days.

3.3.3 Design and Permit Activities

Include design and permit activities with the necessary conferences and follow-up actions and design package submission dates. Include the design schedule in the project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific contract period. Provide at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. Also include review and correction periods associated with each item.

3.3.4 Procurement Activities

Include activities associated with the critical submittals and their approvals, procurement, fabrication, and delivery of long lead materials, equipment, fabricated assemblies, and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days.

3.3.5 Mandatory Tasks

Include the following activities/tasks in the initial project schedule and all updates.

a. Submission, review and acceptance of SD-01 Preconstruction Submittals (individual activity for each).

b. Submission, review and acceptance of features require design completion

c. Submission of mechanical/electrical/information systems layout drawings.

d. Long procurement activities

e. Submission and approval of as-built drawings.

f. Contractor's pre-final inspection.

g. Correction of punch list from Contractor's pre-final inspection.

h. Government's pre-final inspection.

i. Correction of punch list from Government's pre-final inspection.

j. Final inspection.

k. Other water line systems testing, if required.

3.3.6 Government Activities

Show Government and other agency activities that could impact progress. These activities include, but are not limited to: approvals, environmental permit approvals by State regulators, inspections, utility tie-in, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements.

3.3.7 Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11. This exact structure is mandatory. Develop and assign all Activity Codes to activities as detailed herein. A template SDEF compatible schedule backup file is available on the QCS web site: http://rms.usace.army.mil.

The SDEF format is as follows:

Field	Activity Code	Length	Description
1	WRKP	3	Workers per day
2	RESP	4	Responsible party
3	AREA	4	Area of work
4	MODF	6	Modification Number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of work
7	CATW	1	Category of work

Field	Activity Code	Length	Description
8	FOW	20	Feature of work*
*Some systems require that FEATURE OF WORK values be placed in several activity code fields. The notation shown is for Primavera P6. Refer to the specific software guidelines with respect to the FEATURE OF WORK field requirements.			

3.3.7.1 Workers Per Day (WRKP)

Assign Workers per Day for all field construction or direct work activities, if directed by the Contracting Officer. Workers per day is based on the average number of workers expected each day to perform a task for the duration of that activity.

3.3.7.2 Responsible Party Coding (RESP)

Assign responsibility code for all activities to the Prime Contractor, Subcontractor(s) or Government agency(ies) responsible for performing the activity.

a. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Property/Equipment (GFP) and Notice to Proceed (NTP) for phasing requirements.

b. Activities cannot have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT (for USACE).

3.3.7.3 Area of Work Coding (AREA)

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities cannot have more than one Work Area Code.

Not all activities are required to be Work Area coded. A lack of Work Area coding indicates the activity is not resource or space constrained.

3.3.7.4 Modification Number (MODF)

Assign a Modification Number Code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by Contracting Officer. Key all Code values to the Government's modification numbering system. An activity can have only one Modification Number Code.

3.3.7.5 Bid Item Coding (BIDI)

Assign a Bid Item Code to all activities using the Contract Line Item

Schedule (CLIN) to which the activity belongs, even when an activity is not cost loaded. An activity can have only one BIDI Code.

3.3.7.6 Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities. Examples of phase of work are procurement phase and construction phase. Each activity can have only one Phase of Work code.

a. Code proposed fast track design and construction phases proposed to allow filtering and organizing the schedule by fast track design and construction packages.

b. If the contract specifies phasing with separately defined performance periods, identify a Phase Code to allow filtering and organizing the schedule accordingly.

3.3.7.7 Category of Work Coding (CATW)

Assign a Category of Work Code to all activities. Category of Work Codes include, but are not limited to design, design submittal, design reviews, review conferences, permits, construction submittal, procurement, fabrication, weather sensitive installation, non-weather sensitive installation, start-up, and testing activities. Each activity can have no more than one Category of Work Code.

3.3.7.8 Feature of Work Coding (FOW)

Assign a Feature of Work Code to appropriate activities based on the Definable Feature of Work to which the activity belongs based on the approved QC plan.

Definable Feature of Work is defined in Section 01 45 00.00 10 QUALITY CONTROL. An activity can have only one Feature of Work Code.

3.3.8 Contract Milestones and Constraints

Milestone activities are to be used for significant project events including, but not limited to, project phasing, project start and end activities, or interim completion dates. The use of artificial float constraints such as "zero free float" or "zero total float" are prohibited.

Mandatory constraints that ignore or effect network logic are prohibited. No constrained dates are allowed in the schedule other than those specified herein. Submit additional constraints to the Contracting Officer for approval on a case by case basis.

3.3.8.1 Project Start Date Milestone and Constraint

The first activity in the project schedule must be a start milestone titled "NTP Acknowledged," which must have a "Start On" constraint date equal to the date that the NTP is acknowledged.

3.3.8.2 End Project Finish Milestone and Constraint

The last activity in the schedule must be a finish milestone titled "End Project."

Constrain the project schedule to the Contract Completion Date in such a

way that if the schedule calculates an early finish, then the float calculation for "End Project" milestone reflects positive float on the longest path. If the project schedule calculates a late finish, then the "End Project" milestone float calculation reflects negative float on the longest path. The Government is under no obligation to accelerate Government activities to support a Contractor's early completion.

3.3.8.3 Interim Completion Dates and Constraints

Constrain contractually specified interim completion dates to show negative float when the calculated late finish date of the last activity in that phase is later than the specified interim completion date.

3.3.8.3.1 Start Phase

Use a start milestone as the first activity for a project phase. Call the start milestone "Start Phase X" where "X" refers to the phase of work.

3.3.8.3.2 End Phase

Use a finish milestone as the last activity for a project phase. Call the finish milestone "End Phase X" where "X" refers to the phase of work.

3.3.9 Calendars

Schedule activities on a Calendar to which the activity logically belongs. Develop calendars to accommodate any contract defined work period such as a 7-day calendar for Government Acceptance activities, concrete cure times, etc. Develop the default Calendar to match the physical work plan with non-work periods identified including weekends and holidays. Develop Seasonal Calendar(s) and assign to seasonally affected activities as applicable.

If an activity is weather sensitive it should be assigned to a calendar showing non-work days on a monthly basis, with the non-work days selected at random across the weeks of the calendar, using the anticipated days provided in the contract clause TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER. Assign non-work days over a seven-day week as weather records are compiled on seven-day weeks, which may cause some of the weather related non-work days to fall on weekends.

3.3.10 Open Ended Logic

Only two open ended activities are allowed: the first activity "NTP Acknowledged" may have no predecessor logic, and the last activity -"End Project" may have no successor logic.

Predecessor open ended logic may be allowed in a time impact analyses upon the Contracting Officer's approval.

3.3.11 Default Progress Data Disallowed

Actual Start and Finish dates must not automatically update with default mechanisms included in the scheduling software. Updating of the percent complete and the remaining duration of any activity must be independent functions. Disable program features that calculate one of these parameters from the other. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process must match those dates provided in the Contractor Quality Control Reports. Failure to document the AS and AF

dates in the Daily Quality Control report will result in disapproval of the Contractor's schedule.

3.3.12 Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Contracting Officer. Propose logic corrections to eliminate out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Address out of sequence progress or logic changes in the Narrative Report and in the periodic schedule update meetings.

3.3.13 Added and Deleted Activities

Do not delete activities from the project schedule or add new activities to the schedule without approval from the Contracting Officer. Activity ID and description changes are considered new activities and cannot be changed without Contracting Officer approval.

3.3.14 Original Durations

Activity Original Durations (OD) must be reasonable to perform the work item. OD changes are prohibited unless justification is provided and approved by the Contracting Officer.

3.3.15 Leads, Lags, and Start to Finish Relationships

Lags must be reasonable as determined by the Government and not used in place of realistic original durations, must not be in place to artificially absorb float, or to replace proper schedule logic.

a. Leads (negative lags) are prohibited.

b. Start to Finish (SF) relationships are prohibited.

3.3.16 Retained Logic

Schedule calculations must retain the logic between predecessors and successors ("retained logic" mode) even when the successor activity(s) starts and the predecessor activity(s) has not finished (out-of-sequence progress). Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") are not be allowed.

3.3.17 Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete to allow for proper schedule management.

3.3.18 Remaining Duration

Update the remaining duration for each activity based on the number of estimated work days it will take to complete the activity. Remaining duration may not mathematically correlate with percentage found under paragraph entitled Percent Complete.

3.3.19 Cost Loading of Closeout Activities

Cost load the "Correction of punch list from Government pre-final inspection" activity(ies) not less than 1 percent of the present contract value. Activity(ies) may be declared 100 percent complete upon the Government's verification of completion and correction of all punch list work identified during Government pre-final inspection(s).

3.3.19.1 As-Built Drawings

If there is no separate contract line item (CLIN) for as-built drawings, cost load the "Submission and approval of as-built drawings" activity not less than $35,000 or 1 percent of the present contract value, which ever is greater, up to $200,000. Activity will be declared 100 percent complete upon the Government's approval.

3.3.20 Anticipated Adverse Weather

Provide a description of the event(s) that caused the delay and/or impact to the work. As part of the description, identify all schedule activities impacted. Show that the event that caused the delay/impact was the responsibility of the Government. Provide a time impact analysis that demonstrates the effects of the delay or impact on the project completion date or interim completion date(s). Evaluate multiple impacts chronologically; each with its own justification of delay. With multiple impacts consider any concurrency of delay. A time extension and the schedule fragnet becomes part of the project schedule and all future schedule updates upon approval by the Contracting Officer.

The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule shall reflect these anticipated adverse weather delays in all weather dependent activities for the duration of the project.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY WORK DAYS BASED ON 5-DAY WORK WEEK											
JAN	FEB	MARCH	April	MAY	June	July	AUG	SEPT	OCT	NOV	DEC
7	5	6	2	2	2	2	2	3	2	2	4

3.3.21 Early Completion Schedule and the Right to Finish Early

An Early Completion Schedule is an Initial Project Schedule (IPS) that indicates all scope of the required contract work will be completed before the contractually required completion date.

a. No IPS indicating an Early Completion will be accepted without being fully resource-loaded (including crew sizes and manhours) and the Government agreeing that the schedule is reasonable and achievable.

b. The Government is under no obligation to accelerate work items it is responsible for to ensure that the early completion is met nor is it responsible to modify incremental funding (if applicable) for the project to meet the contractor's accelerated work.

3.4 PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The data CD/DVD, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS. These submissions shall enable the Government to assess the Contractor's progress. If the Contractor fails or refuses to furnish the information and schedule updates as set forth herein, then the Contractor will be deemed not to have provided an estimate upon which a progress payment can be made.

Review comments made by the Government on the schedule(s) do not relieve the Contractor from compliance with requirements of the Contract Documents.

3.4.1 Preliminary Project Schedule Submission

Within 15 calendar days after the NTP is acknowledged submit the Preliminary Project Schedule defining the planned operations detailed for the first 90 calendar days for approval. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. The Preliminary Project Schedule may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required plan and program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, planned submissions of all early design packages, permitting activities, design review conference activities, and other non-construction activities intended to occur within the first 90 calendar days. Government acceptance of the associated design package(s) and all other specified Program and Plan approvals must occur prior to any planned construction activities. Activity code any activities that are summary in nature after the first 90 calendar days with Bid Item (CLIN) code (BIDI), Responsibility Code (RESP) and Feature of Work code (FOW).

3.4.2 Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after notice to proceed is issued. The schedule must demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. No payment will be made for work items not fully detailed in the Project Schedule.

3.4.3 Periodic Schedule Updates

Update the Project Schedule on a regular basis, monthly at a minimum. Provide a draft Periodic Schedule Update for review at the schedule update meetings as prescribed in the paragraph PERIODIC SCHEDULE UPDATE MEETINGS. These updates will enable the Government to assess Contractor's progress.

a. Update information including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD), and Percent Complete is subject to the approval of the Government at the meeting.

b. AS and AF dates must match the date(s) reported on the Contractor's Quality Control Report for an activity start or finish.

3.5 SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

3.5.1 Data CD/DVDs

Provide two sets of data CD/DVDs containing the current project schedule and all previously submitted schedules in the format of the scheduling software (e.g. .xer). Also include on the data CD/DVDs the Narrative Report and all required Schedule Reports. Label each CD/DVD indicating the type of schedule (Preliminary, Initial, Update), full contract number, Data Date and file name. Each schedule must have a unique file name and use project specific settings.

3.5.2 Narrative Report

Provide a Narrative Report with each schedule submission. The Narrative Report is expected to communicate to the Government the thorough analysis of the schedule output and the plans to compensate for any problems, either current or potential, which are revealed through that analysis. Include the following information as minimum in the Narrative Report:

a. Identify and discuss the work scheduled to start in the next update period.

b. A description of activities along the two most critical paths where the total float is less than or equal to 20 work days.

c. A description of current and anticipated problem areas or delaying factors and their impact and an explanation of corrective actions taken or required to be taken.

d. Identify and explain why activities based on their calculated late dates should have either started or finished during the update period but did not.

e. Identify and discuss all schedule changes by activity ID and activity name including what specifically was changed and why the change was needed. Include at a minimum new and deleted activities, logic changes, duration changes, calendar changes, lag changes, resource changes, and actual start and finish date changes.

f. Identify and discuss out-of-sequence work.

3.5.3 Schedule Reports

The format, filtering, organizing and sorting for each schedule report will be as directed by the Contracting Officer. Typically, reports contain Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. Provide the reports electronically in .pdf format. Provide 2 sets of hardcopy reports. The following lists typical reports that will be requested:

3.5.3.1 Activity Report

List of all activities sorted according to activity number.

3.5.3.2 Logic Report

List of detailed predecessor and successor activities for every activity in ascending order by activity number.

3.5.3.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

3.5.3.4 Earnings Report by CLIN

A compilation of the Total Earnings on the project from the NTP to the data date, which reflects the earnings of activities based on the agreements made in the schedule update meeting defined herein. Provided a complete schedule update has been furnished, this report serves as the basis of determining progress payments. Group activities by CLIN number and sort by activity number. Provide a total CLIN percent earned value, CLIN percent complete, and project percent complete. The printed report must contain the following for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Earnings to Date, Earnings this period, Total Quantity, Quantity to Date, and Percent Complete (based on cost).

3.5.3.5 Schedule Log

Provide a Scheduling/Leveling Report generated from the current project schedule being submitted.

3.5.4 Network Diagram

The Network Diagram is required for the Preliminary, Initial and Periodic Updates. Depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.4.1 Continuous Flow

Show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

3.5.4.2 Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.5.4.3 Critical Path

Show all activities on the critical path. The critical path is defined as the longest path.

3.5.4.4 Banding

Organize activities using the WBS or as otherwise directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by major elements of work, category of work, work area and/or responsibility.

3.5.4.5 Cash Flow / Schedule Variance Control (SVC) Diagram

With each schedule submission, provide a SVC diagram showing 1) Cash Flow S-Curves indicating planned project cost based on projected early and late activity finish dates, and 2) Earned Value to-date.

3.6 PERIODIC SCHEDULE UPDATE

3.6.1 Periodic Schedule Update Meetings

Conduct periodic schedule update meetings for the purpose of reviewing the proposed Periodic Schedule Update, Narrative Report, Schedule Reports, and progress payment. Conduct meetings at least monthly within five days of the proposed schedule data date. Provide a computer with the scheduling software loaded and a projector which allows all meeting participants to view the proposed schedule during the meeting. The Contractor's authorized scheduler must organize, group, sort, filter, perform schedule revisions as needed and review functions as requested by the Contractor and/or Government. The meeting is a working interactive exchange which allows the Government and Contractor the opportunity to review the updated schedule on a real time and interactive basis. The meeting will last no longer than 8 hours. Provide a draft of the proposed narrative report and schedule data file to the Government a minimum of two workdays in advance of the meeting. The Contractor's Project Manager and scheduler must attend the meeting with the authorized representative of the Contracting Officer. Superintendents, foremen and major subcontractors must attend the meeting as required to discuss the project schedule and work. Following the periodic schedule update meeting, make corrections to the draft submission. Include only those changes approved by the Government in the submission and invoice for payment.

3.6.2 Update Submission Following Progress Meeting

Submit the complete Periodic Schedule Update of the Project Schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 work days after the periodic schedule update meeting.

3.7 WEEKLY PROGRESS MEETINGS

Conduct a weekly meeting with the Government (or as otherwise mutually agreed to) between the meetings described in paragraph entitled PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. Use the current approved schedule update for the purposes of this meeting and for the production and review of reports. At the weekly progress meeting, address the status of RFIs, RFPs and Submittals.

The Contractor shall discuss the Project Schedule during the weekly construction progress meetings for the purpose of jointly reviewing the actual progress of the project as compared to the planned progress and to

review planned activities for the upcoming two weeks. The current and approved schedule update shall be used for the purposes of this meeting and for the production and review of reports. The Contractor's Project Manager and the Government shall attend. The progress meeting will address the status of RFIs and Submittals. Provide a bar chart produced by the scheduling software, organized by Total Float and sorted by Early Start Date, and a two-week "look-ahead" schedule by filtering all schedule activities to show only current ongoing activities and activities scheduled to start during the upcoming two weeks, sorted by Early Start Date.

The Government and the Contractor shall jointly review the reports. If it appears that activities on the longest path(s) which are currently driving the calculated completion date (driving activities) are not progressing satisfactorily and therefore could jeopardize timely project completion, corrective action must be taken immediately. Corrective action includes but is not limited to: increasing the number of work crews; increasing the number of work shifts; increasing the number of hours worked per shift; and determining if Government responsibility-coded activities require Government corrective action.

3.8 REQUESTS FOR TIME EXTENSIONS

Provide a justification of delay to the Contracting Officer in accordance with the contract provisions and clauses for approval within 10 days of a delay occurring. Also prepare a time impact analysis for each Government request for proposal (RFP) to justify time extensions.

3.8.1 Justification of Delay

Provide a description of the event(s) that caused the delay and/or impact to the work. As part of the description, identify all schedule activities impacted. Show that the event that caused the delay/impact was the responsibility of the Government. Provide a time impact analysis that demonstrates the effects of the delay or impact on the project completion date or interim completion date(s). Evaluate multiple impacts chronologically; each with its own justification of delay. With multiple impacts consider any concurrency of delay. A time extension and the schedule fragnet becomes part of the project schedule and all future schedule updates upon approval by the Contracting Officer.

3.8.2 Time Impact Analysis (Prospective Analysis)

Prepare a time impact analysis for approval by the Contracting Officer based on industry standard AACE 52R-06. Utilize a copy of the last approved schedule prior to the first day of the impact or delay for the time impact analysis. If Contracting Officer determines the time frame between the last approved schedule and the first day of impact is too great, prepare an interim updated schedule to perform the time impact analysis. Unless approved by the Contracting Officer, no other changes may be incorporated into the schedule being used to justify the time impact.

3.8.3 Forensic Schedule Analysis (Retrospective Analysis)

Prepare an analysis for approval by the Contracting Officer based on industry standard AACE 29R-03.

3.8.4 Fragmentary Network (Fragnet)

Prepare a proposed fragnet for time impact analysis consisting of a

sequence of new activities that are proposed to be added to the project schedule to demonstrate the influence of the delay or impact to the project's contractual dates. Clearly show how the proposed fragnet is to be tied into the project schedule including all predecessors and successors to the fragnet activities. The proposed fragnet must be approved by the Contracting Officer prior to incorporation into the project schedule.

3.8.5 Time Extension

The Contracting Officer must approve the Justification of Delay including the time impact analysis before a time extension will be granted. No time extension will be granted unless the delay consumes all available Project Float and extends the projected finish date ("End Project" milestone) beyond the Contract Completion Date. The time extension will be in calendar days.

Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

3.8.6 Impact to Early Completion Schedule

No extended overhead will be paid for delay prior to the original Contract Completion Date for an Early Completion IPS unless the Contractor actually performed work in accordance with that Early Completion Schedule. The Contractor must show that an early completion was achievable had it not been for the impact.

3.9 FAILURE TO ACHIEVE PROGRESS

Should the progress fall behind the approved project schedule for reasons other than those that are excusable within the terms of the contract, the Contracting Officer may require provision of a written recovery plan for approval. The plan must detail how progress will be made-up to include which activities will be accelerated by adding additional crews, longer work hours, extra work days, etc.

3.9.1 Artificially Improving Progress

Artificially improving progress by means such as, but not limited to, revising the schedule logic, modifying or adding constraints, shortening activity durations, or changing calendars in the project schedule is prohibited. Indicate assumptions made and the basis for any logic, constraint, duration and calendar changes used in the creation of the recovery plan. Any additional resources, manpower, or daily and weekly work hour changes proposed in the recovery plan must be evident at the work site and documented in the daily report along with the Schedule Narrative Report.

3.9.2 Failure to Perform

Failure to perform work and maintain progress in accordance with the supplemental recovery plan may result in an interim and final unsatisfactory performance rating and may result in corrective action directed by the Contracting Officer pursuant to FAR 52.236-15 Schedules for Construction Contracts, FAR 52.249-10 Default (Fixed-Price Construction), and other contract provisions.

3.9.3 Recovery Schedule

Should the Contracting Officer find it necessary, submit a recovery schedule pursuant to FAR 52.236-15 Schedules for Construction Contracts.

3.10 OWNERSHIP OF FLOAT

Except for the provision given in the paragraph IMPACT TO EARLY COMPLETION SCHEDULE, float available in the schedule, at any time, may not be considered for the exclusive use of either the Government or the Contractor including activity and/or project float. Activity float is the number of work days that an activity can be delayed without causing a delay to the "End Project" finish milestone. Project float (if applicable) is the number of work days between the projected early finish and the contract completion date milestone.

3.11 TRANSFER OF SCHEDULE DATA INTO RMS/QCS

Import the schedule data into the Quality Control System (QCS) and export the QCS data to the Government. This data is considered to be additional supporting data in a form and detail required by the Contracting Officer pursuant to FAR 52.232-5 - Payments under Fixed-Price Construction Contracts. The receipt of a proper payment request pursuant to FAR 52.232-27 - Prompt Payment for Construction Contracts is contingent upon the Government receiving both acceptable and approvable hard copies and matching electronic export from QCS of the application for progress payment.

3.12 PRIMAVERA P6 MANDATORY REQUIREMENTS

If Primavera P6 is being used, request a backup file template (.xer) from the Government, if one is available, prior to building the schedule. The following settings are mandatory and required in all schedule submissions to the Government:

a. Activity Codes must be Project Level, not Global or EPS level.

b. Calendars must be Project Level, not Global or Resource level.

c. Activity Duration Types must be set to "Fixed Duration & Units".

d. Percent Complete Types must be set to "Physical".

e. Time Period Admin Preferences must remain the default "8.0 hr/day, 40 hr/week, 172 hr/month, 2000 hr/year". Set Calendar Work Hours/Day to 8.0 Hour days.

f. Set Schedule Option for defining Critical Activities to "Longest Path".

g. Set Schedule Option for defining progressed activities to "Retained Logic".

h. Set up cost loading using a single lump sum labor resource. The Price/Unit must be $1/hr, Default Units/Time must be "8h/d", and settings "Auto Compute Actuals" and "Calculate costs from units" selected.

i. Activity ID's must not exceed 10 characters.

j. Activity Names must have the most defining and detailed description

within the first 30 characters.

-- End of Section --

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SECTION 01 33 00

SUBMITTAL PROCEDURES
05/11

PART 1 GENERAL

1.1 SUMMARY

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 are to be the same as those used in the Drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Contractor's Quality Control (CQC) System Manager and the Designer of Record, if applicable, to check and approve all items prior to submittal and stamp, sign, and date indicating action taken. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals 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 are to be scheduled and made prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples not incorporated into the work in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

A submittal register showing items of equipment and materials for when submittals are required by the specifications is provided as "Submittal Register".

1.2 DEFINITIONS

1.2.1 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description (SD) numbers and titles as follows:

SD-01 Preconstruction Submittals

Submittals which are required prior to or at the start of the next major phase of the construction on a multi-phase contract, includes schedules, tabular list of data, or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.

Certificates of insurance

Surety bonds

List of proposed Subcontractors

List of proposed products

Construction progress schedule

Network Analysis Schedule (NAS)

Submittal register

Schedule of prices or Earned Value Report

Health and safety plan

Work plan

Quality Control (QC) plan

Environmental protection plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. Unless specified in another section, testing must have been within three years of date of contract award for the project.

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports.

Daily logs and checklists.

Final acceptance test and operational test procedure.

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that the product, system, or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or Subcontractor through Contractor. The document purpose is to further promote the orderly progression of a portion of the work by documenting procedures, acceptability of methods, or personnel qualifications.

Confined space entry permits.

Text of posted operating instructions.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (SDS) concerning impedances, hazards and safety precautions.

SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel, including manufacturer's help and product line documentation necessary to maintain and install equipment. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

This data is intended to be incorporated in an operations and maintenance manual or control system.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Submittals required for Guiding Principle Validation (GPV) or Third Party Certification (TPC).

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

1.2.2 Approving Authority

Office or designated person authorized to approve submittal.

1.2.3 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, except those SD-01 Pre-Construction Submittals noted above, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

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. Submit the following in accordance with this section.

SD-01 Preconstruction Submittals

Submittal Register; G

1.4 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.4.1 Government Approved (G)

Government 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 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are considered to be "shop drawings."

1.4.2 For Information Only

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.

1.4.3 Water Line Submittals

For the water line work, New Jersey American Water (NJAW) shall be provided with all technical specifications and shall identify which submittals require NJAW review and approval.

1.5 FORWARDING SUBMITTALS REQUIRING GOVERNMENT APPROVAL

1.5.1 Submittals Required from the Contractor

As soon as practicable after award of contract, and before procurement of fabrication, forward to the Contracting Officer, submittals required in the technical sections of this specification, including shop drawings, product data and samples.

The Architect-Engineer for this project (designated as AE) will review and approve for the Contracting Officer those submittals reserved for Contracting Officer approval to verify submittals comply with the contract requirements.

1.5.1.1 O&M Data

The Architect-Engineer for this project will review and approve for the Contracting Officer O&M Data to verify the submittals comply with the contract requirements; submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.

In the event the Contractor fails to deliver O&M Data within the time limits specified, the Contracting Officer may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

1.6 PREPARATION

1.6.1 Transmittal Form

Complete, sign, and transmit with each submittal package, one transmittal form. Use the attached sample transmittal form in Appendix B ENG Form 4025-R for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms are included in the QCS software that the Contractor is required to use for this contract. Properly complete this form by filling out all the heading blank spaces and identifying each item submitted. Exercise special care to ensure proper listing of the specification paragraph and sheet number of the contract drawings pertinent to the data submitted for each item. Identify and describe each deviation or variation from Contract Documents.

1.6.2 Identifying Submittals

When submittals are provided by a Subcontractor, the Prime Contractor is to prepare, review and stamp with Contractor's approval all specified submittals prior to submitting for Government approval.

Identify submittals, except sample installations and sample panels, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

a. Project title and location.

b. Construction contract number.

c. Date of the drawings and revisions.

d. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other subcontractor associated with the submittal.

e. Section number of the specification section by which submittal is required.

f. Submittal description (SD) number of each component of submittal.

g. When a resubmission, add alphabetic suffix on submittal description, for example, submittal 18 would become 18A, to indicate resubmission.

h. Product identification and location in project.

1.6.3 Format for SD-02 Shop Drawings

Shop drawings are not to be less than 8 1/2 by 11 inches nor more than 30 by 42 inches, except for full size patterns or templates. Prepare drawings to accurate size, with scale indicated, unless other form is required. Drawings are to be suitable for reproduction and be of a quality to produce clear, distinct lines and letters with dark lines on a white background.

Present 8 1/2 by 11 inches sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.

Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph IDENTIFYING SUBMITTALS.

Number drawings in a logical sequence. Contractors may use their own number system. Each drawing is to bear the number of the submittal in a uniform location adjacent to the title block. Place the Government contract number in the margin, immediately below the title block, for each drawing.

Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Use the same unit of measure for shop drawings as indicated on the contract drawings. Identify materials and products for work shown.

Include the nameplate data, size and capacity on drawings. Also include applicable federal, military, industry and technical society publication references.

Submit drawings in PDF format.

1.6.4 Format of SD-03 Product Data and SD-08 Manufacturer's Instructions

Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.

Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains.

Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for project, with information and

format as required for submission of SD-07 Certificates.

Include the manufacturer's name, trade name, place of manufacture, and catalog model or number on product data. Also include applicable federal, military, industry and technical society publication references. Should manufacturer's data require supplemental information for clarification, submit as specified for SD-07 Certificates.

Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. State on the certificate that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

Collect required data submittals for each specific material, product, unit of work, or system into a single submittal and marked for choices, options, and portions applicable to the submittal. Mark each copy of the product data identically. Partial submittals will not be accepted for expedition of construction effort.

Submit manufacturer's instructions prior to installation.

1.6.5 Format of SD-04 Samples

Furnish samples in sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately same size as specified:

a. Sample of Equipment or Device: Full size.

b. Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11 inches.

c. Sample of Materials Exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.

d. Sample of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.

e. Sample of Non-Solid Materials: Pint. Examples of non-solid materials are sand and paint.

f. Color Selection Samples: 2 by 4 inches. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified. Sizes and quantities of samples are to represent their respective standard unit.

g. Sample Panel: 4 by 4 feet.

h. Sample Installation: 100 square feet.

Samples Showing Range of Variation: Where variations in color, finish, pattern, or texture are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range. Mark each unit to describe its relation to the range of the variation.

Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples are to be in undamaged condition at time of use.

Recording of Sample Installation: Note and preserve the notation of area constituting sample installation but remove notation at final clean up of project.

When color, texture or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

1.6.6 Format of SD-05 Design Data and SD-07 Certificates

Provide design data and certificates on 8 1/2 by 11 inches paper. Provide a bound volume for submittals containing numerous pages.

1.6.7 Format of SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Provide reports on 8 1/2 by 11 inches paper in a complete bound volume.

Indicate by prominent notation, each report in the submittal. Indicate specification number and paragraph number to which it pertains.

1.6.8 Format of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

When submittal includes a document which is to be used in project or become part of project record, other than as a submittal, do not apply Contractor's approval stamp to document, but to a separate sheet accompanying document.

1.6.9 Electronic File Format

Provide submittals in electronic format, with the exception of material samples required for SD-04 Samples items. In addition to the electronic submittal, provide three hard copies of the submittals. Compile the submittal file as a single, complete document, to include the Transmittal Form described within. Name the electronic submittal file specifically according to its contents, coordinate the file naming convention with the Contracting Officer. Electronic files must be of sufficient quality that all information is legible. Use PDF as the electronic format, unless otherwise specified or directed by the Contracting Officer. Generate PDF files from original documents with bookmarks so that the text included in the PDF file is both searchable and can be copied. If documents are scanned, Optical Character Resolution (OCR) routines are required. Index and bookmark files exceeding 30 pages to allow efficient navigation of the file. When required, the electronic file must include a valid electronic signature, or scan of a signature.

E-mail electronic submittal documents fewer than 10MB to an e-mail address

as directed by the Contracting Officer. Provide electronic documents over 10MB on an optical disc, or through an electronic file sharing system such as the AMRDEC SAFE Web Application located at the following website: https://safe.amrdec.army.mil/safe/.

Provide hard copies of submittals when requested by the Contracting Officer. Up to 2 additional hard copies of any submittal may be requested at the discretion of the Contracting Officer, at no additional cost to the Government.

1.7 QUANTITY OF SUBMITTALS

1.7.1 Number of Copies of SD-02 Shop Drawings

Submit six copies of submittals of shop drawings requiring review and approval only by QC organization and seven copies of shop drawings requiring review and approval by Contracting Officer.

1.7.2 Number of Copies of SD-03 Product Data and SD-08 Manufacturer's Instructions

Submit in compliance with quantity requirements specified for shop drawings.

1.7.3 Number of Samples SD-04 Samples

a. Submit two samples, or two sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to Contractor.

b. Submit one sample panel or provide one sample installation where directed. Include components listed in technical section or as directed.

c. Submit one sample installation, where directed.

d. Submit one sample of non-solid materials.

1.7.4 Number of Copies SD-05 Design Data and SD-07 Certificates

Submit in compliance with quantity requirements specified for shop drawings.

1.7.5 Number of Copies SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Submit in compliance with quantity and quality requirements specified for shop drawings other than field test results that will be submitted with QC reports.

1.7.6 Number of Copies of SD-10 Operation and Maintenance Data

Submit five copies of O&M Data to the Contracting Officer for review and approval.

1.7.7 Number of Copies of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

Unless otherwise specified, submit three sets of administrative submittals.

1.8 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 Contractor to resubmit any item found not to comply with the contract. This does not relieve the 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 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.

1.9 SUBMITTAL REGISTER

Prepare and maintain submittal register, as the work progresses. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and (i) as approved. A submittal register showing items of equipment and materials for which submittals are required by the specifications is provided as an attachment. This list may not be all inclusive and additional submittals may be required. Maintain a submittal register for the project in accordance with Section 01 45 00.15 10 RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM)). The Government will provide the initial submittal register in electronic format with the following fields completed, to the extent that will be required by the Government during subsequent usage.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the Government.

1.9.1 Use of Submittal Register

Submit submittal register as an electronic database, using submittals management program furnished to Contractor. Submit with CQC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the following fields on the register submitted with the CQC plan and the project schedule:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (h) Contractor Approval Date: Date Contractor needs

approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.9.2 Contractor Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor with each submittal throughout contract.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

1.9.3 Approving Authority Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (l) List date of submittal receipt.

Column (m) through (p) List Date related to review actions.

Column (q) List date returned to Contractor.

1.9.4 Action Codes

Entries for columns (j) and (o), are to be used are as follows (others may be prescribed by Transmittal Form):

1.9.4.1 Government Review Action Codes

"A" - "Approved as submitted"; "Completed"

"B" - "Approved, except as noted on drawings"; "Completed"

"C" - "Approved, except as noted on drawings; resubmission required"; "Resubmit"

"D" - "Returned by separate correspondence"; "Completed"

"E" - "Disapproved (See attached)"; "Resubmit"

"F" - "Receipt acknowledged"; "Completed"

"G" - "Other (Specify)"; "Resubmit"

"X" - "Receipt acknowledged, does not comply with contract requirements"; "Resubmit"

1.9.4.2 Contractor Action Codes

NR - Not Received

AN - Approved as noted

A - Approved

RR - Disapproved, Revise, and Resubmit

1.10 VARIATIONS

Variations from contract requirements require both Designer of Record (DOR) and Government approval pursuant to contract Clause FAR 52.236-21 and will be considered where advantageous to Government. Modifications to the design and alignment of the water line shall also require NJAW approval.

1.10.1 Considering Variations

Discussion with Contracting Officer prior to submission, after consulting with the DOR, will help ensure functional and quality requirements are met and minimize rejections and re-submittals.

Specifically point out variations from contract requirements in transmittal letters. Failure to point out deviations may result in the Government requiring rejection and removal of such work at no additional cost to the Government.

1.10.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government, including the DOR's written analysis and approval. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

Check the column "variation" of ENG Form 4025 for submittals which include proposed deviations requested by the Contractor. 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.

1.10.3 Warranting that Variations are Compatible

When delivering a variation for approval, Contractor, including its Designer(s) of Record, warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.10.4 Review Schedule Extension

In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by the Government of submittals with variations.

1.11 SCHEDULING

Schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Include certifications to be submitted with the pertinent drawings at the same time. No delay damages or time extensions will be allowed for time lost in late submittals.

a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.

b. Submittals called for by the contract documents will be listed on the register. If a submittal is called for but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the register or marked "N/A."

c. Re-submit register and annotate monthly by the Contractor with actual submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.

d. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.12 GOVERNMENT APPROVING AUTHORITY

When approving authority is Contracting Officer, the Government will:

a. Note date on which submittal was received from QC Manager, on each submittal for which the contracting officer is approving authority.

b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

c. Identify returned submittals with one of the Actions Codes defined in paragraph ACTION CODES and with markings appropriate for action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date submittals. 4 copies of the submittal will be retained by the Contracting Officer and 2 copies of the submittal will be returned to the Contractor.

1.12.1 Review Notations

Contracting Officer review will be completed within 14 calendar days after date of submission. Submittals will be returned to the Contractor with the following notations:

a. Submittals marked "approved" or "accepted" authorize the Contractor to proceed with the work covered.

b. Submittals marked "approved as noted" or "approved, except as noted, resubmittal not required," authorize the Contractor to proceed with the work covered provided he takes no exception to the corrections.

c. Submittals marked "not approved" or "disapproved," or "revise and resubmit," indicate noncompliance with the contract requirements or design concept, or that submittal is incomplete. Resubmit with appropriate changes. No work shall proceed for this item until resubmittal is approved.

d. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

1.13 DISAPPROVED SUBMITTALS

Make 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 Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the FAR clause entitled CHANGES, is to be given to the Contracting Officer. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.14 APPROVED SUBMITTALS

The Contracting Officer's approval or acceptance of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing and other information are satisfactory.

Approval or acceptance will not relieve the Contractor of the responsibility for any error which may exist, as the 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 or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.15 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not be construed to change or modify any contract requirements. Before submitting samples, the Contractor to assure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those which may be damaged in testing, will be returned to the Contractor, at his expense, upon completion of the contract. Samples not approved will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material. Government reserves the right to disapprove any material or equipment which previously has proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Contractor to replace such materials or equipment to meet contract requirements.

Approval of the Contractor's samples by the Contracting Officer does not relieve the Contractor of his responsibilities under the contract.

1.16 WITHHOLDING OF PAYMENT

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

1.17 PROGRESS SCHEDULE

Progress Schedule shall be submitted and updated in accordance with Section 01 32 01.00 10 PROJECT SCHEDULE.

1.18 STATUS REPORT ON MATERIALS ORDERS

Within 7 calendar days after notice to proceed, submit, for approval by the Contracting Officer, an initial material status report on all materials orders. This report will be updated and re-submitted every 7 calendar days as the status on material orders changes.

Report to include list, in chronological order by need date, materials orders necessary for completion of the contract. The following information will be required for each material order listed:

a. Material name, supplier, and invoice number.

b. Bar chart line item or CPM activity number affected by the order.

c. Delivery date needed to allow directly and indirectly related work to be completed within the contract performance period.

d. Current delivery date agreed on by supplier.

e. When item d exceeds item c, the effect that delayed delivery date will have on contract completion date.

f. When item d exceeds item c, a summary of efforts made by the Contractor to expedite the delayed delivery date to bring it in line with the needed delivery date, including efforts made to place the order (or subcontract) with other suppliers.

1.19 STAMPS

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

CONTRACTOR (Firm Name)   _____ Approved _____ Approved with corrections as noted on submittal data and/or attached sheets(s)   SIGNATURE: _____ TITLE: _____ DATE: _____

For design-build construction, both the Contractor Quality Control System Manager and the Designer of Record are to stamp and sign to certify that the submittal meets contract requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 35 29.13

HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES
11/15

PART 1 GENERAL

1.1 SCOPE OF WORK

This section describes the responsibilities of the Contractor for safety, health, and emergency response. The Government is committed that the work performed under these specifications will be actively managed by the Contractor so as to:

1. Prevent injuries to employees or other persons

2. Maintain employee exposures to health hazards well below the occupational limits established by the Occupational Safety and Health Administration (OSHA) and the American Conference of Governmental Industrial Hygienists (ACGIH).

3. Keep the exposure of area residents to air contaminants well below the levels established for general public exposure by OSHA, the United States Environmental Protection Agency (EPA), or the New Jersey Department of Environmental Protection (NJDEP).

4. Prevent increasing contaminant levels in soil, water, sediment, or air near the Site.

5. Perform work in the public right-of-way in a safe manner that limits to the impacts to local residents.

Any disregard for the provisions of these safety and health requirements shall be deemed just and sufficient cause for termination of the contract without compromise or prejudice to the rights of the Contractor.

1.2 REFERENCES

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

AMERICAN PETROLEUM INSTITUTE (API)

API RP 2219	(2016) Safe Operation of Vacuum Trucks Handling Flammable and Combustible Liquids in Petroleum Service

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

ANSI/ISEA Z358.1	(2014) American National Standard for Emergency Eyewash and Shower Equipment

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH 85-115	(1985) Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

EM 385-1-1 and all updates are available for reference on the USACE website:

http://www.usace.army.mil/Safety-and-Occupational-Health/Safety-and-Health-Requirements-Manual/

Updates are conducted electronically by USACE. All provisions at the time of award/RFP will be part of the contract.

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

29 CFR 1904	Recording and Reporting Occupational Injuries and Illnesses
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

1.3 PRECONSTRUCTION SAFETY CONFERENCE

Conduct a preconstruction safety conference prior to the start of site activities and after submission of the Accident Prevention Plan/Site Safety And Health Plan (APP/SSHP). The objective of the meeting is to discuss health and safety concerns related to the impending work, discuss project health and safety organization and expectations, review and answer comments and concerns regarding the APP/SSHP or other health and safety concerns. Ensure that those individuals responsible for health and safety at the project level are available and attend this meeting.

1.4 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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Activity Hazard Analysis (AHA)

Accident Prevention Plan/Site Safety And Health Plan (APP/SSHP)

Health and Safety Team Qualifications

Training Certificates

SD-02 Shop Drawings

Work Zones; G

Decontamination Facilities; G

SD-03 Product Data

Amendments to the APP/SSHP

Exposure Monitoring/Air Sampling Program

Site Control Log

SSHO's Daily Inspection Logs

SD-07 Certificates

Certificate Of Worker/Visitor Acknowledgement

SD-11 Closeout Submittals

Safety And Health Phase-Out Report

Contractor's Daily Quality Control Report

USACE Accident Report Form 3394

1.5 ACCIDENT PREVENTION PLAN/SITE SAFETY AND HEALTH PLAN (APP/SSHP)

Develop and implement a Site Safety and Health Plan in accordance with EM 385-1-1 for occupational and non-occupational exposure protection during excavation and handling of contaminated materials. The requirements shall apply to work performed in both "contaminated" and "non-contaminated" areas. Attach to the Accident Prevention Plan (APP) as an appendix (APP/SSHP).

OSHA Standards 29 CFR 1910, Section 120 (b) and 29 CFR 1926, Section 65(b) require employers to develop and implement a written Health and Safety Plan for employees involved in hazardous waste operations. The site-specific program requirements of the OSHA Standards shall be integrated in the APP/SSHP. The APP/SSHP shall interface with the Contractor's overall Health and Safety Program. Any portions of the overall Contractor's Health and Safety Program that are referenced in the APP/SSHP shall be included as appendices to the APP/SSHP.

Address all occupational safety and health hazards (traditional construction as well as contaminant-related hazards) associated with cleanup operations within the APP/SSHP. Cover each SSHP element in sections 28.A.01 and 33.B of EM 385-1-1 and each APP element in Appendix A

of EM 385-1-1. There are overlapping elements in Section 28.A.01 and Appendix A of EM 385-1-1. SSHP appendix elements that overlap with APP elements need not be duplicated in the APP/SSHP provided each safety and occupational health (SOH) issue receives adequate attention and is documented in the APP/SSHP. The APP/SSHP is a dynamic document, subject to change as project operations/execution change. Modify the APP/SSHP to address changing and previously unidentified health and safety conditions. Ensure that the APP/SSHP is updated accordingly. Submit amendments to the APP/SSHP to the Contracting Officer as the APP/SSHP is updated. For long duration projects resubmit the APP/SSHP to the Contracting Officer annually for review. The APP/SSHP must contain all updates.

1.5.1 Activity Hazard Analysis (AHA)

The APP/SSHP shall contain AHAs for all construction activities to be performed at the site. The AHAs shall be continuously reviewed and, when appropriate, modified to address changing site conditions or operations, with the concurrence of the SHM, the Site Superintendent, and the Government.

The Activity Hazard Analyses shall comply with 29 CFR 1910, Subpart I, "Personal Protective Equipment."

The Contractor shall submit an Activity Hazard Analysis for each major phase of work prior to commencement of work activities and update during work activities. The following major site tasks, at a minimum, shall be addressed as applicable:

1. Mobilization.
2. Temporary facilities and controls.
3. Excavation.
4. Handling of excavated and/or contaminated materials.
5. Sampling of environmental media.
6. Clean corridor soil removal for water line installation.
7. Existing water line relocation.
8. Water line trenching and installation.
9. Water line tie-in connections.
10. Backfilling.
11. Asphalt cap restoration.
12. Pavement restoration in roadways.
13. Site restoration in vegetated area.
14. Pipeline cleaning, disinfection, and pressure testing.
15. Demobilization.

The Activity Hazard Analysis shall include:

1. Initial medical certifications for all field personnel.
2. Number of the Contractor's employees and training certificates for all field personnel who have completed the safety and health course required by OSHA 29 CFR 1910.120 or approval at or prior to the Pre-Construction Conference.
3. Respirator fit test certificates for all field personnel involved in handling contaminated soils.

1.5.2 Acceptance and Modifications

Prior to submittal, the APP/SSHP must be signed and dated by the Safety and Health Manager and the Site Superintendent. Submit for review 30 days prior to the Preconstruction Safety Conference. Deficiencies in the

APP/SSHP will be discussed at the preconstruction safety conference and must be revised to correct the deficiencies and resubmitted for acceptance. Onsite work must not begin until the plan has been accepted. Maintain a copy of the written APP/SSHP onsite. Changes and modifications to the APP/SSHP must be made with the knowledge and concurrence of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer. Bring to the attention of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer any unforeseen hazard that becomes evident during the performance of the work, through the Site Safety and Health Officer (SSHO) for resolution as soon as possible. In the interim, take necessary action to re-establish and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment. Disregard for the provisions of this specification or the accepted APP/SSHP is cause for stopping work until the matter has been rectified.

1.5.3 Availability

Make available the APP/SSHP in accordance with 29 CFR 1910.120, (b)(1)(v) and 29 CFR 1926.65, (b)(1)(v).

1.6 STAFF ORGANIZATION, QUALIFICATION AND RESPONSIBILITIES

The Government considers the Prime Contractor to be the "controlling authority" for site safety and health for all work performed by the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being performed.

An organizational structure shall be developed that sets forth lines of authority, responsibilities, and communication procedures concerning site safety, health, and emergency response. The APP/SSHP shall include a description of this organizational structure as well as qualifications and responsibilities of each of the following individuals. The Contractor shall submit the Health and Safety Team Qualifications and shall obtain the Government's acceptance before replacing any member of the health and safety staff. The health and safety organization shall be separately identified from the project's operations organization in order to maintain the appropriate degree of independence from day-to-day activities. The project manager shall be responsible for health and safety on the project including providing the proper and adequate personnel, materials, and resources to implement the health and safety program.

Provide hazardous waste operations and emergency response organization in accordance with EM 385-1-1, Section 33.

1.6.1 Safety and Health Manager

Safety and Health Manager must be an Industrial Hygienist certified by the American Board of Industrial Hygiene, a safety professional certified by the Board of Certified Safety Professionals or a health physicist certified by the American Board of Health Physicists.

Apply the following in conjunction with the required qualifications and responsibilities stated in EM 385-1-1, Section 33.C.01.

1.6.1.1 Additional Qualifications

The Safety and Health Manager must have the following qualifications:

a. A minimum of 5 years of experience in developing and implementing safety and occupational health programs at HTRW sites, in the HTRW disposal industry, in the chemical industry, in the petroleum processing industry, or at underground storage tank removal projects.

b. Documented experience in supervising professional and technician level personnel.

c. Documented experience in developing worker exposure assessment programs and air monitoring programs and techniques.

d. Documented experience in managing personal protective equipment (PPE) programs and conducting PPE hazard evaluations for the types of activities and hazards likely to be encountered on the project.

e. Working knowledge of state and Federal occupational safety and health regulations.

1.6.1.2 Responsibilities and Duties

a. Development, implementation, oversight, and enforcement of the APP/SSHP.

b. Provide onsite consultation as needed to ensure the APP/SSHP is fully implemented.

c. Conduct initial site-specific training.

d. Be available for consultation during the first 3 days of remedial activities and at the startup of each new major phase of work.

e. Visit the site as needed and at least quarterly for the duration of activities, to audit the effectiveness of the APP/SSHP.

f. Be available for emergencies.

g. Coordinate any modifications to the APP/SSHP with the Site Superintendent, the SSHO, and the Contracting Officer.

h. Be responsible for evaluating air monitoring data and recommending changes to engineering controls, work practices, and PPE.

i. Provide continued support for upgrading/downgrading of the level of personal protection.

j. Serve as a member of the quality control staff.

k. Review accident reports and results of daily inspections.

l. Sign and date the APP/SSHP prior to submittal.

1.6.2 Site Safety and Health Officer

Designate an individual and one alternate as the Site Safety and Health Officer (SSHO). Include the name, qualifications (education and training summary and documentation), and work experience of the Site Safety and

Health Officer and alternate in the APP/SSHP.

Apply the following in conjunction with the required qualifications and responsibilities stated in EM 385-1-1, Section 33.C.02.

1.6.2.1 Qualifications

a. A minimum of 1 year of experience in implementing SOH programs at HTRW sites where personal protective equipment was required.

b. Meet 29 CFR 1910.120/29 CFR 1926.65 requirements for 40-hour initial and 8-hour supervisor training and, maintain 8-hour refresher training requirements.

c. Specific training in personal and respiratory protective equipment, confined space entry and in the proper use of air monitoring instruments and air sampling methods including monitoring for ionizing radiation.

d. Documented experience in construction techniques and construction safety procedures.

e. Working knowledge of Federal and state occupational SOH regulations.

f. Certified as having completed training in First Aid and CPR by a recognized organization such as the American Red Cross.

1.6.2.2 Responsibilities and Duties

a. Assist and represent the Safety and Health Manager in onsite training and the day to day onsite implementation and enforcement of the accepted APP/SSHP.

b. Be assigned to the site on a fulltime basis for the duration of field activities. The SSHO can have collateral duties in addition to SOH related duties. If operations are performed during more than 1 work shift per day, a site Safety and Health Officer must be present for each shift and when applicable, act as the radiation safety officer (RSO) as defined in paragraph 06.F.02 of EM 385-1-1 on radioactive waste cleanup projects.

c. Have authority to stop work if unacceptable health or safety conditions exist and take necessary action to re-establish and maintain safe working conditions.

d. Have authority to ensure site compliance with specified SOH requirements, Federal, state and OSHA regulations and all aspects of the APP/SSHP including, but not limited to, activity hazard analyses, air monitoring, monitoring for ionizing radiation, use of PPE, decontamination, site control, standard operating procedures used to minimize hazards, safe use of engineering controls, the emergency response plan, confined space entry procedures, spill containment program, and preparation of records by performing a daily SOH inspection and documenting results on the Daily Safety Inspection Log in accordance with 29 CFR 1904.

e. In coordination with site management and the Safety and Health Manager, recommend corrective actions for identified deficiencies and oversee the corrective actions.

f. Consult with and coordinate any modifications to the APP/SSHP with the Safety and Health Manager, the Site Superintendent, and the Contracting Officer.

g. Conduct daily safety inspection and document SOH findings into the Daily Safety Inspection Log. Track noted SOH deficiencies to ensure that they are corrected.

h. Conduct accident investigations and prepare accident reports.

i. Serve as a member of the quality control staff on matters relating to SOH.

1.6.3 Occupational Physician

Utilize the services of a licensed physician, who is certified in occupational medicine by the American Board of Preventative Medicine, or who, by necessary training and experience, is Board eligible. The physician must be familiar with the site's hazards and the scope of this project. Include the medical consultant's name, qualifications, and knowledge of the site's conditions and proposed activities in the APP/SSHP. The physician is responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1910.120, (f) and 29 CFR 1926.65, (f) and paragraph MEDICAL SURVEILLANCE PROGRAM.

1.6.4 Persons Certified in First Aid and CPR

At least two persons who are currently certified in first aid and CPR by the American Red Cross or other approved agency must be onsite at all times during site operations. They must be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens Standard of 29 CFR 1910, Section .1030. These persons may perform other duties but must be immediately available to render first aid when needed. An automated external defibrillator (AED) will be placed on-site and site personnel will be trained in its usage.

1.6.5 Safety and Health Technicians

For each work crew in the exclusion zone, one person, designated as a Safety and Health technician, must perform activities such as air monitoring, decontamination, and safety oversight on behalf of the SSHO. They must have appropriate training equivalent to the SSHO in each specific area for which they have responsibility and report to and be under the supervision of the SSHO.

1.7 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

Develop and implement an Emergency Response Plan, that meets the requirements of EM 385-1-1 Section 33.G, 29 CFR 1910.120 (l) and 29 CFR 1926.65 (l), as a section of the APP/SSHP. This plan must present procedures the Contractor shall follow in the case of an injury or in case the Contractor observes an emergency unrelated to the field work.

In the event of any emergency associated with remedial action, without delay, alert all onsite employees and as necessary offsite emergency responders that there is an emergency situation; take action to remove or otherwise minimize the cause of the emergency; alert the Contracting

Officer; and institute measures necessary to prevent repetition of the conditions or actions leading to, or resulting in, the emergency. Train employees that are required to respond to hazardous emergency situations to their level of responsibility according to 29 CFR 1910.120 (q) and 29 CFR 1926.65 (q) requirements. Rehearse the plan regularly as part of the overall training program for site operations. Review the plan periodically and revised as necessary to reflect new or changing site conditions or information. Provide copies of the Emergency Response Portion of the accepted APP/SSHP to the affected local emergency response agencies.

A meeting with the local emergency preparedness agency shall be scheduled by the Contractor to discuss the response measures that shall be followed in the event of a major emergency that may affect off-site areas. A representative of the USEPA, the Government or their representative, local municipalities, and the Contractor (including the SHM) will all be required to attend. It shall be the responsibility of the Contractor to prepare an agenda and chair this meeting. This agenda shall be sent to all participating parties prior to the scheduled meeting. At this meeting, the Contractor shall present suggested guidelines and requirements for protecting local residents in the event of major fires and explosions and the off-site migration of releases from the site. Emergency response procedures shall be confirmed by consensus agreement of the attending parties. Minutes of the meeting shall be distributed to all attendees with 5 days of the meeting.

Address, as a minimum, the following elements in the plan:

a. Pre-emergency planning. Coordinate with local emergency response providers during preparation of the Emergency Response Plan. At a minimum, coordinate with local fire, rescue, hazardous materials response teams, police and emergency medical providers to assure all organizations are capable and willing to respond to and provide services for on-site emergencies. Ensure the Emergency Response Plan for the site is compatible and integrated with the local fire, rescue, medical and police security services available from local emergency response planning agencies.

b. Personnel roles, lines of authority, communications for emergencies.

c. Emergency recognition and prevention.

d. Site topography, layout, and prevailing weather conditions.

e. Criteria and procedures for site evacuation (emergency alerting procedures, employee alarm system, emergency PPE and equipment, safe distances, places of refuge, evacuation routes, site security and control).

f. Route maps to nearest pre-notified medical facility. Site-support vehicles must be equipped with maps. At the beginning of project operations, drivers of the support vehicles must become familiar with the emergency route and the travel time required.

g. Specific procedures for decontamination and medical treatment of injured personnel.

h. Emergency alerting and response procedures including posted instructions and a list of names and telephone numbers of emergency

contacts (physician, nearby medical facility, fire and police departments, ambulance service, Federal, state, and local environmental agencies; as well as Safety and Health Manager, the Site Superintendent, the Contracting Officer and their alternates).

i. Criteria for initiating community alert program, contacts, and responsibilities.

j. Procedures for reporting incidents to appropriate government agencies. In the event that an incident such as an explosion or fire, or a spill or release of toxic materials occurs during the course of the project, the appropriate government agencies must be immediately notified. In addition, verbally notify the Contracting Officer and the local district safety office immediately and submit a written notification within 24 hours. Include within the report the following items:

1. Name, organization, telephone number, and location of the Contractor.

2. Name and title of the person(s) reporting.

3. Date and time of the incident.

4. Location of the incident, i.e., site location, facility name.

5. Brief summary of the incident giving pertinent details including type of operation ongoing at the time of the incident.

6. Cause of the incident, if known.

7. Casualties (fatalities, disabling injuries).

8. Details of any existing chemical hazard or contamination.

9. Estimated property damage, if applicable.

10. Nature of damage, effect on contract schedule.

11. Action taken to ensure safety and security.

12. Other damage or injuries sustained, public or private.

k. Procedures for critique of emergency responses and follow-up.

l. Site security and control for incidents.

m. Procedures for dealing with fires, explosives, and spills.

n. Procedures for decontaminating emergency response vehicles and equipment.

1.8 ACCIDENT NOTIFICATION

The Government shall be notified immediately (no later than 2 hours), verbally or via e-mail, and shall receive a written notice within 24 hours, after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents or resulting in property damage equal to or greater than $5,000.00 (amount to be updated based current requirements at the time of Award). Information shall include:

(1) Contractor name; contract title; type of contract; name of activity
(2) Location where accident occurred
(3) Date and time of accident
(4) Names of personnel injured
(5) Extent of property damage, if any
(6) Extent of injury, if known
(7) Brief description of accident (to include type of construction equipment used, personal protection equipment, and PPE used, etc.)

Preserve the conditions and evidence on the accident site until the Government investigation team arrives onsite and Government investigation is conducted. Accident Reports for recordable injuries and illnesses, and accidents resulting in at least $2,000 in property damage, the Contractor shall conduct an accident investigation to establish the root cause(s) of the accident, complete USACE Accident Report Form 3394, and provide the report to the Government within 5 calendar days of the accident. A draft of the subject report shall be submitted to the Government within 24 hours after the incident. The Government will provide copies of any required or special forms.

1.9 CERTIFICATE OF WORKER/VISITOR ACKNOWLEDGEMENT

A copy of a certificate of worker/visitor acknowledgement must be completed and submitted for each visitor allowed to enter contamination reduction or exclusion zones, and for each employee, following the Worker/Visitor Acknowledgement certificate(s) supplied by the Contractor.

1.10 INSPECTIONS

The SSHO shall perform daily inspections of the job site and the work in progress to ensure compliance with EM 385-1-1, the APP/SSHP, and other occupational health and safety requirements of the contract, and to determine the effectiveness of the Health and Safety Program. Procedures for correcting deficiencies (including actions, timetable and responsibilities) shall be described in the APP/SSHP. Follow-up inspections to ensure correction of deficiencies shall be conducted and documented. Daily Safety Inspection Logs shall be used to document the inspections, noting health and safety deficiencies, deficiencies in the effectiveness of the APP/SSHP, and corrective actions taken.

Attach to and submit with the Daily Quality Control reports the SSHO's Daily Inspection Logs. Include with each entry the following: date, work area checked, employees present in work area, PPE and work equipment being used in each area, special SOH issues and notes, and signature of preparer.

1.11 SAFETY AND HEALTH PHASE-OUT REPORT

Submit a Safety and Health Phase-Out Report in conjunction with the project close out report, prior to final acceptance of the work. Include the following minimum information:

a. Summary of the overall performance of SOH (e.g., accidents or incidents including near misses, unusual events, lessons learned).

b. Final decontamination documentation including procedures and techniques used to decontaminate equipment, vehicles, and on site facilities.

c. Summary of exposure monitoring and air sampling accomplished during the

project.

d. Signatures of Safety and Health Manager and SSHO.

e. Initial and final physical/medical certifications.

f. Daily Safety Inspection Reports.

g. Weekly Safety Reports.

h. Training Logs.

i. Accident Reports.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

Comply with EM 385-1-1, 29 CFR 1926.65, 29 CFR 1910.120, OSHA requirements in 29 CFR 1910 and 29 CFR 1926 with work performed under this contract, and state specific OSHA requirements where applicable. Submit to the Contracting Officer for resolution matters of interpretation of standards before starting work. The most stringent requirements apply where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary.

2.2 PERSONAL PROTECTIVE EQUIPMENT

2.2.1 Site Specific PPE Program

Provide onsite personnel exposed to contaminants with appropriate personal protective equipment. Components of levels of protection (B, C, D and modifications) must be relevant to site-specific conditions, including heat and cold stress potential and safety hazards. Use only respirators approved by NIOSH.

Keep protective equipment and clothing clean and well maintained. Include site-specific procedures to determine PPE program effectiveness and for onsite fit-testing of respirators, cleaning, maintenance, inspection, cartridge change out, and storage of PPE within the PPE section of the APP/SSHP.

2.2.2 Levels of Protection

The Safety and Health Manager must establish and evaluate as the work progresses the levels of protection for each work activity. Also establish action levels for upgrade or downgrade in levels of PPE. Describe in the SSHP the protocols and the communication network for changing the level of protection. Address air monitoring results, potential for exposure, changes in site conditions, work phases, job tasks, weather, temperature extremes, and individual medical considerations within the PPE evaluation protocol.

Available site information shall be reviewed and the list of tasks and operations and these levels of protection shall be expanded and/or revised during preparation of the SSHP.

2.2.2.1 Initial PPE Components

The following items constitute initial minimum protective clothing and equipment ensembles.

Level D	Coveralls; gloves; footwear with chemical-resistant, steel to and shank; outer boots (chemical resistant and disposable); safety glasses or chemical splash goggles; hard hat; escape mask; face shield
Level C	Full-face or half-mask, air purifying respirators (NIOSH approved); Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls); Coveralls; Gloves, outer, chemical-resistant; Gloves, inner, chemical-resistant; Boots (outer), chemical-resistant steel toe and shank; Boot-covers, outer, chemical-resistant (disposable); Hard hat; Escape mask; face shield
Level B	Positive pressure, full-facepiece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved); Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls); Coveralls; Gloves, outer, chemical-resistant; Gloves, inner, chemical-resistant; Boots, outer, chemical-resistant steel toe and shank; Boot-covers, outer, chemical-resistant (disposable); Hard hat; Face shield

2.2.2.2 Water Line Construction PPE

Based on available information, Level D may be appropriate for the majority of work on the water line. Work on establishing the Clean Corridor along the water line on the former CDE property (Sta. 0+00 to Sta. 0+81) should be assumed to require Level C protections unless additional soil or air monitoring data supports the use of lower protection levels. Available site information shall be reviewed and the list of tasks and operations and these levels of protection shall be expanded and/or revised during preparation of the APP/SSHP.

2.2.2.3 PPE for Government Personnel

Five clean sets of personal protective equipment and clothing, as required for entry into the Exclusion Zone and Contamination Reduction Zone, must be available for use by the Government or official visitors (excluding air-purifying negative-pressure respirators and safety shoes, which will be provided by individual visitors). The items must be cleaned, maintained and clearly marked: "FOR USE BY GOVERNMENT ONLY." The Contractor shall provide basic training in the use and limitations of the PPE provided, and institute administrative controls to check prerequisites prior to issuance. Such prerequisites include meeting minimum training

requirements for the work tasks to be performed and medical clearance for site hazards and respirator use. Visitors shall be responsible for adhering to the requirements of their Health and Safety Plan as well as the Contractor's Health and Safety Plan.

2.3 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

Maintain, as a minimum, the following items onsite and available for immediate use:

a. First aid equipment and supplies approved by the consulting physician.

b. Emergency eyewashes and showers that comply with ANSI/ISEA Z358.1.

c. Emergency-use respirators. For escape purposes, supply 2 5- to 15-minute emergency escape masks. For rescue purposes, Supply 2 positive pressure self-contained breathing apparatus (SCBA). Dedicate these for emergency use only and maintained onsite in the Contamination Reduction Zone.

d. Provide fire extinguishers of sufficient size and type at site facilities and in all vehicles and at any other site locations where flammable or combustible materials present a fire risk.

e. Spill control materials and equipment that are sufficient to meet the requirements describe in subpart 3.8 SPILL AND DISCHARGE CONTROL.

PART 3 EXECUTION

3.1 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

3.1.1 Project/Site Conditions

Documents describing site history and contamination characterization are available upon request from the Contracting Officer.

3.2 TASK SPECIFIC HAZARDS, INITIAL PPE, HAZWOPER MEDICAL SURVEILLANCE AND TRAINING APPLICABILITY

Reevaluate occupational safety and health hazards as the work progresses and to adjust the PPE and onsite operations, if necessary, so that the work is performed safely and in compliance with occupational safety and health regulations.

The following potential hazards may be encountered during site work and shall be addressed. These are not complete lists; therefore, they shall be expanded and/or revised as necessary during preparation of the AHAs and APP/SSHP.

A. Safety Hazards - Hazards including heavy equipment operation, containment handling, process equipment operations, slips, trips, and falls, rigging and lifting, etc.

B. Chemical Hazards - Hazards involving chemical, physical and toxicological properties of contaminant sources and pathways of employee exposures.

C. Physical Agents - Hazards associated with noise and heat/cold stress.

D. Biological Hazards - Hazards associated with poisonous plants, insects, and animals.

E. Confined Space Entry - Entry into and work in a confined space will not be allowed when oxygen readings are less than 19.5 percent or greater than 23.5 percent or if the Lower Explosive Limit (LEL) reading is greater than 10 percent, unless these conditions are adequately addressed in the Confined Space Entry Program.

3.3 TRAINING

In conjunction with EM 385-1-1, Section 33D, meet the training program requirements for workers performing cleanup operations and who will be exposed to contaminants.

3.3.1 General HTRW Operations Training

All personnel performing duties with potential for exposure to onsite contaminants must meet and maintain the following 29 CFR 1910.120/ 29 CFR 1926.65 (e) training requirements:

a. 40 hours of off-site HTRW instruction.

b. 3 days actual on-the-job field experience under the direct supervision of a trained, experienced supervisor.

c. 8 hours refresher training annually.

Onsite supervisors must have an additional 8 hours management and supervisor training specified in 29 CFR 1910.120/29 CFR 1926.65 (e) (4).

Copies of current Training Certificates shall be submitted prior to initial entry onto the work site. The Contractor shall maintain, at the work site, documentation that shows that each on-site employee or subcontractor has completed the safety and health training course appropriate for their job function and responsibility. The training certificates shall be current within 12 months of the start of work and remain up-to-date during work performance.

3.3.2 Site-Specific Training

Site-specific training sessions shall be documented in accordance with Section 01.B.03.b of EM 385-1-1. The Contractor's SHM shall approve a site-specific training session for the Contractor and Government personnel scheduled to work on-site. This training may be given by the SSHO. This site-specific training shall consist of an initial health and safety briefing on the following information:

a. Names of personnel and alternate responsible for site health and safety.

b. Hazards present on the site.

c. Hazard communications training.

d. Safe use of engineering controls and equipment on-site.

e. Work practice by which the employee can minimize risks from hazards.

f. Selection, use, care, and maintenance of PPE.

g. Site control procedures, including log-in and log-out.

h. Confined space training (as needed).

i. Site decontamination procedures.

j. Standard operating safety procedures.

k. Site emergency response contingency plan.

3.3.3 Pre-Entry Briefing

Prior to commencement of onsite field activities, all site employees, including those assigned only to the Support Zone, must attend a site-specific SOH training session. This session will be conducted by the Safety and Health Manager and the Site Safety and Health Officer to ensure that all personnel are familiar with requirements and responsibilities for maintaining a safe and healthful work environment. Thoroughly discuss procedures and contents of the accepted APP/SSHP and Sections 01.B.02 and 28.D.03 of EM 385-1-1. Each employee must sign a training log to acknowledge attendance and understanding of the training. Notify the Contracting Officer at least 5 days prior to the initial site-specific training session so government personnel involved in the project may attend.

3.3.4 Periodic Sessions

Conduct periodic onsite training by the SSHO at least weekly for personnel assigned to work at the site during the following week. Address SOH procedures, work practices, any changes in the APP/SSHP, activity hazard analyses, work tasks, or schedule; results of previous week's air monitoring, review of safety discrepancies and accidents. Convene a meeting prior to implementation of the change should an operational change affecting onsite field work be made, to explain SOH procedures. Each employee must sign a training log to acknowledge attendance and understanding of the training.

3.3.5 Other Training

Conduct site-specific training sessions for new personnel, visitors, and suppliers by the SSHO using the training curriculum outlines developed by the Safety and Health Manager. Special site specific training requirements will be dictated by site conditions and tasks. Each employee, visitor and supplier must sign a training log to acknowledge attendance and understanding of the training.

3.4 DAILY SAFETY MEETINGS

Daily safety meetings shall be conducted and documented as required by EM 385-1-1. Minutes showing contract title, signatures of attendees and a list of topics discussed shall be attached to the Contractor's Daily Quality Control Report.

3.5 MEDICAL SURVEILLANCE PROGRAM

Meet all requirements of 29 CFR 1910.120/29 CFR 1926.65 medical surveillance program and EM 385-1-1, Section 33.G for workers performing cleanup operations and who will be exposed to contaminants. Ensure the

Occupational Physician or the physician's designee performs the physical examinations and reviews examination results. Participation in the medical surveillance program is without cost to the employee, without loss of pay and at a reasonable time and place.

3.6 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

Prepare and implement by the Safety and Health Manager an exposure monitoring/air sampling program to identify and quantify SOH hazards and airborne levels of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment for affected site personnel. Include action levels for upgrading/downgrading PPE in the program. Submit personnel exposure monitoring/sampling results. Monitor for the anticipated hazardous materials (known or potential) expected to be a risk to field staff.

A separate Perimeter Air Monitoring Program shall be completed in accordance with Section 01 36 20, PERIMETER AIR MONITORING.

3.7 HEAT STRESS MONITORING AND MANAGEMENT

Document in the APP/SSHP and implement the procedures and practices in section 06.J. in EM 385-1-1 to monitor and manage heat stress.

3.8 SPILL AND DISCHARGE CONTROL

Develop and implement written spill and discharge containment/control procedures. Address radioactive wastes, shock sensitive wastes, laboratory waste packs, material handling equipment, as well as drum and container handling, opening, sampling, shipping and transport. Describe prevention measures, such as building berms or dikes; spill control measures and material to be used (e.g., booms, vermiculite); location of the spill control material; personal protective equipment required to cleanup spills; disposal of contaminated material; and who is responsible to report the spill. Storage of contaminated material or hazardous materials must be appropriately bermed, diked and contained to prevent any spillage of material on uncontaminated soil.

If the spill or discharge with potential for entering waters of the state (New Jersey) is reportable, or human health or the environment are threatened, immediate verbal and e-mail notification to EPA Remedial Project Manager, USACE on-site representatives, National Response Center, the state, and the Contracting Officer is required as soon as possible. In accordance with current guidance from EPA and NJDEP management, any potential contaminated material (i.e., water, liquid) that has entered the waters of the state, or onto land to which it could flow to the waters of the state (groundwater included) is reportable to the NJDEP. Additional guidance from NJDEP Superfund manager may be required prior to start of work activities. Provide control as required by Section 01 57 19 TEMPORARY ENVIRONMENT CONTROLS.

3.9 MATERIALS TRANSFER SAFETY

Remove liquids and residues from the tanks using explosion-proof or air-driven pumps. In accordance with EM 385-1-1, Section 9, electrically bond the tank and ground pump motors and suction hoses to prevent electrostatic ignition hazards. Use of a hand pump will be permitted to remove the last of the liquid from the bottom of the tanks. If a vacuum truck is used for removal of liquids or residues, the area of operation for

the vacuum truck must be vapor free. Position the truck upwind from the tank and outside the path of probable vapor travel. Discharge the vacuum pump exhaust gases through a hose of adequate size and length downwind of the truck and tank area. Vacuum truck operating and safety practices must conform to API RP 2219. Collect tank residues in drums, tanks, or tank trucks labeled according to 49 CFR 171 and 49 CFR 172 and disposed of as specified. Disconnect and drain fittings and lines of their contents after the materials have been transferred and the tanks have been exposed. Do not spill contents into the environment during cutting or disconnecting of tank fittings. Transfer materials drained into DOT-approved drums for storage and transportation. Use only non-sparking or non-heat producing tools to disconnect and drain or to cut through tank fittings. Electrical equipment (e.g., pumps, portable hand tools) used for tank preparation must be explosion-proof. Following cutting or disconnecting of the fittings, plug openings leading to the tanks.

3.10 SITE CONTROL MEASURES

3.10.1 Work Zones

Initial anticipated work zone boundaries (exclusion zone, contamination reduction zone, support zone, all access points and decontamination areas) are to be clearly delineated on the site drawings. Base delineation of work zone boundaries on the contamination characterization data and the hazard/risk analysis to be performed as described in EM 385-1-1 06.A.02. As work progresses and field conditions are monitored, work zone boundaries may be modified (and site drawings modified) with approval of the Contracting Officer. Clearly identify work zones and mark in the field (using fences, tape, or signs). Submit and post a site map, showing work zone boundaries and locations of decontamination facilities in the onsite office. Work zones must consist of the following:

3.10.1.1 Exclusion Zone (EZ)

The exclusion zone is the area where hazardous contamination is either known or expected to occur and the greatest potential for exposure exists. Control entry into this area and exit may only be made through the Contamination Reduction Zone (CRZ).

3.10.1.2 Contamination Reduction Zone (CRZ)

The CRZ is the transition area between the Exclusion Zone and the Support Zone. The personnel and equipment decontamination areas must be separate and unique areas located in the CRZ.

3.10.1.3 Support Zone (SZ)

The Support Zone is defined as areas of the site, other than exclusion zones and contamination reduction zones, where workers do not have the potential to be exposed to hazardous substances or dangerous conditions resulting from HTRW operations. Secure the Support Zone against active or passive contamination. Site offices, parking areas, and other support facilities must be located in the Support Zone.

3.10.2 Site Control Log

A log of personnel visiting, entering, or working on the site must be maintained. Include the following: date, name, agency or company, time entering and exiting site, time entering and exiting the exclusion zone (if

applicable). Before visitors are allowed to enter the Contamination Reduction Zone or Exclusion Zone, they must show proof of current training, medical surveillance and respirator fit testing (if respirators are required for the tasks to be performed) and fill out a Certificate of Worker or Visitor Acknowledgment. Record this visitor information, including date, in the log.

3.10.3 Communication

Provide, describe and install an employee alarm system that has adequate means of on and off site communication in accordance with 29 CFR 1910 Section .165. The means of communication must be able to be perceived above ambient noise or light levels by employees in the affected portions of the workplace. The signals must be distinctive and recognizable as messages to evacuate or to perform critical operations.

Communications with the office trailer, if it is outside vocal range, shall be by radio. Two-way radio communication shall be required during construction activity. Communications between Contractor and other organizations (e.g., the Government or the emergency response provider) shall be over the telephone.

At a minimum, the following emergency telephone numbers must appear in the APP/SSHP:

1. Medical treatment facility and physician, including names and address.
2. Ambulance services.
3. Fire department.
4. Police department.
5. EPA Region II.
6. EPA and NJDEP spill control.
7. National Response Center.

3.10.4 Site Security

Provide and describe site security. Print signs in bold large letters on contrasting backgrounds. Signs must be visible from all points where entry might occur and at such distances from the restricted area that employees may read the signs and take necessary protective steps before entering.

3.11 PERSONAL HYGIENE AND DECONTAMINATION

Personnel entering the Exclusion or Contamination Reduction Zones or otherwise exposed to hazardous chemical vapors, gases, liquids, or contaminated solids must decontaminate themselves and their equipment prior to exiting the contamination reduction zone (CRZ) and entering the support zone. Consult Chapter 10.0 of NIOSH 85-115 when preparing decontamination procedures. Submit a detailed discussion of personal hygiene and decontamination facilities and procedures to be followed by site workers as part of the APP/SSHP. Train employees in the procedures and enforce the procedures throughout site operations.

3.11.1 Decontamination Facilities

Submit drawings showing the layout of the personnel and equipment decontamination areas and/or facilities.

3.11.2 Personnel Decontamination

Initially set up a decontamination line in the CRZ. Employees must exit the exclusion zone through the CRZ and implement decontamination procedures and techniques as described and provided by site management.

Showers, if needed, must comply with 29 CFR 1910, Section.141 and EM 385-1-1, 02 F, Washing Facilities. It is the Site Safety and Health Officer's responsibility to recommend techniques to improve personnel decontamination procedures, if necessary.

3.11.3 Equipment Decontamination

Decontaminate the vehicles and equipment used in the EZ in the CRZ prior to leaving the EZ.

3.11.3.1 Facilities for Equipment and Personnel

Provide a vehicle/equipment decontamination station within the CRZ for decontaminating vehicles and equipment leaving the EZ. Construct a decontamination station pad, which meets the site decontamination needs for all vehicles and larger equipment decontamination. Construct the pad to capture decontamination water, including overspray, and allow for collection and removal of the decontamination water using sumps, dikes and ditches as required. Provide a high pressure, low volume, water wash area for equipment and vehicles; provide a steam cleaning system for use after the mud or site material has been cleaned from the equipment.

3.11.3.2 Procedures

Procedures for equipment decontamination must be developed and utilized to prevent the spread of contamination into the SZ and offsite areas. These procedures must address disposal of contaminated products and spent materials used on the site, including, as a minimum, containers, fluids, and oils. Assume any item taken into the EZ to be contaminated and perform an inspection and decontaminate. Vehicles, equipment, and materials must be cleaned and decontaminated prior to leaving the site. Handle construction material in such a way as to minimize the potential for contaminants being spread or carried offsite. Prior to exiting the site, vehicles and equipment must be inspected to ensure the adequacy of decontamination.

-- End of Section --

SECTION 01 35 45

CHEMICAL DATA QUALITY CONTROL
04/06

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

This section covers requirements for the Contractor's Chemical Data Quality Control for remedial action and water line replacement at the Cornell-Dubilier Electronics Superfund Site Operable Unit 4. This Section shall be used in the preparation of a Uniform Federal Policy for Quality Assurance Project Plan (UFP-QAPP), monitoring of subcontract laboratory performance, data validation, data reporting, and preparation of chemical data final report, as defined in this section. The UFP-QAPP shall contain the necessary technical detail and directions for all sampling and field measurements and specifies all quality assurance (QA) and quality control (QC) procedures required for planning, implementation and assessment of the remedial action.

Field measurements and laboratory analytical samples shall be collected by the Contractor and will include:

a. Characterization of surface and subsurface soil and debris to confirm compliance with remedial action goals

b. Air monitoring

c. Water sampling

d. Characterization of backfill materials and topsoil

f. Characterization of site debris to comply with handling, transportation, and disposal requirements

g. Health and safety sampling and measurements

h. Characterization of spent carbon from temporary treatment systems

1.2 REFERENCES

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

NEW JERSEY ADMINISTRATIVE CODE (NJAC)

NJAC 7:26D	Remediation Standards
NJAC 7:26E	Technical Requirements for Site Remediation

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 200-1-6	(1997) Environmental Quality -- Chemical Quality Assurance for HTRW Projects

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 240/B-06/001	(2006) Guidance on Systematic Planning Using the Data Quality Objectives Process
EPA 540/P-87/001	(1987) A Compendium of Superfund Field Operations Methods
EPA 540-R-014-013	(2015) Sampler's Guide: Contract Laboratory Program Guidance for Field Samplers
EPA 540-R-10-011	(2010) USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review
EPA 540-R-08-01	USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review
EPA 402-B-04-001A	(2004) Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP) Part I: Chapters 1 - 9, Appendices A - E, (Volume I)
EPA SW-846	(Third Edition; Update IV) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

Intergovernmental Data Quality Task Force (IDQTF)

IDQTF	(2012) Uniform Federal Policy for Quality Assurance Project Plans. Optimized UFP-QAPP Worksheets

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

40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 268	Land Disposal Restrictions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 178	Specifications for Packagings

1.3 ACRONYMS

The definition of acronyms used by the Contractor that pertain to chemical data quality control shall be clearly defined for all contract related products and communications.

1.4 CHEMISTRY REQUIREMENTS

Chemical Data Quality Control (CDQC) shall be as defined by EM 200-1-6 for detail technical guidance on CDQC.

1.4.1 Data Quality Objectives (DQO)

1.4.1.1 Project Objective

The United States Environmental Protection Agency (USEPA) issued the Record of Decision, Operable Unit 4 Bound Brook (ROD; USEPA 2015) in May 2015, which describes the remedy for the OU4 CDE Site.

The work described herein includes excavation and offsite disposal of PCB-containing floodplain soils and Bound Brook sediments, excavation and offsite disposal of an area where PCB-contaminated capacitors were present (i.e., OU4: Phase 1 Boundary), and relocation of a water line that transverses the former CDE property (OU-2 Area). The majority of work associated with the installation of the new water line is not within the OU4: Phase 1 Boundary (as described in the Drawings) and outside the limits of contaminated soil on the former CDE facility property.

1.4.1.2 Sampling Objectives

Samples shall be acquired and analyzed in such a manner that the resulting data meets and supports data use requirements. Both definitive and field screening data are anticipated for this project, as defined by the USEPA Guidance for Systematic Planning (EPA 240/B-06/001) and the USACE Chemical QA for HTRW Projects (EM 200-1-6). Field screening quality data shall be generated for health and safety purposes which can be used to identify media or samples that may be subject to further analysis. Definitive level quality data shall be used to confirm limits of contamination; characterize waste; demonstrate imported backfill quality; and verify that the treated water meets discharge limits for surface water and/or POTW. Definitive quality data shall be acquired, documented, verified and reported to ensure that the specified data quality indicators' (DQIs) (precision, accuracy, completeness, comparability and representativeness) measurement performance requirements are achieved. Sampling objectives will be discussed in detail to ensure that the data obtained will be of sufficient quality and quantity to meet the DQOs. The sampling objectives to be contained in the Contractor's UFP-QAPP shall include specific disposal facility requirements for sampling, analysis and reporting.

a. Confirmatory analytical samples: Confirmation samples shall be analyzed for PCBs. The analytical results obtained by the Contractor should be sufficient to document that the limits of excavation have been achieved as described in Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL and the Drawings.

b. Waste disposal characterization samples (solid): Waste disposal characterization samples from excavated soil, rock, and debris shall be analyzed in accordance with disposal facility sampling requirements. The analytical results obtained by the Contractor shall be sufficient to address any and all requirements of the selected disposal facility.

c. Waste disposal characterization samples (water): Waste disposal characterization samples from dewatering operations. The analytical results obtained by the Contractor shall be sufficient to address any and all requirements of the selected disposal facility.

d. Samples of imported backfill from each offsite source shall be collected and analyzed for the parameters listed in Table 1. Sample data shall be sufficient to demonstrate that backfill materials do not contain contaminants that are hazardous to human health or the environment or exceed limits established for the site. Material delivered to the site shall meet the definition provided in NJAC 7:26E -1.8. The Contractor shall compare sample data against available site background data and/or NJAC 7:26D, NJDEP Soil Cleanup Standard. The data will be compared to the most stringent NJDEP soil cleanup standard, which will be the lowest value for each listed compound from either Table 1A-Residential Direct Contact Health Based Criteria and Soil Remediation Standards (mg/kg) or Table 1B-Non-Residential Direct Health Based Criteria and Soil Remediation Standards (mg/kg), where those numbers are not below background or method detection limits. No backfill shall be brought to the site without written approval from the Contracting Officer.

e. Performance samples from the temporary on-site water treatment system used to treatment dewatering fluids, shall be collected and analyzed to monitor treatment plant performance and refine operating procedures as described in Sections 01 35 45 CHEMICAL DATA QUALITY CONTROL AND 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS. Compliance samples (Table 1) shall be collected and analyzed to monitor the effectiveness of the treatment and compliance with the applicable permit limits. The sampling objectives to be contained in the Contractor's UFP-QAPP shall include effluent limits for all compounds required under applicable permit equivalency.

1.4.1.3 Chemical DQO:

Chemical data shall be acquired, documented, verified and reported in a manner that assures that the precision, accuracy, and completeness requirements provided in Table 2 are achieved. The UFP-QAPP shall comply with the DQO process requirements as specified in EPA 240/B-06/001.

1.4.2 Sampling, Analysis and Measurement

The requirements that are listed in the following subsections shall be included in the UFP-QAPP.

1.4.2.1 Waste Disposal Characterization Samples

a. Samples from excess soil excavated during construction shall be collected and analyzed in accordance with Contractor's approved disposal facility requirements. Samples shall be analyzed for waste characteristics to determine handling, transportation and disposal requirements. The number and volume of samples are determined by disposal facility. The analytes are listed in Table 1. The Contractor shall ensure that all the disposal facility requirements are met prior to shipment of the waste.

b. Samples from water treatment activities shall be collected and analyzed in accordance with Contractor's approved disposal requirements. Samples shall be analyzed for waste characteristics to determine handling, transportation and disposal requirements. The minimum required analytes are listed in Table 1. The Contractor shall ensure that all the disposal facility requirements are met prior to shipment of the waste.

c. Material shipping manifesting shall be in accordance with 40 CFR 261, 40 CFR 262, 40 CFR 268, 49 CFR 172, and 49 CFR 178. Manifesting samples shall be collected and analyzed according to Table 1.

1.4.2.2 Backfill Material Samples

a. Backfill material samples are to be collected at a frequency stated in Section 31 23 00.00 20 BACKFILL AND COMPACTION for Phase 1 Remediation Work and Section 31 23 00.99 TRENCHING AND BACKFILL for Phase 2 Water Line Work. Analytical methods are included in Tables 1 and 2.

b. Sample data shall be sufficient to demonstrate that backfill and topsoil materials meet the definition of clean fill per NJAC 7:26E -1.8. The criteria for backfill to be free of radiological contamination are listed below:

1) Radium(Ra-226) less than 3 picoCuries per gram (pCi/g) (assuming background level of 1 pCi/g).
2) Gamma Radiation Exposure Rate less than 30 microRoentgen per hour (uR/hr).

1.4.2.3 Confirmatory Analytical Samples

Confirmatory Analytical Samples are to be collected and analyzed for PCBs as stated in Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL and in the Drawings.

1.5 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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Uniform Federal Policy Quality Assurance Project Plan; G

SD-06 Test Reports

Chemistry Data Package

Chemical Data Final Report; G

1.6 QUALITY ASSURANCE (QA) / Quality Control (QC) ELEMENTS

Follow the QA/QC elements necessary to monitor and ensure the quality of chemical data produced.

1.6.1 Analytical Testing Laboratory

1.6.1.1 General

a. The Contractor shall comply with the Superfund Field and Analytical Services Teaming Advisory Committee (FASTAC) policy in selecting and implementing analytical services for this project. This policy requires use of the tiered decision tree for procuring Superfund analytical services for all non-time critical data collection projects. The

decision tree is as follows:

1) Tier 1: EPA Region II Division of Environmental Science and Assessment (DESA) Laboratory including Environmental Services Assessment Team (ESAT) support.

2) Tier 2: National Analytical Services Contract Laboratories Program (CLP).

3) Tier 3: Region Specific Analytical Services (SAS) Contract laboratories.

4) Tier 4: Contractor, Interagency Agreement (IAGs) and Field Contractor Subcontract laboratories.

b. For this project, all data are time critical so a subcontracted lab (i.e., Tier 4) will be used, however, the Contractor shall comply with the following parts of the FASTAC policy.

1. The Contractor shall submit the Analytical Service Request Form (ARF) to EPA Regional Sample Control Center (RSCC) a minimum of two weeks prior to mobilization of the sampling event. The Contractor shall include in the ARF the proposed analytical subcontract laboratory to be used.

2. The ARF shall be submitted to the EPA Region 2 Hazardous Waste Support Branch (HWSB) Sharepoint site. The selected subcontract laboratory shall be approved by the EPA Remedial Project Manager (RPM) and USACE. The Contractor shall provide justification for use of a subcontract laboratory to the EPA RPM along with the ARF indicating the required analyses, turnaround times, special requests, etc. The subcontract laboratory shall meet the certification requirements listed in paragraph 1.6.1.3.

1.6.1.2 Subcontracted Laboratory Analytical Requirements

The Contractor shall provide chemical analyses for all parameters by methods specified in the project specification or UFP-QAPP to achieve the project DQO.

1.6.1.3 Subcontract Laboratory Certification

Environmental laboratory services are to be provided only by laboratories compliant with the most recently published version of the National Environmental Laboratory Accreditation Program (NELAP) accreditation for all appropriate fields-of-testing and certified by the State of New Jersey. Before testing services can be performed by the laboratory, the Contractor shall verify the candidate laboratory's acceptability by reviewing their certifications. NELAP accreditation information is to be provided annually. The laboratory shall notify the Government immediately of change in status of laboratory operations that may affect on-going compliance with these requirements. The USACE/EPA may, at any time, conduct audits (including requests for pertinent data or information) that support an environmental laboratory's self-declaration of compliance with this policy. If the USACE/EPA finds the laboratory is in non-compliance; the Contractor shall utilize alternate, compliant laboratory services until such time as compliance is again demonstrated. Before performing environmental testing, the laboratory shall have access to the approved UFP-QAPP.

1.6.1.4 Subcontract Laboratory Performance

The Contractor shall provide oversight to ensure continued acceptable analytical performance and shall establish a procedure to address data deficiencies noted by review and/or quality control sample results. The Contractor shall provide and implement a mechanism for providing analytical laboratories with the UFP-QAPP, for monitoring analytical performance and for ensuring corrective action procedures are implemented.

1.6.2 Documentation of Sample Collection and Analysis

The Contractor shall submit a trip report to the EPA RSCC within seven days of collection of the final sample in a CLP Case for samples analyzed by a CLP laboratory. The trip report shall include sample locations, dates of collection and shipment, identification of QC samples, and names of laboratories to which samples were submitted. The trip report shall be submitted via the EPA Region 2 HWSB Sharepoint site.

1.6.3 Documentation of Sample Collection and Analysis

The Contractor shall be responsible for the independent data review of the entire primary data set.

1.6.4 Contractor QC Sample Collection and Analysis

Quality control samples shall be collected and analyzed by the Contractor in accordance with EPA's Contract Laboratory Program Guidance for Field Samplers (EPA 540-R-014-013) and other guidance documents and the Contractor's approved UFP-QAPP. Quality control samples shall be collected as described in the Contractor's approved UFP-QAPP. The following summarizes the minimum QC sampling requirements:

1. Field duplicates shall be collected at a rate of at least one per every 20 samples to assess the overall precision of the field sampling technique.

2. One trip blank shall be included with each daily shipment that contains aqueous samples collected for VOC analysis to verify the presence or absence of cross contamination in VOC samples during handling and shipment from the field to the laboratory.

3. One field (equipment/rinsate) blank shall be collected at a frequency of one per decontamination event, not to exceed one per day, for each equipment type and for each sample matrix to assess the effectiveness of equipment decontamination.

4. One cooler temperature indicator or "temperature blank" will be placed in each cooler containing samples (solid and aqueous) for analysis to verify that samples have been maintained at 0 to 6 degrees C (32 to 42.8 degrees F).

5. One matrix spike/spike duplicate or matrix duplicate (MS/MSD or MD) will be collected at a rate of least one per every 20 samples to demonstrate the accuracy of laboratory analysis.

1.6.5 Data Validation

1. The Contractor shall validate analytical data for samples analyzed by the Contractor's subcontract laboratory. The inorganic and organic data

shall be evaluated in accordance with EPA Contract Laboratory Program National Functional Guidelines (Inorganic - EPA 540-R-10-011 and Organic - EPA 540-R-08-01). Radionuclide data shall be evaluated in accordance with Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP) Chapter 8, Section 8.5 (EPA 402-B-04-001A). Items listed below shall be assessed as part of the data validation. The data validation criteria shall be consistent with project DQOs and discussed in the approved UFP-QAPP. The Contractor shall prepare a data validation report, which shall include a summary of the independent data reviewer's findings. The summary shall consist of a table listing each QC result outside of established criteria, the established criteria, and the validation actions. Comments shall be included on how these data affect the validity of analytical results of the samples including data qualifiers used. The data validation report shall include, but not be limited to, the following parameters:

a. Data completeness.
b. Method blank and field blanks.
c. Holding time including sample integrity.
d. Surrogate recovery.
e. Instrument calibration.
f. Matrix spike.
g. Continuing calibration verification.
h. Laboratory and field duplicate results.
i. Laboratory control samples.
j. Verification of sample results.

2. The Contractor shall have the laboratory data validated by an organization independent of the organization generating the data.

1.6.6 Analytical Data

1. Hard Copy: The chemistry data packages shall be re-produced and provided to the Government no later than 4 weeks after receipt of the analytical data package from the subcontract laboratory. The chemistry data package shall contain information to demonstrate that the project's DQOs have been fulfilled.

2. Electronic Data Deliverables:

a. All laboratory data shall be submitted by the Contractor to EPA in the Staged Electronic Data Deliverable (SEDD) format. Details on the SEDD format are provided in the SEDD Version 5.2 (or most recent version) specification located at: https://www.epa.gov/clp/staged-electronic-data-deliverable-sedd

b. The Contractor shall prepare and submit to EPA a final EDD for all final sampling results prepared in accordance with the procedures and requirements set forth in the Comprehensive EDD Specification Manual (current edition) and as described at the following website: https://www.epa.gov/superfund/region-2-superfund-electronic-data-submission.

c. The Contractor shall provide the Government with a copy of the transmittal letter for all EDD submissions, identifying what data were provided in the EDD. The Contractor shall also provide the Government with a copy of the notice from EPA that the EDD submittal was successfully uploaded.

1.7 QUALIFICATIONS

1.7.1 Chemical Quality Control Officer

As a minimum, the Contractor's Chemical Quality Control Officer shall have: a Bachelor's Degree (B.A. or B.S.) degree in Chemistry; three years of experience with Hazardous Toxic and Radioactive Waste (HTRW) Quality Control including hazardous waste manifesting.

The Chemical Quality Control Officer shall ensure that all chemistry related objectives including responsibilities for DQO definitions, sampling and analysis, project requirements for data documentation and validation, and final project reports are attained. The Chemical Quality Control officer need not be present onsite during routine sampling, but shall be available for consultation with Government and Contractor personnel.

1.7.2 Project Chemist

As a minimum, the Contractor's Project Chemist shall have: a Bachelor's Degree (B.A. or B.S.) degree in Chemistry; three years of experience related to investigations, studies, design and remedial actions at HTRW sites; three field seasons experience in calibrating and operating various field monitoring devices; and three years of experience in the operation of an HTRW commercial laboratory with standard analytical chemistry methods common for analyzing soil, water, air and other materials for chemical contamination assessment, including data for hazardous waste manifesting. The Chemist shall be available for consultation with the Contractor's personnel and Government personnel. The Chemist should have general knowledge of remedial process chemistry, fate and transport of organics and inorganics, knowledge of chemical quality control, experience with ADR.NET validation software and staged electronic data deliverables. The Chemist shall be experienced in the sampling and analysis of toxic/hazardous chemicals and radiological contamination in environmental matrices. The Chemist will be required to have advanced expertise (senior level) in chemical data quality management of environmental analytical data. The project chemist shall ensure that all chemistry related goals of the program are attained.

1.7.3 Environmental Sampler

As a minimum, the Contractor's Environmental Sampler shall have: a Bachelor's Degree (B.A. or B.S.) degree in Chemistry, Environmental Science, Engineering, Geology, Hydrology, or a related field; three years of experience in the development and preparation of SAP and work plans; one year of experience in and knowledge of EPA methods for collecting environmental and hazardous waste samples; one year of experience in operation of field screening equipment (e.g., PID, FID). The Environmental Sampler shall collect all onsite samples and perform all field screening tests. The Environmental Sampler shall review the sampling results and provide recommendations for the Contractor's sampling program. The Environmental Sampler shall be onsite during excavation and stockpiling operations involving contaminated soil.

1.8 COORDINATION MEETING

After the preconstruction conference, before any sampling or testing, the Contractor and the Contracting Officer will meet at the construction site to discuss the CQC Plan and the UFP-QAPP. The coordination meeting will be simultaneous to any CQC coordination meeting required in Section

01 45 00.00 10 QUALITY CONTROL unless otherwise indicated or directed. A list of definable features that involve chemical measurements shall be agreed upon. At a minimum, each matrix (soil, water, air, etc.) shall be a definable work feature. Management of the chemical data quality system including project DQO, project submittals, chemical data documentation, chemical data assessment, required sampling and analysis protocols, and minimum data reporting requirements shall be agreed upon. The meeting will serve to establish an interrelationship between the Contractor's chemical data quality management and Government chemical quality assurance requirements. Minutes of the meeting will be documented by the Contractor and shall be signed by both the Contractor and the Government. The minutes will include any or all unresolved chemical issues along with the conditions for resolution and will become a part of the contract file. There may be occasions when additional conferences may be called by either party to reconfirm mutual understandings, and/or to address deficiencies in the CQC system, or procedures that may require corrective action by the Contractor.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Provide chemical sample acquisition, sample analysis, instrumental measurements of chemical parameters for chemical data quality control. An effective chemical data quality control system shall be established that meets the requirements for the chemical measurement DQO applicable to the Project. The system shall cover chemical measurements pertaining to and required for Contractor and subcontractor produced chemical data. Control field screening, sampling, and testing in conjunction with remedial activities to meet all DQO; minimize the amount of excavated material requiring temporary storage; prevent dilution of contaminated soils with clean soils; and ensure completion of work within the required time.

3.2 CONTRACTOR QUALITY CONTROL PLAN

3.2.1 Additional Requirements

In addition to the quality control requirements specified in Section 01 45 00.00 10 QUALITY CONTROL, the CQC Plan shall incorporate the qualifications, authority and responsibilities of all chemical quality management and support personnel. Chemical measurements including sampling and/or chemical parameter measurement will not be permitted to begin until after production and acceptance of the CQC Plan, and Government approval of the UFP-QAPP.

3.2.2 Chemistry Elements of the CQC Plan

To cover contract related chemical measurements by the Contractor and all subcontractors, the CQC Plan shall include the following as a minimum.

3.2.2.1 Qualifications

Names, education, experience qualifications, authorities, and

decision-making responsibilities of all chemical quality management and support personnel. The CQC Plan shall contain a copy of a letter from the project QC manager designating and authorizing a Chemical Quality Control Officer and chemical quality control organization staff.

3.2.2.2 Authority and Responsibility

A diagram, flow chart, or figure clearly depicting the chemical data quality management and support staff and the authority and responsibility of each for chemical sampling and analysis, procedures for corrective actions, deliverables and submittals, deviations and changes, chemical quality documentation, data validation, minimum data reporting requirements, and DQO for chemical parameter measurement by the Contractor and subcontractors. The contents of this section of the CQC Plan shall be included in the applicable "Project Organization" elements of the FSP and the QAPP.

3.3 UNIFORM FEDERAL POLICY QUALITY ASSURANCE PROJECT PLAN

3.3.1 General

The UFP-QAPP shall describe all chemical parameter measurements for all phases of the remedial action. The Contractor must provide sufficient detail for the project team to obtain data that meets the data quality objectives of the project. The Contractor's developed QAPP shall be in accordance with the UFP-QAPP Manuals referenced in Subpart 1.2 and shall be in the Optimized UFP-QAPP Worksheet format (IDQTF, 2012).

3.3.2 Level of Detail

The UFP-QAPP shall contain necessary technical detail and direction such that field and laboratory personnel understand all sampling and field measurement requirements. It shall document all aspects of the project, planning, implementation, assessment, corrective actions and reconciliation of completed tasks with documented planned objectives. It shall contain sufficient direction and detail that onsite personnel can perform all onsite activities required to attain project DQOs, including: collection of samples for offsite chemical analysis, shipment of samples for offsite analyses, and performance of onsite instrumental parameter measurements, data documentation and reporting requirements. The level of detail in the UFP-QAPP shall be such that any technically-competent personnel unfamiliar with the Site can follow the plan and perform all required work. It shall contain sufficient direction and detail that analytical laboratory personnel understand the analytical methods required and the project required reporting limits, project data validation and reporting requirements.

3.3.3 Appendices

The Appendices of the UFP-QAPP shall contain all Contractor standard forms, project figures and tables, and SOPs, and all references pertaining to the project requirements included in the UFP-QAPP relating to project DQOs, standard and non-standard measurement method, equivalency data, U.S. Government and regional agency guidance and regulatory documents, existing site related documents, and other contract related chemical analysis documents. Reference to all applicable SOPs from EPA 540/P-87/001, Compendium of Superfund Field Operations Methods, or Contractor SOPs, where applicable, shall be included.

3.3.4 Content

The UFP-QAPP shall cover, at minimum, the following topics and meet the requirements of the UFP-QAPP Manual:

1. Distribution List.
2. Title and Approval Page.
3. Project Description.
4. Introduction including, Summary of Scope and Objectives, Site History and Contaminants.
5. Existing Site Data Summary-Evaluation of Secondary Data and Use Limitations.
6. Project Description/Problem Definition/ Site Specific Analysis Problems.
7. Project Objectives/Systematic Planning Documentation/Data Quality Objectives.
8. Sampling Design and Rationale.
9. Scope and Objectives.
10. Project Schedule and Timelines.
11. Project Organization and Responsibility.
12. Personnel Responsibilities, Qualifications and Special Training Requirements.
13. Field Activities and Procedures (SOPs).
14. Field and Laboratory QC Samples.
15. Sampling Procedures and Container/Preservation Requirements.
16. Sample Custody, Chain-of-Custody/Sample Documentation.
17. Sample Handling/ Identification.
18. Field Logbooks and Contents; Documentation Procedures.
19. Sample Packaging and Shipping.
20. Equipment Decontamination.
21. Contractor Quality Control.
22. Daily Quality Control Reports.
23. Field Quality Control and Corrective Actions.
24. Sampling Apparatus and Field Instrumentation.
25. Data Quality Objectives and Measurement Performance Criteria.
26. Sample Custody and Holding Times.
27. Analytical Procedures.
28. Reference Limits and Evaluation of Quantization Limit Goals.
29. Laboratory Calibration Procedures and Frequency.
30. Internal QC Checks.
31. Calculation of Data Quality Indicators.
32. Laboratory Corrective Actions.
33. Data Reduction, Review, Validation and Reporting.
34. Laboratory Reporting Requirements.
35. Preventive Maintenance (Field and Laboratory).
36. Performance and System Audits.
37. QC Reports to Management.
38. Appendices.

3.3.5 Table of Contents

The UFP-QAPP shall include a table of contents; crosswalk showing that all UFP-QAPP elements have been addressed; definitions, acronyms, references pertaining to the project, and other related chemical analysis documents such as the data validation SOP for parameters not included in the National Functional Guidelines.

3.3.6 Packing and Shipping

The following procedures shall be followed for sample packing and shipment:

CLP/DESA Laboratory - Contract Laboratory Program Guidance for Field Samplers (EPA 540-R-014-013), January 2011.

3.3.7 Regulatory Requirements

All Department of Transportation (DOT) regulations 40 CFR 261, 106 to 179 shall be followed regarding shipment of the samples.

3.4 CHEMISTRY DATA PACKAGE

The chemistry data package shall contain information to demonstrate that the project's DQO have been fulfilled. Content of a data package is defined in EM 200-1-6. The chemistry data package shall be produced and provided to the Government monthly. The QA function will compare QA sample results to corresponding primary sample results, will assess the Contractor's compliance with the UFP-QAPP, and will recommend corrective action as necessary.

3.5 CONTROL OF CHEMICAL DATA QUALITY

3.5.1 General

Contractor chemical data quality control ensures that a quality control program is in place that assures sampling and analytical activities and the resulting chemical parameter measurement data comply with the DQO and the requirements of the UFP-QAPP. Utilize the three-phase control system that includes a preparatory, initial and follow-up phase for each definable feature of work. The Contractor's three-phase chemical data control process shall ensure that data reporting requirements are achieved and shall be implemented according to Section 01 45 00.00 10 QUALITY CONTROL. When possible, the three-phase chemical data control process shall be combined with that under Section 01 45 00.00 10 QUALITY CONTROL.

3.5.2 Three Phase Chemical Data Control Process

1. The preparatory phase shall include a review of the specification, UFP-QAPP, and all relevant SOPs for the chemical parameter measurement and/or chemical sample acquisition and shipment. It shall include a physical examination of all required forms, materials and equipment to ensure conformance with the UFP-QAPP and that all materials are on site. It shall include a demonstration of sampling procedures by the Contractor's field sampling personnel.

2. The initial phase shall be performed at the initiation of each definable feature of work by the CQC Representative to confirm compliance with the UFP-QAPP, including: instrument calibration, operation and performance checks, sample acquisition, labeling, and shipment in accordance with required SOPs, sampling equipment decontamination, and completion of all required documentation.

3. The follow up phase shall require daily inspections to ensure compliance with the UFP-QAPP.

3.6 ANALYTICAL TESTING LABORATORIES

If DESA or CLP cannot accommodate the analyses, Contractor shall propose the analytical laboratories to be used for the primary samples analyses. Laboratory validation requirements shall be in accordance with paragraph Paragraph 1.6.6 Data Validation. The Contractor may utilize its own laboratory or utilize subcontract laboratories to achieve the primary required sample analyses.

3.6.1 Laboratory Analytical Requirements

Provide the specified chemical analyses by the Contractor's laboratory and /or by subcontractor's laboratory. Provide chemical analyses to achieve the project DQO for all parameters by the methods in the UFP-QAPP. To give the USACE programs the greatest flexibility in the execution of its projects, the EPA SW-846 methods are generally the methods employed for the analytical testing of environmental samples. These methods are flexible and shall be adapted to individual project-specific requirements.

3.6.2 Laboratory Performance

Monitor and ensure continued acceptable analytical performance and establish a procedure to address data deficiencies noted by review and/or quality assurance sample results. Provide and implement a mechanism for providing analytical labs with the UFP-QAPP, for monitoring the lab's performance and for performing corrective action procedures. Acquire analytical services with additional USACE and State of New Jersey validated laboratories in the event a project lab loses its validation status during the project.

3.7 CHEMICAL DATA FINAL REPORT

The Chemical Data Final Report (CDFR) shall be produced including a summary of quality control practices employed and all chemical parameter measurement activities after project completion. As a minimum, the CDFR shall contain the following:

A. Summary of project scope and description.

B. Summary of any deviations from the UFP-QAPP or the design chemical parameter measurement specifications.

C. Summary of chemical parameter measurements performed as contingent measurements.

D. Summary discussion of resulting data including achieving data reporting requirements.

E. Summary of data usability and achievement of project specific DQO based on the results of validation and verification.

F. Presentation and evaluation of the data to include an overall assessment on the quality of the data for each method and matrix.

G. Internal QC data generated during the project, including tabular summaries correlating sample identifiers with all blank, matrix spikes, surrogates, duplicates, laboratory control samples, and batch identifiers.

H. A list of the affected sample results for each analyte (indexed by method and matrix) including the appropriate data qualifier flag (J, B, R, etc.), where sample results are negatively impacted by adverse quality control criteria.

I. Comparison of the USACE QA samples to the corresponding project sample data analyzed by the Subcontract laboratory.

J. Summary of field and laboratory oversight activities, providing a discussion of the reliability of the data, QC problems encountered, and a summary of the evaluation of data quality for each analysis and matrix as indicated by the laboratory QC data and any other relevant findings.

K. Conclusions and recommendations.

L. Appendices containing the chemistry data packages for all subcontract laboratory data and validation reports.

3.8 NOTIFICATION OF NON-COMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice.

3.9 SUPPLEMENTARY INFORMATION

The supplements listed below are provided in Appendix A: Supplementary Information.

1. Table 1: Analytical Methods for Chemical Parameters.
2. Table 2: General Data Quality Objectives for Chemical Parameters.

-- End of Section --

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SECTION 01 36 20

PERIMETER AIR MONITORING
09/17

PART 1 GENERAL

1.1 SCOPE OF WORK

This section describes the responsibilities of the Contractor for monitoring potentially contaminated particulates in the OU-2 Area, OU4: Phase 1 Boundary, and Phase 2 Limit of Water Line Construction as shown in the Drawings. This section is to be used in the preparation of the Perimeter Air Monitoring Plan (PAMP). The Contracting Officer is committed that the work performed under these specifications will be actively managed so that airborne dust and contaminants, if present, generated by construction activities are maintained below the applicable allowable levels established for general public exposure.

Matters of interpretation of these standards associated with perimeter air monitoring shall be identified and submitted to the Contracting Officer. All matters of interpretation shall be resolved before starting work. Where the requirements of this Specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

1.2 REFERENCES

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

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 625/R-96/010a	(1999) Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air
EPA/625/R-96/010b	(1999) Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Perimeter Air Monitoring Plan (PAMP); G

AQS Name And Qualifications; G

SD-06 Test Reports

Daily Air Monitoring Summary Report

Monthly Air Monitoring Report Compilation; G

Meteorological Data; G

1.4 PERIMETER AIR MONITORING PLAN

The Contractor shall develop, submit for Government review and implement after Government acceptance a written Perimeter Air Monitoring Plan (PAMP) for Remedial Action operations.

1.4.1 Contents

The PAMP shall be prepared covering remediation activities to be performed by the Contractor and all subcontractors. The PAMP shall establish, in detail, the protocols necessary for the anticipation, recognition, evaluation, and control of emissions associated with each task performed based upon site-specific conditions.

The PAMP shall be a stand-alone plan and shall include, but not be limited to, the following:

a. Control of airborne contaminant emissions.
b. Air quality monitoring and sampling procedures.
c. Collection of meteorological data.
d. Detailed descriptions of proposed perimeter air monitoring equipment, O&M procedures, and calibrations schedules.
e. Organizational structure indicating personnel responsibilities.
f. The qualifications of the Air Quality Monitoring Specialist.
g. Plans for response if and when the action levels have been exceeded.
h. Location of the nearest residents, and proposed monitoring locations. Reference EPA 625/R-96/010a for height above ground, and detailed spacing criteria.

1.4.2 Acceptance and Modification of PAMP

The PAMP shall be submitted to the Contracting Officer for review and approval. Any deficiencies in the PAMP will be discussed at the pre-construction safety conference, and the PAMP shall be revised to correct the deficiencies and resubmitted for acceptance. Onsite work shall not begin until the plan has been accepted by the Contracting Officer.

The Contractor shall keep a copy of the written PAMP on site for review by the USACE and its representatives. As work proceeds, the PAMP shall be adapted to new situations and new conditions. Changes and modifications to the accepted PAMP shall be made with the knowledge and concurrence of the Air Quality Specialist (AQS), the Site Superintendent, and the Contracting Officer. The requested modification shall not be implemented until authorized in writing by the Contracting Officer. Should the Contracting Officer require a modification of any portion or provision of the PAMP, the Contracting Officer will notify the Contractor in writing of such modifications.

The Contracting Officer may stop all site work at any point if the Contractor shows any disregard for the provisions of this specification or the accepted PAMP.

1.5 AIR QUALITY PROTECTION PRINCIPLES

The Contractor shall provide all equipment, materials, and personnel necessary to monitor and quantify dust at the site perimeter fence-line during intrusive site activities. The PAMP shall describe procedures, equipment, and training needed to monitor and quantify the amount of airborne particulate generated by site work activities. The Contractor shall operate a program of equipment maintenance in accordance with the manufacturer's specifications. The Contracting Officer may reject the use of equipment if, in his opinion, it provides less protection than that specified in the PAMP.

1.5.1 Action Levels

The Contractor shall perform remediation in a manner such that ambient air quality objectives at the site perimeter are achieved in accordance with the action levels presented in Table 01 36 20-1. The action levels and required actions shall be presented in the PAMP in both text and tabular form in accordance with Table 01 36 20-1. Contractor shall confirm that there are no local or state action levels at the site that are lower than these action levels.

The Contractor shall notify the Contracting Officer every time a community action level is exceeded as well as actions taken.

Table 01 36 20-1

Analyte	**Action Level[4]**	**Frequency Per Location[2 and 3]**	**Analytical Method**	**Action Required**
Background Site Perimeter - 1 Upwind Location[5]				
Real Time Respirable Dust (PM10)	None	Continuously during the work day, and for 1 hour before and after. Log 15-minute averages	Direct Reading dust meter with data logger	None
Real Time Vapor Monitoring	None	Continuously during the work day, and for 1 hour before and after. Log 15-minute averages	Direct Reading dust meter with data logger	None
Combustible Gas in air	None	Twice per day, once in morning and once in evening	Direct Reading instrument with data logger	None

Analyte	**Action Level[4]**	**Frequency Per Location[2 and 3]**	**Analytical Method**	**Action Required**
Oxygen	None	Twice per day, once in morning and once in evening	Direct Reading instrument with data logger	None
PCBs in air	None	Once prior to excavating, handling, and treating of contaminated material to establish background concentrations in ambient air.[7]	High-volume sampler with sorbent cartridge containing polyurethane foam (PUF)	None
Site Perimeter - 3 Downwind Locations[5]				
Real Time Respirable Dust (PM10)	150 ug/m3[1] (15 minute)	Continuously during the work day, and for 1 hour before and after. Log 15-minute averages	Direct Reading dust meter with data logger	First Instance: Evaluate engineering controls, implement dust control After an Hour: The above steps plus Stop work and notify Contracting Officer. Resume work after Contracting Officer acceptance
Real Time Vapor Monitoring	2 ppm (15 minute) 0.5 ppm (work shift)	Continuously during the work day. Log 15-minute averages	Direct Reading Photoionizatio meter with data logger	First Instance: Evaluate engineering controls, implement vapor emission control. After an Hour: The above steps plus Stop work and notify Contract Officer. Resume work after CO acceptance of control measures.
Combustible Gas in air	More than 10 percent LEL	Twice per day, once in morning and once in evening	Direct Reading instrument with data logger	Evacuate area

Analyte	**Action Level[4]**	**Frequency Per Location[2 and 3]**	**Analytical Method**	**Action Required**
PCBs in air	To be determine by Contactir Officer	Once per week during excavating, handling, and treating of contaminated material[7]	High-volume sampler with sorbent cartridge containing polyurethane foam (PUF)	To be determined by Contacting Officer

Table Notes:

[1]Ambient concentrations, over background.

[2]Frequencies listed in the table are for active construction periods. The Contracting Officer may modify this frequency.

[3]Sampling shall comply with EPA protocols and shall achieve detection limits to demonstrate compliance with specified action levels. Note that the sampling equipment described in EPA 625/R-96/010a must be adjusted to measure particle size of less than 10um.

[4]Total dust and compound-specific action levels are evaluated using data corrected for upwind values.

[5]Three downwind measurements are required with one between active zone and nearest residence or receptor. Locations shall be approved by the Contracting Officer. Monitoring locations will vary as work progresses along the pipeline route.

[6]If perimeter action levels are exceeded, the Contractor shall stop work and initiate dust controls or other remedy actions immediately.

[7]To be collected using high-volume sampler capable of pulling ambient air through the filter/adsorbent cartridge at a flow rate of approximately 8 standard cubic feet per minute (scfm) (0.225 std m3/min) to obtain a total sample volume of greater than 300 scm over a 24-hour period and as described in EPA/625/R-96/010b.

1.6 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

The Contractor's project team shall include an Air Quality Specialist (AQS) and an Air Monitoring and Sampling Technician (AM&ST):

1.6.1 Air Quality Specialist (AQS)

The services of an AQS who is experienced in air monitoring and sampling, shall be utilized. The Safety and Health Manager (SHM) can also serve as the AQS if he/she meets the qualification requirements of an AQS listed in Paragraph 1.6.1.1 below. This specialist shall be familiar with this site's hazards and the scope of this project.

1.6.1.1 Qualifications

The Contractor shall document the AQS name and qualifications in the PAMP. The Contractor shall demonstrate to the Contracting Officer that this AQS has the following credentials:

1. At least one year of experience in air monitoring or sampling, including the following:

a. Serving in responsible professional charge on at least one project in which the impacts of site work on community air was measured.
b. At least 100 hours of hands-on experience (each) in taking ambient air measurements and samples by EPA methods.

2. A scientific or engineering college degree that included the study of air quality issues. The Contracting Officer may accept equivalent training at his or her sole discretion.

3. Appropriate credentials for working on the site are included in the SSHP.

4. Although the Contracting Officer may accept other credentials, the Certified Industrial Hygienist credential offered by the American Board of Industrial Hygiene and the Qualified Environmental Professional credential offered by the Institute for Professional Environmental Practice are both deemed appropriate.

1.6.1.2 Responsibilities

The AQS shall be responsible for the following:

1. Preparation of the air monitoring and sampling protocols for the site work.

2. Selecting the equipment to be used for air monitoring and sampling

3. Determining the times, durations, and locations of air measurements and samples.

4. Develop protocols to determine upwind location and to adjust monitoring and sample results for ambient background.

5. Approving the qualifications of any technicians that will collect air measurements or samples.

6. Interpreting the results of the air monitoring and sampling effort.

7. Approving and signing reports of air quality that the Contractor provides to the Contracting Officer or his representatives.

8. Periodically evaluating if the selected equipment and protocols are adequately representing perimeter conditions.

9. Periodically audit the implementation of the PAMP, and take corrective action when necessary.

1.6.2 Air Monitoring and Sampling Technician

During intrusive activities by the Contractor, an AM&ST shall perform the air monitoring activities as specified in the PAMP. The Site Safety and Health Officer (SSHO) can also serve as the AM&ST, if the AQS approves. The AM&ST shall have appropriate training approved by the Air Quality Specialist.

1.7 AIR QUALITY MONITORING AND SAMPLING

1.7.1 General

The monitoring specified in the PAMP shall detect and quantify dust, and pesticides.

The Contractor shall collect, at minimum, the number of air quality measurements and samples as shown in Table 01 36 20-1. The Contractor shall use monitoring and analytical sampling / methods that accurately measure at detection limits that are consistent with the action levels listed in Table 01 36 20-1.

1.7.2 Sampling Requirements

a. The continuous air monitoring equipment shall be capable of providing the following:

1. Automated communication capability (telemetry) to facilitate real time and remote access to data.
2. Auto-Dialer, emergency lights or other alerting systems to promptly and effectively notify the Contractor that action levels have been exceeded.
3. The AQS shall certify that the air monitoring equipment proposed is consistent with Perimeter Air Monitoring objectives and associated action levels presented in Table 01 36 20-1. Air monitoring methods and equipment locations shall be proposed by the Contractor in the PAMP.

b. The perimeter air sampling should be conducted at all times during intrusive site activities. Sampling shall be conducted at the frequencies defined in Table 01 36 20-1. The Contracting Officer may direct a change in air sampling frequency.

c. Equipment used for air monitoring or sampling in accordance with this section shall be calibrated before and after each use, as required, and maintained as per specified methods, manufacturer's recommendations, and good industrial hygiene practices. Test instruments used in the calibration of air sampling equipment shall be calibrated and traceable to NIST standards.

d. The Contractor shall document, in the site log or site files, the regular calibration of each instrument used. Only individuals trained to operate this equipment shall do so.

e. The Contractor shall furnish, install and maintain a portable meteorological station in accordance with 01 35 29.13, HEALTH, SAFETY AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES for the collection of meteorological data including continuous observation and recording of wind speed, wind direction, ambient air temperature, atmospheric pressure, atmospheric humidity, solar insolation, and atmospheric precipitation.

1. The station shall be capable of recording all measured parameters every 5 minutes. The station shall also transmit real-time data back to a central location so that the real-time particulate monitoring can be correlated to wind direction.
2. Meteorological data collected by the station shall be logged on each day of intrusive site work, so that the weather influences on

the air samples can be characterized. Contractor shall maintain records, written or electronic, of the meteorological monitoring results for the duration of the project.

3. Visual wind direction indicators shall be established in a central location at each active work area.

f. The Contractor shall collect each air measurement over a duration that the AQS determines will yield an accurate representation of the air quality at that time and location.

g. The sampling and analytical procedures to be followed for the collection, handling, and analysis of air samples are those prescribed by EPA Analytical Procedures listed in Table 01 36 20-1. Air samples shall be collected by drawing a known volume of air into a collector as specified in the EPA sampling guide. The analytical results shall be compared to Action Levels established in Table 01 36 20-1 and, if appropriate, action shall be undertaken (i.e., evaluation of work practices). The calibration protocols described in the EPA methods shall be followed. A qualified laboratory shall perform analysis by EPA methods described in Table 01 36 20-1 within 48 hours. A laboratory is "qualified" if it holds certificates required by the New Jersey Department of Environmental Protection for analysis of air samples for the contaminants of interest. NOTE: Monthly samples shall be analyzed with a seven-day turnaround time.

1.7.3 Air Sampling and Monitoring Results Reporting

1.7.3.1 Air Sampling and Monitoring Logs

The Contractor shall maintain an up-to-date log for all sampling activities. A copy of the log shall be submitted to the Contracting Officer weekly during the course of the project site work. The log shall contain sufficient information to verify that proper procedures were followed and confirm the accuracy of results.

1.7.3.2 Daily Air Monitoring Summary Report:

The daily air monitoring summary report shall discuss calibration, calibration check, general observations, weather conditions, and discussion of all required corrective action. In addition, the report shall contain additional information where real-time sampling is utilized.

The Air Sample Analysis Results shall be collected and submitted. A summary of real-time monitoring results shall be presented in tabular form. The table shall include results from all monitoring locations including background and at the minimum included:

a. For dust, peak 15-minute average and daily time-weighted average with all results exceeding action levels clearly delineated and associated corrective action described.

b. For vapor, peak 15-minute average and daily time-weighted average with all results exceeding action levels clearly delineated and associated corrective action described.

c. Comparison of results corrected for background to peak 15-minute average, and time weighted average action levels.

d. Summary of meteorological conditions during the sampling period.

1.7.3.3 Monthly Air Monitoring Report Compilation

Within 5 working days of month's end, the Contractor shall compile and submit copies of each Daily Air Monitoring Summary Report and the weekly air sampling results, for which results were received from the previous calendar month.

1.8 RESPONSE TO AIR EMISSIONS

Contractor shall compare the highest of direct reading measurements for dust downwind of the site (minus the value upwind) to the action levels in Table 01 36 20-1. If the wind is blowing from a direction for which there is no monitor, the upwind value shall be assumed to be the lowest of the values collected by any of the monitors.

When the ambient air monitoring system reveals that action level has been exceeded for 15 or more minutes, the Contractor shall evaluate its engineering controls and implement emission controls. If its process modifications succeed, Contractor shall report the exceedance in its daily air monitoring summary report.

When the air monitoring system reveals that the action level has been exceeded for an hour or more, Contractor shall temporarily suspend intrusive activities, notify the Contracting Officer, and implement corrective action to reduce site-related emissions to below required action levels. The adequacy of these controls is subject to acceptance by the Contracting Officer's representative prior to restarting intrusive activities. Contractor shall report the exceedance in its daily air monitoring summary report.

Site emissions control measures that may be needed to reduce the emissions to below action levels may include, but are not limited to:

1. Adding moisture to exposed soil or stockpiles.
2. Applying a vapor barrier (plastic) to exposed soil or stockpiles.
3. Using a misting system with an odor neutralizing additive.
4. Applying foam to exposed soil or stockpiles.
5. Reducing the speed of equipment that disturbs the soil.
6. Installing barriers to reduce wind speed.
7. Limiting the rate of excavation.

When the ambient air sampling system reveals that action level has been exceeded, the AQS shall use that information to modify the action levels to which the direct-reading measurements are compared so that they will protect the community.

1.9 INSPECTIONS

The Contractor shall perform daily inspections of the job site and the surrounding work in progress in accordance with 01 35 29.13, HEALTH, SAFETY AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES to ensure compliance with PAMP. Contracting Officer may stop all site work at any point if the Contractor shows any disregard for the provisions of this specification or the accepted PAMP.

1.10 DUST AND EMISSION CONTROL

Dust control shall be used throughout the work in accordance with the

Contractor's approved Dirt and Dust Control Plan as required in 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS AND Exposure Monitoring/Air Sampling Program as required by 01 35 29.13, HEALTH, SAFETY AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES.

The AQS shall ensure that dust suppression practices are effective and being utilized. Visual surveillance shall be conducted along construction roads and downwind portions of the Site at least once a day and the areas swept as necessary to control dust and tracking.

PART 2 PRODUCTS

2.1 GENERAL

The Contractor shall provide all necessary sampling devices, pumps and collection media and support equipment to perform the sampling per the approved Perimeter Air Monitoring Plan.

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 45 00.00 10

QUALITY CONTROL
11/16

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 within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D3740	(2012a) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E329	(2014a) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Contractor Quality Control (CQC) Plan; G

SD-06 Test Reports

Verification Statement

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Establish and maintain an effective quality control (QC) system that complies with the Contract Clause titled "Inspection of Construction." QC consist of plans, procedures, and organization necessary to produce an end product which complies with the Contract requirements. The QC system covers all construction operations, both onsite and offsite, and will be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal

by the Contracting Officer for non-compliance with the quality requirements specified in the Contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent maintains a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

3.2 CONTRACTOR QUALITY CONTROL (CQC) PLAN

Submit no later than 15 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." 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 or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional work.

3.2.1 Content of the CQC Plan

Include, as a minimum, the following to cover all construction-operations, both onsite and offsite, 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 will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager that reports 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 which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the Contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will be issued by the CQC System Manager. Furnish copies of these letters to the Contracting Officer.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 00 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 approved by the Contracting Officer are required to be used.)

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. Establish verification procedures that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and is identified by different trades or disciplines, or it is work by the same trade in a different environment. Although each section of the specifications can generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

j. Coordinate scheduled work as needed to ensure that all inspections are conducted in accordance with all permits/permit equivalencies and local, state, and federal regulation. Include Borough of South Plainfield and NJAW in coordination activities (including document reviews as applicable) to ensure that NJAW and the Borough have representatives available on-site as appropriate.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan 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 Contractor to make changes in the Contractor 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, 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, meet with the Contracting Officer and discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by the Government, signed by both the Contractor and the Contracting Officer and will become a part of the contract file. There can be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings or address deficiencies in the CQC system or procedures which can require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a Safety and Health Manager,

CQC System Manager, and sufficient number of additional qualified personnel to ensure safety and Contract compliance. The Safety and Health Manager reports directly to a senior project (or corporate) official independent from the CQC System Manager. The Safety and Health Manager will also 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 Contractor's CQC staff maintains 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 ensure Contract compliance. The CQC staff will be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization is responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization that is responsible for overall management of CQC and has the authority to act in all CQC matters for the Contractor. The CQC System Manager is required to be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of 10 years construction experience on construction similar to this Contract. The individual proposed as the CQC System Manager should have experience with QA/QC in areas specific to HTRW sites and managing submittals. These areas should include remedial investigations, remedial design, and remedial actions. This CQC System Manager is on the site at all times during construction and is employed by the prime Contractor. The CQC System Manager is assigned as CQC System Manager but may have duties, such as backup to the project superintendent, in addition to quality control. Identify in the CQC Plan an alternate to serve in the event of the CQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: civil, geotechnical, environmental, materials technician, submittals clerk. These individuals or specialized technical companies are employees of the prime or subcontractor; responsible to the CQC System Manager; physically present at the construction site during work on the specialized personnel's areas of responsibility; have the necessary education or experience in accordance with the experience matrix listed herein. These individuals can perform other duties but need to be allowed sufficient time to perform the specialized personnel's assigned quality control duties as described in the Quality Control Plan. A single person can cover more than one area provided that the single person is qualified to perform quality control activities in each designated area and that workload allows.

Experience Matrix	
Area	Qualifications
Civil	Graduate Civil Engineer or Construction Manager with 5 years of experience related to investigation, design, and construction of geotechnical features with a minimum of 3 years of experience being related to remedial investigations, feasibility studies, and design and construction of geotechnical features in HTRW sites
Geotechnical	Graduate Geotechnical Engineer or Construction Manager with 2 years of experience or person with 5 years of experience related to investigation, design, and construction of geotechnical features with a minimum of 3 years of experience being related to remedial investigations, feasibility studies, and design and construction of geotechnical features in HTRW sites
Environmental	Graduate Environmental Engineer with 3 years of experience
Submittals	Submittal Clerk with 1 year of experience
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 education requirements, the CQC System Manager and Alternate CQC System Manager are required to have completed the Construction Quality Management (CQM) for Contractors course. If the CQC System Manager does not have a current certification, obtain the CQM for Contractors course certification within 90 days of award. This course is periodically offered by the Naval Facilities Engineering Command and the Army Corps of Engineers. Contact the Contracting Officer for information on the next scheduled class.

The Construction Quality Management Training certificate expires after 5 years. If the CQC System Manager's certificate has expired, retake the course to remain current.

3.4.5 Organizational Changes

Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, have to comply with the requirements in Section 01 33 00 SUBMITTAL PROCEDURES. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements.

3.6 CONTROL

CQC is the means by which the 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 are required to be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase is 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 includes:

a. A review of each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.

b. Review of the Contract drawings.

c. Check to assure that all materials and 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. 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. 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. Check to ensure 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 needs to be notified at least 48 hours in advance of beginning the preparatory control phase. 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. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:

a. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing are in compliance with the contract.

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 needs to be notified at least 48 hours in advance of beginning the initial phase for definable feature of work. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for definable feature of work for future reference and comparison with follow-up phases.

g. The initial phase for each definable feature of work is repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

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

3.7 TESTS

3.7.1 Testing Procedure

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

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including that all of the test documentation requirements have been prepared.

e. Record results of all tests taken, both passing and failing on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports are submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated results in nonpayment for related work performed and disapproval of the test facility for this Contract.

3.7.2 Testing Laboratories

All testing laboratories must be validated by the USACE Material Testing Center (MTC) for the tests to be performed. Information on the USACE MTC with web-links to both a list of validated testing laboratories and for the laboratory inspection request for can be found at:

http://www.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476661/materials-testing-center/

3.7.2.1 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 is required to meet criteria detailed in ASTM D3740 and ASTM E329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the 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 Contractor.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Conduct an inspection of the work by the CQC System Manager near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications, as required by paragraph DOCUMENTATION. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. Make a second inspection the CQC System Manager or staff to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility 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 facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. 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. Correct any items noted on the Pre-Final inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph need to 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 with separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative is required to be in attendance at the final acceptance inspection. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notify the Contracting Officer at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the 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 Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the Contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

3.9.1 Quality Control Activities

Maintain current records providing factual evidence that required quality control activities and tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:

a. The name and area of responsibility of the Contractor/Subcontractor.

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 control activities performed with results and references to specifications/drawings requirements. Identify the control phase (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

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

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

g. Offsite 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 specifications.

3.9.2 Verification Statement

Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the Contract. Furnish the original and one copy of these records in report form to the Government daily within 48 hours 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, prepare and submit one report for every 7 days of no work and on the last day of a no work period. All calendar days need to be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports need to be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the CQC System Manager Report.

3.10 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of

notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer can 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 will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

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SECTION 01 45 00.15 10

RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM)
11/16

PART 1 GENERAL

1.1 REFERENCES

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

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

1.2 CONTRACT ADMINISTRATION

The Government will use the Resident Management System (RMS) to assist in its monitoring and administration of this contract. The Contractor uses the Government-furnished Construction Contractor Mode of RMS, referred to as RMS CS, to record, maintain, and submit various information throughout the contract period. The Contractor mode user manuals, updates, and training information can be downloaded from the RMS web site (http://rms.usace.army.mil). The joint Government-Contractor use of RMS facilitates electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

Administration
Finances
Quality Control
Submittal Monitoring
Scheduling
Import/Export of Data

1.2.1 Correspondence and Electronic Communications

For ease and speed of communications, exchange correspondence and other documents in electronic format to the maximum extent feasible between the Government and Contractor. Correspondence, pay requests and other documents comprising the official contract record are also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

1.2.2 Other Factors

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01 32 01.00 10 PROJECT SCHEDULE, Section 01 33 00 SUBMITTAL PROCEDURES, and Section 01 45 00.00 10 QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through RMS. Also, there is no separate payment for establishing and maintaining the RMS database; costs associated will be included in the contract pricing for the work.

1.3 RMS SOFTWARE

RMS is a Windows-based program that can be run on a Windows based PC meeting the requirements as specified in Section 1.3. The Government will make available the RMS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor will be responsible to download, install and use the latest version of the RMS software from the Government's RMS Internet Website. Any program updates of RMS will be made available to the Contractor via the Government RMS Website as the updates become available.

1.3.1 RMS CONTRACTOR'S MODE (CM)

RMS Contractor's Mode or RMS CM is the replacement for Quality Control System or QCS. The database remains the same. References to RMS in this specification includes RMS CM.

1.4 SYSTEM REQUIREMENTS

The following is the minimum system configuration required to run RMS and Contractor Mode:

Minimum RMS System Requirements	
Hardware	
Windows-based PC	1.5 GHz 2 core or higher processor
RAM	8 GB
Hard drive disk	200 GB space for sole use by the QCS system
Monitor	Screen resolution 1366 x 768
Mouse or other pointing device	
Windows compatible printer	Laser printer must have 4 MB+ of RAM
Connection to the Internet	minimum 4 Mbs per user
Software	
MS Windows	Windows 7 x 64 bit (RMS requires 64 bit O/S) or newer
Word Processing software	Viewer for MS Word 2013, MS Excel 2013, or newer
Microsoft.NET Framework	Coordinate with Government QA Representative for free version required
E-mail	MAPI compatible
Virus protection software	Regularly upgraded with all issued manufacturer's updates and is able to detect most zero day viruses.

1.5 RELATED INFORMATION

1.5.1 RMS User Guide

After contract award, download instructions for the installation and use of RMS from the Government RMS Internet Website.

1.6 CONTRACT DATABASE

Prior to the pre-construction conference, the Government will provide the Contractor with basic contract award data to use for RMS. The Government will provide data updates to the Contractor as needed. These updates will generally consist of submittal reviews, correspondence status, Quality Assurance(QA) comments, and other administrative and QA data.

1.7 DATABASE MAINTENANCE

Establish, maintain, and update data in the RMS database throughout the duration of the contract at the Contractor's site office. Submit data updates to the Government (e.g., daily reports, submittals, RFI's, schedule updates, payment requests) using RMS. The RMS database typically includes current data on the following items:

1.7.1 Administration

1.7.1.1 Contractor Information

Contain within the database the Contractor's name, address, telephone numbers, management staff, and other required items. Within 7 calendar days of receipt of RMS software from the Government, deliver Contractor administrative data in electronic format in RMS.

1.7.1.2 Subcontractor Information

Contain within the database the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor is listed separately for each trade to be performed. Assign each subcontractor/trade a unique Responsibility Code, provided in RMS. Within 7 calendar days of receipt of RMS software from the Government, deliver subcontractor administrative data in electronic format.

1.7.1.3 Correspondence

Identify all Contractor correspondence to the Government with a serial number. Prefix correspondence initiated by the Contractor's site office with "S". Prefix letters initiated by the Contractor's home (main) office with "H". Letters are numbered starting from 0001 (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

1.7.1.4 Equipment

Contain within the Contractor's RMS database a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.7.1.5 Management Reporting

RMS includes a number of reports that Contractor management can use to

track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of RMS. Among these reports are: Progress Payment Request worksheet, Quality Assurance/Quality Control (QA/QC) comments, Submittal Register Status, Three-Phase Control checklists.

1.7.1.6 Request For Information (RFI)

Exchange all Requests For Information (RFI) using the Built-in RFI generator and tracker in RMS.

1.7.2 Finances

1.7.2.1 Pay Activity Data

Include within the RMS database a list of pay activities that the Contractor develops in conjunction with the construction schedule. The sum of pay activities equals the total contract amount, including modifications. Each pay activity must be assigned to a Contract Line Item Number (CLIN). The sum of the activities equals the amount of each CLIN. The sum of all CLINs equals the contract amount.

1.7.2.2 Payment Requests

Prepare all progress payment requests using RMS. Complete the payment request worksheet, prompt payment certification, and payment invoice in RMS. Update the work completed under the contract, measured as percent or as specific quantities, at least monthly. After the update, generate a payment request report using RMS. Submit the payment request, prompt payment certification, and payment invoice with supporting data using RMS CM. If permitted by the Contracting Officer, e-mail or a optical disc may be used. A signed paper copy of the approved payment request is also required and will govern in the event of discrepancy with the electronic version.

1.7.3 Quality Control (QC)

RMS provides a means to track implementation of the 3-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other Contractor QC requirements. Maintain this data on a daily basis. Entered data will automatically output to the RMS generated daily report. Provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01 45 00.00 10 QUALITY CONTROL. Within seven calendar days of Government acceptance, submit a RMS update reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

1.7.3.1 Daily Contractor Quality Control (CQC) Reports.

RMS includes the means to produce the Daily CQC Report. The Contractor can use other formats to record basic Quality Control (QC) data. However, the Daily CQC Report generated by RMS must be the Contractor's official report. Summarize data from any supplemental reports by the Contractor and consolidate onto the RMS-generated Daily CQC Report. Submit daily CQC Reports as required by Section 01 45 00.00 10 QUALITY CONTROL. Electronically submit reports to the Government within 24 hours after the date covered by the report. Also provide the Government a signed, printed copy of the daily CQC report.

1.7.3.2 Deficiency Tracking.

Use RMS to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using its Quality Control (QC) punch list items. Maintain a current log of its QC punch list items in the RMS database. The Government will log the deficiencies it has identified using its Quality Assurance (QA) punch list items. The Government's QA punch list items will be included in its export file to the Contractor. Regularly update the correction status of both QC and QA punch list items.

1.7.3.3 QC Requirements

Develop and maintain a complete list of QC testing and required structural and life safety special inspections required by the International Code Council (ICC), transferred and installed property, and user training requirements in RMS. Update data on these QC requirements as work progresses, and promptly provide the information to the Government via RMS.

1.7.3.4 Three-Phase Control Meetings

Maintain scheduled and actual dates and times of preparatory and initial control meetings in RMS.

1.7.3.5 Labor and Equipment Hours

Log labor and equipment exposure hours on a daily basis. The labor and equipment exposure data will be rolled up into a monthly exposure report.

1.7.3.6 Accident/Safety Reporting

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be provided via RMS CM. Regularly update the correction status of the safety comments. In addition, utilize RMS to advise the Government of any accidents occurring on the jobsite. A brief supplemental entry of an accident is not to be considered as a substitute for completion of mandatory reports, e.g., ENG Form 3394 and OSHA Form 300.

1.7.3.7 Features of Work

Include a complete list of the features of work in the RMS database. A feature of work is associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

1.7.3.8 Hazard Analysis

Use RMS CM to develop a hazard analysis for each feature of work included in the CQC Plan. The Activity Hazard Analysis will include information required by EM 385-1-1, paragraph 01.A.13.

1.7.4 Submittal Management

The Government will provide the initial submittal register in electronic format. Thereafter, maintain a complete list of submittals, including completion of data columns. Dates when submittals are received and returned by the Government will be included. Use RMS CM to track and transmit submittals. ENG Form 4025, submittal transmittal form, and the

submittal register update is produced using RMS. RMS will be used to update, store and exchange submittal registers and transmittals. In addition to requirements stated in Section 01 33 00, actual submittals are to be stored in RMS CM, with hard copies also provided. Exception will be where the Contracting Officer specifies only hard copies required, where size of document cannot be saved in RMS CM, and where samples, spare parts, color boards, and full size drawings are to be provided.

1.7.5 Schedule

Develop a construction schedule consisting of pay activities, in accordance with Section 01 32 01.00 10 PROJECT SCHEDULE. Input and maintain in the RMS database the schedule either manually or by using the Standard Data Exchange Format (SDEF) (see Section 01 32 01.00 10 PROJECT SCHEDULE). Include with each pay request the updated schedule. Provide electronic copies of transmittals.

1.7.6 Import/Export of Data

RMS includes the ability to import schedule data using SDEF.

1.8 IMPLEMENTATION

Use of RMS CM as described in the preceding paragraphs is mandatory. Ensure that sufficient resources are available to maintain contract data within the RMS CM system. RMS CM is an integral part of the Contractor's management of quality control.

1.9 MONTHLY COORDINATION MEETING

Update the RMS CM database each workday. At least monthly, generate and submit a schedule update. At least one week prior to submittal, meet with the Government representative to review the planned progress payment data submission for errors and omissions.

Make required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will not be accepted. The Government will not process progress payments until all required corrections are processed.

1.10 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of notification.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS
08/09

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 within the text by the basic designation only.

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C511	(2017) Reduced-Pressure Principle Backflow Prevention Assembly

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR List	(continuously updated) List of Approved Backflow Prevention Assemblies
FCCCHR Manual	(10th Edition) Manual of Cross-Connection Control

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	(2017) Guide Specifications for Design of Metal Flagpoles
NFPA 70	(2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2) National Electrical Code

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

ANSI/NAAMM FP 1001-07	(2013; Errata 2015) Standard for Safeguarding Construction, Alteration, and Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2009) Manual on Uniform Traffic Control Devices

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction Site Plan; G

Traffic Control Plan; G

Noise Control Plan; G

Dust Control Plan; G

SD-06 Test Reports

Backflow Preventer Tests

SD-07 Certificates

Backflow Tester Certificate

Backflow Preventers Certificate of Full Approval

Backflow Prevention Training Certificate

1.3 PERMITS AND APPROVALS

Submit copies of permits and approvals for construction as required by Laws and Regulations and governing agencies.

1.4 CONSTRUCTION SITE PLAN

Prior to the start of work, submit a site plan showing the locations and dimensions of temporary facilities (including layouts and details, equipment and material storage area (onsite and offsite), and access and haul routes, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Indicate if the use of a supplemental or other staging area is desired. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas.

1.5 TEMPORARY CONTROL PLANS

1.5.1 Dust Control Plan

Plan describing materials, equipment, and methods to be used to monitor and control dust generation during project operations. A Dust Control Plan shall be included in the APP/SSHP. The SSHO shall ensure that dust suppression practices are effective and being used. At a minimum, the following provisions shall be incorporated into the Dust Control Plan as follows:

a. The Contractor shall implement dust control measures during all activities that may potentially generate airborne dust including, but not limited to, excavation, trenching, truck loading and transport. Visible, airborne dust shall be minimized at all times. The Contractor shall cease all dust generating activities when the wind speed, as measured by the on-site meteorological station, exceeds 15 mph for a sustained period of 15 minutes. Potential dust generating activities may resume based on the determination of the SSHO.

b. The Contractor shall provide and use water as a dust-suppressing agent to prevent the creation and dispersion of dust. No spray on adhesives shall be used for dust suppression. The Contractor shall avoid methods that generate slippery conditions or sticky mud.

c. Trucks in which the rubble and contaminated debris are carried shall be covered and sealed to control dust releases with a double, positive locking mechanism on the tailgates.

d. Stock piles shall be covered at all times when not in use.

1.5.2 Noise Control Plan

Plan describing methods that will be used to control dust and soil track-out from the work zone including construction procedures, methods of dust control, cleaning of paved surfaces, management of collected dust and soil, and air monitoring. Dust Control Plan shall be in accordance with requirements detailed in Sections 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES and 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS.

1.5.3 Traffic Control Plan

Plan describing methods that will be used to control vehicle and pedestrian traffic in the active construction work zone and along access routes in accordance with USACE EM 385-1-1. The plan will include a public information program to inform local businesses who routinely use Hamilton Boulevard, New Market Avenue, New Market Avenue Extension and Spicer Avenue for truck traffic about the proposed construction and schedule of work that is anticipated to disrupt traffic in the area. Consideration for road user safety, worker and responder safety, and the efficiency of road user flow shall be an integral element of the plan. Proposed detours shall be approved by the local authorities prior to inclusion in the plan.

The Contractor shall limit truck traffic to and from the site during peak (rush hour) periods and during periods when students may be traveling to or from the local school. The Contractor may propose additional controls to protect students (e.g., additional flaggers or police details, alternative routes) and request approval of the Contracting Officer to expand the hours when truck traffic is allowed.

1.5.4 Lighting Plan

Plan describing the equipment and methods that will be used for worker during non daylight hours in accordance with USACE EM 385-1-1.

1.6 BACKFLOW PREVENTERS CERTIFICATE ON WATER SUPPLY LINES

If the water supply for the site is based on a direct connection to the local water supply system, a Certificate of Full Approval from FCCCHR List, University of Southern California, attesting that the design, size and make of each backflow preventer has satisfactorily passed the complete sequence of performance testing and evaluation for the respective level of approval shall be provided. Certificate of Provisional Approval will not be acceptable.

1.6.1 Backflow Tester Certificate

Prior to testing, submit to the Contracting Officer certification issued by the State or local regulatory agency attesting that the backflow tester has successfully completed a certification course sponsored by the regulatory agency. Tester must not be affiliated with any company participating in any other phase of this Contract.

1.6.2 Backflow Prevention Training Certificate

Submit a certificate recognized by the State or local authority that states the Contractor has completed at least 10 hours of training in backflow preventer installations. The certificate must be current.

1.7 HURRICANE CONDITION OF READINESS

Unless directed otherwise, comply with:

a. Condition FOUR (Sustained winds of 50 knots or greater expected within 72 hours): Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers scrap lumber, waste material, and rubbish for removal and disposal at the close of each work day. Maintain the construction site including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove all debris, trash, or objects that could become missile hazards. Contact Contracting Officer for Condition of Readiness (COR) updates and completion of required actions.

b. Condition THREE (Sustained winds of 50 knots or greater expected within 48 hours): Maintain "Condition FOUR" requirements and commence securing operations necessary for "Condition ONE" which cannot be completed within 18 hours. Cease all routine activities which might interfere with securing operations. Commence securing and stow all gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to "Condition TWO" and continue action as necessary to attain "Condition THREE" readiness. Contact Contracting Officer for weather and COR updates and completion of required actions.

c. Condition TWO (Sustained winds of 50 knots or greater expected within 24 hours): Curtail or cease routine activities until securing operation is complete. Reinforce or remove form work and scaffolding. Secure machinery, tools, equipment, materials, or remove from the jobsite. Contact Contracting Officer for weather and Condition of Readiness (COR) updates and completion of required actions.

d. Condition ONE. (Sustained winds of 50 knots or greater expected within 12 hours): Secure the jobsite and leave Government premises.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNAGE

2.1.1 Bulletin Board

Immediately upon beginning of work, 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.

2.1.2 Project and Safety Signs

Maintain a project identification sign and safety performance sign at the locations directed by the contracting Officer. The project sign shall contain, at a minimum, the USEPA logo, the USACE logo, name of the site, and a point-of-contact with their telephone number for obtaining further information or reporting any suspicious activities. Erect signs within 15 days after receipt of the notice to proceed. Correct the data required by the safety sign daily, with light colored metallic or non-metallic numerals.

2.2 TEMPORARY TRAFFIC CONTROL

2.2.1 Haul Roads

Primary access to the former CDE Facility property off of New Market Avenue. The entrance off of Hamilton Boulevard may be used as a secondary entrance if approved by Contracting Officer.

Construct access and haul roads necessary for proper prosecution of the work under this contract with access onto the former CDE Facility property as shown in the Drawings. Construct with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic are to be avoided. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, must be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads are subject to approval by the Contracting Officer. Lighting must be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations.

Flaggers and police patrols will be provided as necessary during road lane closures as necessary and in accordance with local requirements.

2.2.2 Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas. 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 pedestrian, workers, and vehicular traffic barricades will be required. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

2.2.3 Fencing

Provide fencing along the construction site at all open excavations to control access by unauthorized people.

The safety fencing must be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 48 inches high and maximum mesh size of 2 inches, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. Install fencing to be able to restrain a force of at least 250 pounds against it.

Work zone fencing only needs to be installed in the active work area. Once

backfilling is completed and the area stabilized and no presents a safety hazard to vehicles and pedestrians, the Contractor may remove work zone fencing with the approval of the Contracting Officer.

Use of work zone fencing shall not be considered a substitute for safety barricades as necessary to protect workers and pedestrians in the area.

2.2.4 Temporary Pavement

Following the completion of pipeline construction, including backfilling, temporary pavement shall be installed, according to the requirements in Section 32 12 16.99, PAVEMENT FOR ROADS prior to the placement of the final pavement.

Limited short-term use of steel plates is acceptable to allow restoration of traffic flow. However, once a segment of water line trench has been backfilled, temporary pavement shall be installed as soon as feasible.

2.3 TEMPORARY WIRING

Provide temporary wiring in accordance with NFPA 241 and NFPA 70. Include frequent inspection of all equipment and apparatus.

2.4 BACKFLOW PREVENTERS

Reduced pressure principle type conforming to the applicable requirements AWWA C511. Provide backflow preventers complete with 150 pound flanged cast iron, mounted gate valve and strainer, 304 stainless steel or bronze, internal parts. The particular make, model/design, and size of backflow preventers to be installed must be included in the latest edition of the List of Approved Backflow Prevention Assemblies issued by the FCCCHR List and be accompanied by a Certificate of Full Approval from FCCCHR List. After installation conduct Backflow Preventer Tests and provide test reports verifying that the installation meets the FCCCHR Manual Standards.

PART 3 EXECUTION

3.1 EMPLOYEE PARKING

Contractor employees will park privately owned vehicles in an area designated by the Contracting Officer. This area will be within reasonable walking distance of the construction site. Contractor employee parking must not interfere with existing and established parking requirements of the surrounding properties.

3.2 TEMPORARY BULLETIN BOARD

Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer and described in 01 58 00 PROJECT IDENTIFICATION and Appendix A: Supplemental Information. Bulletin board can be mounted on the field trailers or other structures at the site. Posts used to mount project signs and bulletin board shall not penetrate the asphalt cap on the former CDE Facility property.

3.3 AVAILABILITY AND USE OF UTILITY SERVICES

3.3.1 Temporary Utilities

Provide temporary utilities required for construction. Materials may be new or used, must be adequate for the required usage, not create unsafe conditions, and not violate applicable codes and standards.

3.3.2 Payment for Utility Services

a. The Government will make all reasonably required utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed will be charged to or paid for by the Contractor at prevailing rates charged to the Government or, where the utility is produced by the Government, at reasonable rates determined by the Contracting Officer. Carefully conserve any utilities furnished without charge.

b. Reasonable amounts of the following utilities will be made available to the Contractor at the prevailing rates.

c. The point at which the Government will deliver such utilities or services and the quantity available is as indicated. Pay all costs incurred in connecting, converting, and transferring the utilities to the work. Make connections, including providing backflow-preventing devices on connections to domestic water lines; providing meters; and providing transformers; and make disconnections. Under no circumstances will taps to fire hydrants be allowed for obtaining domestic water.

3.3.3 Meters and Temporary Connections

At the Contractors expense and in a manner satisfactory to the Contracting Officer, provide and maintain necessary temporary connections, distribution lines, and meter bases (Government will provide meters) required to measure the amount of each utility used for the purpose of determining charges. Notify the Contracting Officer, in writing, 5 working days before final electrical connection is desired so that a utilities contract can be established. The Government will provide a meter and make the final hot connection after inspection and approval of the Contractor's temporary wiring installation. The Contractor will not make the final electrical connection.

3.3.4 Final Meter Reading

Before completion of the work and final acceptance of the work by the Government, notify the Contracting Officer, in writing, 5 working days before termination is desired. The Government will take a final meter reading, disconnect service, and remove the meters. Then remove all the temporary distribution lines, meter bases, and associated paraphernalia. Pay all outstanding utility bills before final acceptance of the work by the Government.

3.3.5 Water

a. Provide potable water for sanitary facilities, field offices, site maintenance and cleaning. Water used will not be furnished by the Government. Continuously maintain adequate water flow and pressure for

all purposes during the Project, until removal of temporary water system.

b. If on-site water system is directly connected to municipal system, backflow preventers will be installed, certified, and maintained per Subpart 2.4.

a. Provide water for testing of water line from local hydrant. Secure written permission for connection and use from New Jersey American Water Company and Borough of South Plainfield and meet requirements for use. Notify fire department before obtaining water from fire hydrants. Use only special hydrant-operating wrenches to open hydrants. Make certain hydrant valve is open full, since cracking valve causes damage to hydrant. Repair damaged hydrants and notify appropriate agency as quickly as possible. Hydrants shall be completely accessible to fire department at all times. Include costs to connect and transport water to construction areas in Contract Price.

3.3.6 Sanitation

a. Provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer and periodically empty wastes into a municipal, district, or station sanitary sewage system, or remove waste to a commercial facility. Obtain approval from the system owner prior to discharge into any municipal, district, or commercial sanitary sewer system. Any penalties and / or fines associated with improper discharge will be the responsibility of the Contractor. Coordinate with the Contracting Officer and follow station regulations and procedures when discharging into the station sanitary sewer system. Maintain these conveniences at all times without nuisance. Include provisions for pest control and elimination of odors. Government toilet facilities will not be available to Contractor's personnel.

b. Provide temporary sewer and sanitation facilities that are self-contained units with both urinals and stool capabilities. Ventilate the units to control odors and fumes and empty and clean them at least once a week or more often if required by the Contracting Officer. The doors shall be self-closing. Locate the facility behind the construction fence or out of the public view.

3.3.7 Telephone

Make arrangements and pay all costs for telephone facilities required by Contracting Officer.

3.3.8 Internet

Make arrangements and pay all costs for internet services needed for completion of the work. The shall included, at a minimum, a DSL business internet connection with dedicated IP address, preferably cable, with 8 connections and a Linksys, Cisco Cable, or DSL router with a 4- to 8-port network switch.

3.3.9 Fire Protection

Provide temporary fire protection equipment for the protection of personnel and property during construction. Remove debris and flammable materials weekly to minimize potential hazards.

3.4 TRAFFIC PROVISIONS

3.4.1 Maintenance of Traffic

a. Conduct operations in a manner that will not close any surface street, thoroughfare or otherwise interfere in any way with traffic on railways or highways except with written permission of the Contracting Officer and the Borough of South Plainfield requested at least 15 calendar days prior to the proposed modification date and provide a Traffic Control Plan detailing the proposed controls to traffic movement for approval. The plan must be in accordance with State and local regulations and the MUTCD, Part VI. Make all notifications and obtain any permits required for modification to traffic movements outside Station's jurisdiction. Contractor may move oversized and slow-moving vehicles to the worksite provided requirements of the highway authority have been met.

b. Conduct work in accordance with Traffic Control Plan, requirements of Borough of South Plainfield and Middlesex County, NJDOT and USDOT Federal Highway Administration MUTCD.

c. Obtain all necessary local permits for work within the public right-of-way (Spicer Avenue, New Market Avenue, New Market Avenue Extension, and Hamilton Boulevard) prior to start of work.

d. Coordinate work in the public ROWs with local authorities. Pay for police services for traffic control as required by traffic permits.

e. Conduct work so as to minimize obstruction of traffic and maintain traffic on at least half of the roadway width at all times. Obtain approval from the Contracting Officer prior to starting any activity that will obstruct traffic. Where feasible, route construction traffic on non-public on-site access roads constructed for the project.

f. Provide, erect, and maintain, at Contractor's expense, lights, barriers, signals, passageways, detours, and other items, that may be required by the Life Safety Signage, overhead protection authority having jurisdiction.

3.4.2 Protection of Traffic

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 the work, and the erection and maintenance of adequate warning, danger, and direction signs, and police oversight will be as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property. Minimize the interference with public traffic on roads selected for hauling material to and from the site. Investigate the adequacy of existing roads and their allowable load limit. Contractor is responsible for the repair of any damage to roads caused by construction operations.

3.4.3 Protection of Pedestrians

Pedestrian traffic in the area should be diverted whenever possible. Flaggers should engage pedestrians and request that they maintain a safe distance from the area to avoid both construction equipment as well as

routine road traffic which may be distracted by road diversions and detours. Where necessary, barriers should be installed to protect pedestrians

3.4.4 Protection of Workers

Protect workers in work areas along the public ROW through the use of barriers, warning lights and signs, flaggers (both private workers and police where appropriate).

3.4.5 Rush Hour and School Hour Restrictions

Do not interfere with the peak traffic flows preceding and during normal operations without notification to and approval by the Contracting Officer.

Do not route traffic through school zones. Coordinate deliveries for trucks entering and leaving the site to mitigate impacts to children traveling to and from nearby schools. In the traffic control plan, the Contractor shall propose additional traffic control measures during hours when children are present for truck traffic accessing the site, such as routing traffic away from Hamilton Boulevard and residential areas or providing additional crossing guards, subject to the approval of the Contracting Officer.

3.4.6 After Hours Work Schedules

If required by local authorities, Contractor shall perform work in the public right-of-way during weekends and non standard work hours to minimize the impact on local traffic. No work shall be performed outside standard working hours without Contracting Officer and Borough of South Plainfield approval. Night-time work will be addressed in the APP/SSHP prepared under Section 01 35 29.13 HEALTH, SAFETY AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES.

3.5 CONTRACTOR'S TEMPORARY FACILITIES

3.5.1 Safety

Protect the integrity of any installed safety systems or personnel safety devices. If entrance into systems serving safety devices is required, the Contractor must obtain prior approval from the Contracting Officer. If it is temporarily necessary to remove or disable personnel safety devices in order to accomplish contract requirements, provide alternative means of protection prior to removing or disabling any permanently installed safety devices or equipment and obtain approval from the Contracting Officer.

3.5.2 Administrative Field Offices

Provide and maintain administrative field office facilities within the construction area at the designated site.

3.5.3 Storage Area

Construct a temporary 6 foot high chain link fence around trailers and materials. Include plastic strip inserts, colored green, so that visibility through the fence is obstructed. Do not place or store trailers, materials, or equipment outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer. Trailers, equipment, or materials

must not be open to public view with the exception of those items which are in support of ongoing work on any given day. Do not stockpile materials outside the fence in preparation for the next day's work. Park mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment within the fenced area at the end of each work day.

3.5.4 Supplemental Storage Area

Upon Contractor's request, the Contracting Officer will designate another area for the Contractor's use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but will be within the installation boundaries. Fencing of materials or equipment may be required at this site at the discretion of the Contracting Officer; however, the Contractor is responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area. Utilities will not be provided to this area by the Government.

3.5.5 Appearance of Trailers

a. Trailers utilized by the Contractor for administrative or material storage purposes must present a clean and neat exterior appearance and be in a state of good repair. Trailers which, in the opinion of the Contracting Officer, require exterior painting or maintenance will not be allowed on installation property.

b. Paint using suitable paint and maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal.

3.5.6 Maintenance of Staging Area

Contractor shall construct and maintain staging areas as described in Sections 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL and 31 05 19 GEOSYNTHETICS.

Keep fencing in a state of good repair and proper alignment. Grassed or unpaved areas, which are not established roadways, will be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways, should the Contractor elect to traverse them with construction equipment or other vehicles; gravel gradation will be at the Contractor's discretion. Mow and maintain grass located within the boundaries of the construction site for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers will be edged or trimmed neatly.

3.5.7 Security Provisions

Provide adequate outside security lighting at the Contractor's temporary facilities. The Contractor will be responsible for the security of the work, project, materials, its own equipment, and property from loss, theft, damage, and vandalism. In addition, the Contractor will be responsible for protection of property in the vicinity of the work from injury and loss in connection with performance of the project. The Contractor will notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

3.5.8 Weather Protection of Temporary Facilities and Stored Materials

Take necessary precautions to ensure that roof openings and other critical

openings in the trailer(s) are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.

3.5.8.1 Building and Site Storm Protection

When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby Government property. Precautions must include, but are not limited to, closing openings; removing loose materials, tools and equipment from exposed locations; and removing or securing scaffolding and other temporary work. Close openings in the work when storms of lesser intensity pose a threat to the work or any nearby Government property.

3.6 GOVERNMENT FIELD OFFICE

3.6.1 Contracting Officer and other Government Representative

a. Furnish equipment specified for exclusive use of Contracting Officer and Government representatives.

b. Ownership of equipment furnished under this article will remain, unless otherwise specified, that of Contractor.

c. Equipment furnished shall be new or like new in appearance and function.

d. Two Flag Poles: two 20-foot aluminum flag poles meeting the American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM FP 1001-07, 5th Ed.), Guide Specifications for Design of Metal Flagpoles or equal and all of the standard hardware to fly the U.S. Flag and U.S. Army Corps of Engineers Flag. The flag poles will be installed at a location to be determined by the Government. Asphalt cap will be restored following removal of flag poles.

e. Trailer Type Mobile Structure: Two single-wide or one double-wide trailer.

f. Minimum features:

1. 110-volt lighting and wall plugs.
2. Fluorescent ceiling lights.
3. Electric heating and self-contained air conditioning unit, properly sized for Project locale and conditions. Provide ample electrical power to operate installed systems.
4. Railed stairways and landings at entrances.
5. Exterior door(s):

   i. Number: Two. Type: Solid Core.
   ii. Lock(s): Cylindrical keyed alike.

6. Number of windows: Two.
7. Minimum Interior Height: 8 feet.

g. Floor Space: Minimum 225 square feet.

h. Rooms: Two, with minimum private office floor space of 80 square feet

and remainder configured for open meeting or storage space.

i. Plan table; plan rack; one double desk(s) with desk surface located 29 inches from floor; two 2-drawer, steel file cabinets; and overhead shelf(s).

j. All-metal frame; all-metal exterior, side, and roof; and insulated double walls, floor, and roof.

k. Security guard screens on windows.

l. Toilet and wash basin in separate compartment with hot and cold water and drains.

m. Blinds or drapes on windows.

3.6.2 Resident Engineer's Office

Provide the Government Resident Engineer with an office, approximately 200 square feet in floor area, located where directed and providing space heat, electric light and power, and toilet facilities consisting of one lavatory and one water closet complete with connections to water and sewer mains. Provide a mail slot in the door or a lockable mail box mounted on the surface of the door. Include a 4 by 8 foot plan table, computer work space a standard size office desk and chair, and telephone. At completion of the project, the office will remain the property of the Contractor and be removed from the site. Utilities will be connected and disconnected in accordance with local codes and to the satisfaction of the Contracting Officer.

3.6.3 Quality Control Manager Records and Field Office

Provide on the jobsite an office with approximately 100 square feet of useful floor area for the exclusive use of the QC Manager. Provide a weathertight structure with adequate heating and cooling, toilet facilities, lighting, ventilation, a 4 by 8 foot plan table, a standard size office desk and chair, computer station, and working communications facilities. Provide either a 1,500 watt radiant heater or a window-mounted air conditioner rated at 9,000 Btus minimum or a window-mounted heat pump of the same minimum heating and cooling ratings. Provide a door with a cylinder lock and windows with locking hardware. Make utility connections. Locate as directed. File quality control records in the office and make available at all times to the Government. After completion of the work, remove the entire structure from the site.

3.6.4 Trailer-Type Mobile Office

The Contractor may, at its option, furnish and maintain a trailer-type mobile office acceptable to the Contracting Officer and providing as a minimum the facilities specified above. Securely anchor the trailer to the ground at all four corners to guard against movement during high winds.

3.6.5 Field Office Equipment

Provide the following furnishing and supplies in each field trailer:

a. Office swivel chairs and office desks.
b. Internet and electric outlet service.
c. Air conditioning and heat as specified in Paragraph 3.6.2.

d. Metal folding chairs.
e. Fire extinguisher.
f. First aid equipment.
g. Night security lighting.
h. Folding tables each 6 by 2.5 feet.
i. Shelving or bookcase with a total of 12 feet of shelf length and at least 12 inches deep.
j. Polyethylene waste baskets, each with a minimum 13 gallon capacity.
k. White board for use with dry erase markers, approximately 6 by 4 feet, with marker holding tray.
l. Refrigerator with a minimum of 2.5 cubic foot capacity.
m. Electric coffee maker.
n. Electric water cooler dispenser for 5 gallon bottles with cup dispenser.
o. Multi-purpose printer/scan/fax capable of photocopying, automatic feed, enlargement/reduction, sorting and collating, color and black & white scanning to produce PDF and JPG files, fax transmittal, and e-mail capabilities. Additionally, provide necessary cables and appurtenances to enable all functions of this piece of equipment, including scan, e-mail, and printing. An additional high-speed internet connection shall be provided for exclusive use by the Contracting Officer.
p. Paper shredder.
q. Recycling bin.
r. 2 color, SVGA high resolution monitors (19" minimum).

3.6.6 Field Office Maintenance and Supplies

Maintain in good repair and appearance, and provide weekly cleaning service and replenishment, as required, of paper towels, paper cups, hand soap, toilet paper, first-aid kit supplies, and bottled water. Replenish, as needed, toner or ink cartridges and paper for multipurpose printer.

3.7 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, furnish and erect temporary project safety fencing at the work site. Maintain the safety fencing during the life of the contract and, upon completion and acceptance of the work, will become the property of the Contractor and be removed from the work site.

3.8 CLEANUP

Remove construction debris, waste materials, packaging material and the like from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways must be cleaned away. Store any salvageable materials resulting from demolition activities within the fenced area described above or at the supplemental storage area. Neatly stack stored materials not in trailers, whether new or salvaged.

3.9 RESTORATION OF WORK AREA

Upon completion of the project remove the bulletin board, signs, barricades, haul roads, and any other temporary products from the site as directed by the Contracting Officer. After removal of trailers, materials, and equipment from within the fenced area, remove the fence that will become the property of the Contractor. Restore areas used by the Contractor for the storage of equipment or material, or other use to the original or better condition. Remove gravel used to traverse grassed areas and restore the area to its original condition, including top soil and seeding as necessary.

Site conditions along the public ROW shall be restored to preconstruction conditions following the completion of construction. If construction access requires the relocation of any existing landscaping features, tree and shrub root balls shall be wrapped in burlap, moved to a secure shady location and watered regularly. At the end of construction, the trees and shrubs shall be restored to their original location. Trees and shrubs that do not survive transplanting shall be replaced with a similar (both in size and species) item. Mulched areas will be remulched; grassed areas will be sodded.

Contractor shall replace or restore any sections of the permanent chain link fence surrounding the former CDE Facility property if it is removed or damaged as part of construction.

-- End of Section --

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SECTION 01 57 13

EROSION AND SEDIMENT CONTROLS
05/18

PART 1 GENERAL

1.1 SUMMARY OF WORK

The work consists of furnishing and installation of temporary and permanent soil surface erosion control materials to prevent the pollution of air, water, and land. The Contractor shall perform management of storm water and stabilization of soil to prevent the transport of soil and sediment disturbed to during project activities.

The minimum areas requiring soil erosion and sediment control measures are indicated on the Drawings. The Contracting Officer reserves right to modify use, location, and quantities of soil erosion and sediment control measures based on activities of Contractor.

1.1.1 Erosion, Sediment, and Flood Control

a. Provide, maintain, and operate temporary facilities to control erosion and sediment releases in accordance with Middlesex County Sedimentation and Soil Erosion Control and the state of New Jersey Department of Agriculture, and Freehold Soil Conservation District soil erosion and sediment control requirements. In the event of a conflict, the more stringent requirement shall apply.

b. Plan and execute construction by methods to control surface drainage from cuts and fills, from stockpiles, staging areas, and other work areas. Prevent erosion and sedimentation.

c. All necessary sedimentation control and soil erosion control measures installed shall be adequately maintained for the duration of the project or until such measures are permanently stabilized, whichever is longer.

1.1.2 Soil Erosion Stabilization and Sediment Control Elements

a. Maintenance of existing storm drainage piping and catch basins, detention basin, and spillway.

b. Construction of temporary erosion control facilities such as inlet protections, silt fences, compost filter socks, straw wattles, and straw bales.

c. Construction of permanent erosion control measures such as armored and vegetated bank restoration and toe protection.

d. Placement and maintenance of temporary and permanent seeding on areas disturbed by construction.

e. Erosion control devices for stockpile areas to restrict sediment transport.

f. Cover all stockpiles or open soil when not in active use.

g. Contact Water (water that has been in contact with contaminated soil) shall be treated as described in the Drawings and Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

1.1.3 Storm Water Management

a. Manage stormwater generated in all disturbed and work areas.

b. Storm water that has come in contact with disturbed contaminated soil (Contact Water) shall be managed as described in the Drawings and Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

c. Stormwater that has NOT come into contact with contaminated material (Non-Contact Water) shall be presumed to be clean. All stormwater generated outside the limits of Construction shall be considered Non-Contact Water unless impacted by a spill.

d. Install inlet protection devices on all inlets on the OU2 Area and along New Market Avenue Extension and Spicer Avenue in accordance with the Drawings and herein. Type of devices will vary depending on location.

e. Non-Contact Water can be diverted to inlets to the on-site detention basin.

f. Contact water shall NOT at any time to be allowed to enter storm drains that discharge into Bound Brook via the existing storm water detention basin.

1.2 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D3787	(2016) Bursting Strength of Textiles - Constant-Rate-of-Traverse (CRT), Ball Burst Test
ASTM D4533/D4533M	(2015) Standard Test Method for Trapezoid Tearing Strength of Geotextiles
ASTM D4972	(2013) pH of Soils
ASTM D5268	(2013) Topsoil Used for Landscaping Purposes
ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D1140	(2017) Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing
ASTM D4632/D4632M	(2015a) Grab Breaking Load and Elongation of Geotextiles

ASTM D6629	(2001; E 2012; R 2012) Selection of Methods for Estimating Soil Loss by Erosion

NEW JERSEY ADMINISTRATIVE CODE (NJAC)

NJAC 7:14	Water Pollution Control Act
NJAC 7:14A	New Jersey Pollutant Discharge Elimination System (NJPDES) Rules

NEW JERSEY STATUTES ANNOTATED (NJSA)

NJSA 4:24-39	(1975) Soil Erosion and Sediment Control Act

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Sediment And Soil Erosion Control Plan; G

Stormwater, Sediment, and Soil Erosion Control Plan; G

Contact Water Handling And Treatment Plan; G

Layout Figure

Installer's Qualification; G

SD-03 Product Data

Mulch

Erosion Control Matting

Geotextile

SD-11 Closeout Submittals

Maintenance Record

1.4 QUALITY ASSURANCE

Water pollution control shall comply with procedures outlined in U.S. Environmental Protection Agency manuals entitled, "Guidelines for Erosion and Sedimentation Control Planning" and "Implementation, Processes, Procedures, and Methods to Control Pollution Resulting from all Construction Activity".

1.4.1 Installer's Qualification

The installer of erosion control measures shall be certified by the

manufacturer for training and experience installing the material. Submit the installer's company name and address, and/or certification.

1.4.2 Erosion Potential

Assess potential effects of soil management practices on soil loss in accordance with ASTM D6629.

1.4.3 Substitutions

Substitutions will not be allowed without written request and approval from the Contracting Officer.

1.5 DELIVERY, STORAGE, AND HANDLING

Prior to delivery of materials, submit certificates of compliance attesting that materials meet the specified requirements. Store materials in designated areas and as recommended by the manufacturer protected from the elements, direct exposure, and damage. Do not drop containers from trucks. Material shall be free of defects that would void required performance or warranty. Deliver geosynthetic binders and synthetic soil binders in the manufacturer's original sealed containers and stored in a secure area.

a. Furnish erosion control blankets and geotextile fabric in rolls with suitable wrapping to protect against moisture and extended ultraviolet exposure prior to placement as described in Section 31 05 19 GEOSYNTHETICS. Label erosion control blanket and geotextile fabric rolls to provide identification sufficient for inventory and quality control purposes.

b. Inspect seed upon arrival at the jobsite for conformity to species and quality as described in the Drawings and Section 32 92 19 SEEDING for Phase 1 Remediation Work and Section 32 92 19.99 SEEDING for Phase 2 Water Line Work. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected.

1.6 STORMWATER, SEDIMENT, AND SOIL EROSION CONTROL PLAN

Submit a Stormwater, Sediment, and Soil Erosion Control Plan containing elements addressing, but not limited to, those detailed in Paragraph 1.1.

1.6.1 Stormwater, Sediment, and Soil Erosion Control Plan

The plan shall comply with the Freehold Soil Conservation District and State of New Jersey regulations and guidance including NJDEP DSW General Permit for Construction Activity Stormwater NJAC 7:14 Water Pollution Control Act, including NJAC 7:14A, Pollutant Discharge Elimination System; NJSA 4:24-39 et seq., and SCS Standards for Soil Erosion and Sediment Control in New Jersey. Address the following in the erosion control plan and distribute copies of the work schedule and the plan to site subcontractors:

a. Statement of erosion control and stormwater control objectives.

b. Description of temporary and permanent erosion control, stormwater control, and air pollution control measures to be implemented on site.

c. Description of the type and frequency of maintenance activities

required for the chosen erosion control methods.

d. Vegetative restoration plan with planting and seeding dates and fertilizer, lime, and mulching rates as described in the Drawings and Sections 32 92 19 SEEDING and 32 93 00 EXTERIOR PLANTS for Phase 1 Remediation Work and Section 32 92 19.99 SEEDING for Phase 2 Water Line Work. Distribute copies of the work schedule and erosion control plan to site subcontractors.

e. Comparison of proposed post-construction stormwater runoff conditions with pre-construction conditions.

1.6.2 Scheduling

Submit a construction work sequence schedule, with the state or local government approved erosion control plan a minimum of 30 days prior to start of construction. The work schedule shall coordinate the timing of land disturbing activities with the provision of erosion control measures to reduce on-site erosion and off-site sedimentation. Coordinate installation of temporary erosion control features with the construction of permanent erosion control features to assure effective and continuous control of erosion, pollution, and sediment deposition. Completed work areas shall be fully restored within a maximum of 30 days.

1.7 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 eighteen month warranty. Permanent erosion control materials shall carry a minimum three year warranty.

PART 2 PRODUCTS

2.1 GEOTEXTILE

2.1.1 Silt Fence

Supply and install as described in Section 31 05 19 GEOSYNTHETICS.

2.1.2 Fence Posts

a. In unpaved areas, supply and install fence posts in accordance the Drawings.

b. In paved areas, use straw wattles weighed down with sand bags or other approved methods.

2.2 STRAW WATTLE

Supply and install Straw Wattle as described in the Drawings. In paved areas, use straw wattles weighed down with sand bags or other approved methods.

2.3 STRAW BALES

Clean salt hay or straw of oat, wheat, barley, or rye free from seed of noxious weeds; machine baled using standard baling wire or string.

2.4 INLET PROTECTION

Where possible, supply and install filter bag inlet protection as described in the Drawings. In locations where inlet grates cannot be removed, install permeable non-woven filter fabric across entire inlet surface and extending 1 inch minimum pas grate in all direction. Secure fabric to pavement or grate with caulk, waterproof adhesive, or other approved mechanism. Ensure there is no leakage at edges of fabric.

2.5 SEED MIX

Use seed mix appropriate for native vegetation in Northern New Jersey or as approved by Contracting Officer and as described in the Drawings and Section 32 92 19 SEEDING for Phase 1 Remediation Work and Section 32 92 19.99 SEEDING for Phase 2 Water Line Work.

2.6 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.

2.6.1 Straw

Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

2.6.2 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.

2.6.3 Wood Cellulose Fiber

Wood cellulose fiber shall be 100 percent recycled material and shall not contain any growth or germination-inhibiting factors and shall be dyed with non-toxic, biodegradable dye an appropriate color to facilitate placement during application. Composition on air-dry weight basis: a minimum 9 to a maximum 15 percent moisture, and between a minimum 4.5 to a maximum 6.0 pH. Wood cellulose fiber shall not contain environmentally hazardous levels of heavy metals. Materials may be bulk tested or tested by toxicity characteristic leaching procedure (TCLP).

2.6.4 Paper Fiber

Paper fiber mulch shall be 100 percent post-consumer recycled news print that is shredded for the purpose of mulching seed.

2.6.5 Shredded Bark

Locally shredded material shall be treated to retard the growth of mold and fungi.

2.6.6 Wood By-Products

Submit composition, source, and particle size. Products shall be free from toxic chemicals or hazardous material. Wood locally chipped or ground bark shall be treated to retard the growth of mold and fungi. Gradation: A

maximum 2 inch wide by 4 inch long.

2.6.7 Mulch Control Netting and Filter Fabric

Mulch control netting and filter fabric will not be used in or on the banks of Bound Brook. Mulch control netting and filter fabric may be constructed of lightweight recycled plastic, cotton, or paper or organic fiber. The recycled plastic shall be a woven or nonwoven polypropylene, nylon, or polyester containing stabilizers and/or inhibitors to make the fabric resistant to deterioration from UV, and with the following properties:

Minimum grab tensile strength (TF 25 #1/ASTM D4632/D4632M)	180 pounds
Minimum Puncture (TF 25 #4/ASTM D3787)	75 psi in the weakest direction
Apparent opening sieve size	minimum 40 and maximum 80 (U.S. Sieve Size)
Minimum Trapezoidal tear strength (TF 25 #2/ASTM D4533/D4533M)	50 pounds

2.6.8 Hydraulic Mulch

Hydraulic mulch shall be made of 100 percent recycled material. Wood shall be naturally air-dried to a moisture content of 10.0 percent, plus or minus 3.0 percent. A minimum of 50 percent of the fibers shall be equal to or greater than 0.15 inch in length and a minimum of 75 percent of the fibers shall be retained on a 28 mesh screen. Hydraulic mulch shall have the following mixture characteristics:

CHARACTERISTIC (typical)	VALUE
pH	5.4 $\pm$ 0.1
Organic Matter (oven dried basis)	percent 99.3 within $\pm$ 0.2
Inorganic Ash (oven dried basis)	percent 0.7 within $\pm$ 0.2
Water Holding Capacity	percent 1,401

2.6.9 DYE

Dye shall be a water-activated, green color. Pre-package dye in water dissolvable packets in the hydraulic mulch.

2.7 COIR (COCONUT FIBER) AND COIR LOGS

Provide and install as described in the Drawings.

2.8 RIPRAP - BANK PROTECTION

Provide riprap stone associated with bank protection with a minimum D50 of 12 inches from an approved source as described in the Drawings and in accordance with NJDOT standards. Determine gradation of in accordance with

ASTM C136/C136M or ASTM D1140 as appropriate. One test per source and material imported unless otherwise specified. Material shall be adequately free from thin, flat and elongated pieces, and shall be free from debris and foreign objects such as frozen material, coal, wood, hay, burlap, paper, plastics, tree roots, pieces of concrete or pavement or contaminants (chemical and/or biological).

2.9 RIPRAP - TOE PROTECTION

Provide riprap stone associated with toe of slope protection with a minimum D50 of 12 inches from an approved source as described in the Drawings and in accordance with NJDOT standards. Determine gradation of in accordance with ASTM C136/C136M or ASTM D1140 as appropriate. One test per source and material imported unless otherwise specified. Material shall be adequately free from thin, flat and elongated pieces, and shall be free from debris and foreign objects such as frozen material, coal, wood, hay, burlap, paper, plastics, tree roots, pieces of concrete or pavement or contaminants (chemical and/or biological).

2.10 EROSION CONTROL MATTING

2.10.1 Erosion Control Matting

Erosion control blanket shall be a machine-produced permanent mat with a 70 percent herbaceous straw and 30 percent coconut fiber blend matrix. . Permanent erosion control blanket shall meet Type 5A, 5B, and 5C specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) FP-03 Section 713.18 and shall have the following properties:

Material Content	
Matrix	70 percent straw fiber with approximately 0.35 lb/yd^2 weight. 30 percent coconut fiber cured in fresh water with approximately 0.15 lb/yd^2 weight
Netting	Top and bottom, UV-stabilized polypropylene with approximately 5 lb/1000 sq. ft weight. Middle, corrugated UV-stabilized polypropylene with approximately 24 lb/1000 sf weight.
Thread	Polypropylene, UV stable.
Note: Apply to slopes up to a maximum 1:1 gradient.	

Index Property	Test Method	Typical Value
Thickness	ASTM D6525	15.75 mm; 0.62 inch
Resiliency	ASTM D6524	95.2 %
Density	ASTM D792	0.891 g/cm^3
Mass per Unit Area	ASTM 6566	548 g/cm^3; 16.13 oz/sy

Index Property	Test Method	Typical Value
UV Stability	ASTM D4355 / 1000 hr	100%
Porosity	ETC Guidelines	99%
Stiffness	ASTM D1388	222.65 oz/in
Light Penetration	ASTM D6567	4.1 %
Tensile Strength - MD	ASTM D6818	10.51 kN/m; 709 lb/ft
Tensile Strength - TD	ASTM D6818	10.56 kN/m; 709 lb/ft
Elongation - MD	ASTM D6818	73.9%
Elongation - TD	ASTM D6818	36.9%
Biomass Improvement	ASTM D7322	441%

Design Permissible Shear Stress		
	Short Duration	Long Duration
Phase 1: Unvegetated	3.0 psf (144 Pa)	2.5 psf (120 Pa)
Phase 2: Partially Vegetated	8.0 psf (383 Pa)	8.0 psf (383 Pa)
Phase 3: Fully Vegetated	10.0 psf (480 Pa)	8.0 psf (383 Pa)
Unvegetated Velocity	9.5 fps (2.9 m/s)	
Vegetated Velocity	15 fps (4.6 m/s	

2.10.2 Anchoring

Percussion earth anchors shall be provided as recommended by the manufacturer.

2.10.3 Staples

Staples shall be as recommended by the manufacturer.

2.11 WATER

Unless otherwise directed, water is the responsibility of the Contractor and the source must be approved by the Contracting Officer.

PART 3 EXECUTION

3.1 WEATHER CONDITIONS

Perform erosion control operations 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, submit a revised construction schedule for approval. Do not apply erosion control materials in adverse weather conditions which could affect their performance.

3.2 PREPARATION

Acceptance of Sediment and Soil Erosion Control Plan and Contact Water Handling and Treatment Plan required prior to starting earth-disturbing activities.

3.2.1 Soil Test

Test soil in accordance with ASTM D5268 and ASTM D4972 for determining the particle size and mechanical analysis. Sample collection onsite shall be random over the entire site. The test shall determine the soil particle size as compatible for the specified material.

3.2.2 Layout Figure

Submit scale drawings defining areas to receive recommended materials as required by federal, state or local regulations. Erosion control material locations may be adjusted to meet field conditions. When soil tests result in unacceptable particle sizes, submit a shop drawing indicating the corrective measures.

Contractor shall be responsible for sequencing Work in areas allocated for their exclusive use during the Project, including proposed stockpile areas and installation of temporary erosion control devices, or other facilities.

Areas set aside for Contractor's use during Project may be temporarily developed to provide satisfactory working, staging, and administrative areas. Preparation of these areas shall be in accordance with other requirements contained within Specifications and completed in a manner to control sediment transport away from area.

3.2.2.1 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. Identify existing trees, shrubs, plant beds, and landscape features that are to be preserved on site by appropriate tags and barricade with reusable, high-visibility fencing along the dripline. Mitigate damage to existing trees 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.

3.2.2.2 Obstructions Below Ground

When obstructions below ground affect the work, submit shop drawings showing proposed adjustments to placement of erosion control material for approval.

3.3 SOIL STOCKPILES

a. Keep all stockpiles of contaminated soil covered at all times. Where possible, excavated excess contaminated soil shall be placed in rolloffs with lids or other covered storage containers prior to

off-site disposal. Minimize the amount of contaminated soil stored on-site.

b. Sediment transport and erosion from stockpiles of excavated soils shall be controlled and restricted from moving beyond immediate stockpile area by use of temporary silt barriers such as compost sock filters or straw bales. Keep these temporary facilities in operational condition by regular cleaning, regrading, and maintenance.

c. Stockpiles of clean material brought in for construction shall be kept covered at all times not in active use, to minimize wind and water erosion.

3.3.1 INSTALLATION

Immediately stabilize exposed soil using fabric, mulch, compost, and seed as specified in the Drawings and herein. Stabilize areas for construction access immediately as specified in the paragraph Construction Entrance. Install principal sediment controls before any major site grading takes place. Provide additional sediment traps and sediment fences as grading progresses. Provide inlet and outlet protection at the ends of new drainage systems. Remove temporary erosion control measures at the end of construction and provide permanent seeding.

3.3.1.1 Construction Entrance

Provide as indicated on Drawings, a minimum of 6 inches thick, at points of vehicular ingress and egress on the construction site. Construction entrances shall be cleared and grubbed prior to placement of the filter fabric and aggregate. The aggregate shall be placed in a manner that will prevent damage and movement of the fabric. Place fabric in one piece, where possible. Overlap fabric joints a minimum of 12 inches.

3.3.1.2 Seeding

When seeding is required prior to installing mulch on synthetic grid systems, verify that seeding will be completed in accordance with Sections 31 23 00.00 20 BACKFILL AND COMPACTION and 32 92 19 SEEDING for Phase 1 Remediation Work and Sections 31 23 00.99 TRENCHING AND BACKFILL and 32 92 19.99 SEEDING for Phase 2 Water Line Work.

3.3.1.3 Mulch Installation

Install mulch in the areas indicated. Apply mulch evenly at the rate of 1-1/2 to 2 tons per acre (70 to 90 pounds per 1,000 square feet) for straw or Hay. If a crimper is used instead of a liquid mulch-binder, apply mulch at the rate of 3 tons per acre (138 pounds per 1,000 square feet).

3.3.1.4 Mulch Control Netting

Netting may be stapled over mulch according to manufacturer's recommendations.

3.3.1.5 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.

3.3.1.6 Asphalt Adhesive Tackifier

Asphalt adhesive tackifier shall be sprayed at a rate between 10 to 13 gallons/1000 square feet. Do not completely exclude sunlight from penetrating to the ground surface.

3.3.1.7 Non-Asphaltic Tackifier

Apply hydrophilic colloid at the rate recommended by the manufacturer, using hydraulic equipment suitable for thoroughly mixing with water. Apply a uniform mixture 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/1000 square feet, using power mulch equipment equipped with suitable asphalt pump and nozzle. Apply the adhesive-coated mulch evenly over the surface. Do not completely exclude sunlight from penetrating to the ground surface.

3.3.1.9 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

Apply wood cellulose fiber, paper fiber, or recycled paper as part of the hydraulic mulch operation.

3.3.1.10 Hydraulic Mulch Application

3.3.1.10.1 Unseeded Area

Install hydraulic mulch as indicated and in accordance with manufacturer's recommendations. Mix hydraulic mulch 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.

3.3.1.10.2 Seeded Area

For seeded areas, apply hydraulic mulch evenly at the rate of 1,500 pounds per acre, or as recommended by product manufacturer. Do not mix mulch with the seed and fertilizer.

3.3.1.11 Erosion Control Blankets

a. Install erosion control blankets as indicated and in accordance with manufacturer's recommendations. The extent of erosion control blankets shall be as indicated.

b. Orient erosion control blankets in vertical strips and anchored with staples, as indicated. Abut adjacent strips to allow for installation of a common row of staples. Overlap horizontal joints between erosion control blankets sufficiently to accommodate a common row of staples with the uphill end on top.

c. Where exposed to overland sheet flow, locate a trench at the uphill termination. Staple the erosion control blanket 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.

3.3.1.12 Silt Fence

Install posts at the spacing indicated on the Drawings. Do not attach filter fabric to existing trees. Secure filter fabric to the post and wire fabric using staples, tie wire, or hog rings. Imbed the filter fabric into the ground as indicated on the Drawings. Splice filter fabric at support pole using a 6 inch overlap and securely seal.

3.3.1.13 Straw Wattle and Straw Bales

a. Install prior to starting earth disturbing activities.

b. Install in accordance with manufacturer's instructions and as described in the Drawings.

c. Remove after upgradient areas have been permanently stabilized.

3.3.1.14 Inlet Protection

Install as described in the Drawings.

3.4 SEEDING

Apply Soil Stabilization Seeding (if necessary) as described in the Drawings and Section 32 92 19 SEEDING:

1. Hydroseeding is acceptable method of applying seed and associated soil conditioning agents as needed to establish satisfactory stand of grass.

2. Place and maintain over disturbed areas. Maintain until such time as areas are approved for permanent seeding. As a minimum, maintenance shall include the following:

   a. Fix up and reseeding of bare areas or redisturbed areas.

   b. Mowing stands of grass or weeds exceeding 6 inches in height.

Begin watering immediately after installing erosion control blanket. Apply water to supplement rainfall at a sufficient rate to ensure moist soil conditions to a minimum 1 inch depth. Prevent run-off and puddling. Do no drive watering trucks over turf areas, unless otherwise directed. Prevent watering of other adjacent areas or plant material.

3.5 FIELD QUALITY CONTROL

Conduct inspections jointly with Government every 2 weeks to evaluate conformance to requirements of Federal, state and local regulations.

Replace or repair failed or overloaded silt fences, check dams, or other temporary erosion control devices within 2 days after Site inspections.

Accumulated soil from sweeping pavement on the site shall be containerized and characterized for disposal.

3.6 MAINTENANCE RECORD

Furnish a record describing the maintenance work performed, record of measurements and findings for product failure, recommendations for repair, and products replaced.

3.6.1 Maintenance

Maintenance shall include watering; eradicating weeds; protecting embankments and ditches from surface erosion; maintaining the performance of the erosion control materials and mulch; protecting installed areas from traffic.

Promptly repair or replace silt fence that becomes damaged.

Provide and maintain soil stabilization seeding at all times.

Inspect, repair, and replace erosion control measures weekly and within 24 hours after a 0.5-inch storm event during the time period from start of construction to completion of construction.

3.6.2 Maintenance Instructions

Furnish written instructions containing drawings and other necessary information, describing the care of the installed material; including, when and where maintenance should occur, and the procedures for material replacement. Submit instruction for year-round care of installed material. Include manufacturer supplied spare parts.

3.6.3 Maintenance of Stormwater Inlets

a. Clean collected sediment after every storm or as determined from biweekly inspections.

b. Perform cleaning in a manner that will not direct sediment into storm drain piping system.

c. Take removed sediment to area selected by Government where it can be cleaned of sticks and debris, then allowed to dry.

d. Dispose of final sediment onsite as designated by Government.

e. Dispose of debris offsite.

3.7 SITE CLEAN UP AND RESTORATION

3.7.1 Site Clean Up

At the end of construction, remove all control devises and dispose of in accordance with all state and local regulations.

Dispose of excess material, debris, and waste materials offsite at an approved landfill or recycling center. Clear adjacent paved areas. Immediately upon completion of the installation in an area, protect the area against traffic or other use by erecting barricades and providing signage as required, or as directed.

All accumulated soil/sediment will be containerized for characterization and disposal.

3.7.2 Site Restoration

Install permanent stormwater, erosion, and sediment controls are described in the Drawings, including:

a. Armored stream bank restoration

b. Vegetated stream bank restoration

c. Toe of slope protection

d. Erosion control matting

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SECTION 01 57 19

TEMPORARY ENVIRONMENTAL CONTROLS
11/15

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 within the text by the basic designation only.

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA SW-846	(Third Edition; Update IV) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

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

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
40 CFR 112	Oil Pollution Prevention
40 CFR 122.26	Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)
40 CFR 241	Guidelines for Disposal of Solid Waste
40 CFR 243	Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
40 CFR 258	Subtitle D Landfill Requirements
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 261.7	Residues of Hazardous Waste in Empty Containers
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 262.31	Standards Applicable to Generators of Hazardous Waste-Labeling
40 CFR 262.34	Standards Applicable to Generators of Hazardous Waste-Accumulation Time
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of

	Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 273	Standards For Universal Waste Management
40 CFR 273.2	Standards for Universal Waste Management - Batteries
40 CFR 273.4	Standards for Universal Waste Management - Mercury Containing Equipment
40 CFR 273.5	Standards for Universal Waste Management - Lamps
40 CFR 279	Standards for the Management of Used Oil
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 300.125	National Oil and Hazardous Substances Pollution Contingency Plan - Notification and Communications
40 CFR 355	Emergency Planning and Notification
40 CFR 403	General Pretreatment Regulations for Existing and New Sources of Pollution
40 CFR 50	National Primary and Secondary Ambient Air Quality Standards
40 CFR 60	Standards of Performance for New Stationary Sources
40 CFR 63	National Emission Standards for Hazardous Air Pollutants for Source Categories
40 CFR 64	Compliance Assurance Monitoring
40 CFR 745	Lead-Based Paint Poisoning Prevention in Certain Residential Structures
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 171	General Information, Regulations, and Definitions

49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Contractor Generated Hazardous Waste

Contractor generated hazardous waste is 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 Contractor 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), waste thinners, excess paints, excess solvents, waste solvents, excess pesticides, and contaminated pesticide equipment rinse water.

1.2.2 Electronics Waste

Electronics waste is discarded electronic devices intended for salvage, recycling, or disposal.

1.2.3 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which 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 or historically.

1.2.4 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; radiant energy and radioactive material as well as other pollutants.

1.2.5 Hazardous Debris

As defined in paragraph SOLID WASTE, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) in accordance with 40 CFR 261. Hazardous debris also includes debris that exhibits a characteristic of hazardous waste in accordance with 40 CFR 261.

1.2.6 Hazardous Materials

Hazardous materials as defined in 49 CFR 171 and listed in 49 CFR 172.

Hazardous material is any material that: Is regulated as a hazardous

material in accordance with 49 CFR 173; or requires a Safety Data Sheet (SDS) in accordance with 29 CFR 1910.120; or during end use, treatment, handling, packaging, storage, transportation, or disposal meets or has components that meet or have potential to meet the definition of a hazardous waste as defined by 40 CFR 261 Subparts A, B, C, or D. Designation of a material by this definition, when separately regulated or controlled by other sections or directives, does not eliminate the need for adherence to that hazard-specific guidance which takes precedence over this section for "control" purposes. Such material includes ammunition, weapons, explosive actuated devices, propellants, pyrotechnics, chemical and biological warfare materials, medical and pharmaceutical supplies, medical waste and infectious materials, bulk fuels, radioactive materials, and other materials such as asbestos, mercury, and polychlorinated biphenyls (PCBs).

1.2.7 Hazardous Waste

Hazardous Waste is any material that meets the definition of a solid waste and exhibit a hazardous characteristic (ignitability, corrosivity, reactivity, or toxicity) as specified in 40 CFR 261, Subpart C, or contains a listed hazardous waste as identified in 40 CFR 261, Subpart D.

1.2.8 Land Application

Land Application means spreading or spraying discharge water at a rate that allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" must occur. Comply with federal, state, and local laws and regulations.

1.2.9 National Pollutant Discharge Elimination System (NPDES)

The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

1.2.10 Oily Waste

Oily waste are those materials that are, or were, mixed with Petroleum, Oils, and Lubricants (POLs) and have become separated from that POLs. Oily wastes also means materials, including wastewaters, centrifuge solids, filter residues or sludges, bottom sediments, tank bottoms, and sorbents which have come into contact with and have been contaminated by, POLs and may be appropriately tested and discarded in a manner which is in compliance with other state and local requirements.

This definition includes materials such as oily rags, "kitty litter" sorbent clay and organic sorbent material. These materials may be land filled provided that: It is not prohibited in other state regulations or local ordinances; the amount generated is "de minimus" (a small amount); it is the result of minor leaks or spills resulting from normal process operations; and free-flowing oil has been removed to the practicable extent possible. Large quantities of this material, generated as a result of a major spill or in lieu of proper maintenance of the processing equipment, are a solid waste. As a solid waste, perform a hazardous waste determination prior to disposal. As this can be an expensive process, it is recommended that this type of waste be minimized through good housekeeping practices and employee education.

1.2.11 Regulated Waste

Regulated waste are solid wastes that have specific additional federal, state, or local controls for handling, storage, or disposal.

1.2.12 Sediment

Sediment is soil and other debris that have eroded and have been transported by runoff water or wind.

1.2.13 Solid Waste

Solid waste is a solid, liquid, semi-solid or contained gaseous waste. A solid waste can be a hazardous waste, non-hazardous waste, or non-Resource Conservation and Recovery Act (RCRA) regulated waste. Types of solid waste typically generated at construction sites may include:

1.2.13.1 Debris

Debris is non-hazardous solid material generated during the construction, demolition, or renovation of a structure that exceeds 2.5-inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (for example, cobbles and boulders), broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. Inert materials may not be reinforced with or contain ferrous wire, rods, accessories and weldments. A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

1.2.13.2 Green Waste

Green waste is the vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be relocated, or be reused are not included.

1.2.13.3 Material not regulated as solid waste

Material not regulated as solid waste is nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

1.2.13.4 Non-Hazardous Waste

Non-hazardous waste is waste that is excluded from, or does not meet, hazardous waste criteria in accordance with 40 CFR 263.

1.2.13.5 Recyclables

Recyclables are materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable, and structural components. It also includes commercial-grade refrigeration equipment with Freon removed, household appliances where the basic material content is metal, clean

polyethylene terephthalate bottles, cooking oil, used fuel oil, textiles, high-grade paper products and corrugated cardboard, stackable pallets in good condition, clean crating material, and clean rubber/vehicle tires. Metal meeting the definition of lead contaminated or lead based paint contaminated may not be included as recyclable if sold to a scrap metal company. Paint cans that meet the definition of empty containers in accordance with 40 CFR 261.7 may be included as recyclable if sold to a scrap metal company.

1.2.13.6 Surplus Soil

Surplus soil is existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars, and paving. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included and must be managed in accordance with paragraph HAZARDOUS MATERIAL MANAGEMENT.

1.2.13.7 Scrap Metal

This includes scrap and excess ferrous and non-ferrous metals such as reinforcing steel, structural shapes, pipe, and wire that are recovered or collected and disposed of as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.

1.2.13.8 Wood

Wood is dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included. Treated wood includes, but is not limited to, lumber, utility poles, crossties, and other wood products with chemical treatment.

1.2.14 Surface Discharge

Surface discharge means discharge of water into drainage ditches, storm sewers, creeks or "waters of the United States". Surface discharges are discrete, identifiable sources and require a permit from the governing agency. Comply with federal, state, and local laws and regulations.

1.2.15 Wastewater

Wastewater is the used water and solids from a community that flow to a treatment plant.

1.2.15.1 Stormwater

Stormwater is any precipitation in an urban or suburban area that does not evaporate or soak into the ground, but instead collects and flows into storm drains, rivers, and streams.

1.2.16 Waters of the United States

Waters of the United States means Federally jurisdictional waters, including wetlands, that are subject to regulation under Section 404 of the Clean Water Act or navigable waters, as defined under the Rivers and Harbors Act.

1.2.17 Wetlands

Wetlands are those areas that are inundated or saturated by surface or groundwater 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.

1.2.18 Universal Waste

The universal waste regulations streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (for example, thermostats), and lamps (for example, fluorescent bulbs). The rule is designed to reduce hazardous waste in the municipal solid waste (MSW) stream by making it easier for universal waste handlers to collect these items and send them for recycling or proper disposal. These regulations can be found at 40 CFR 273.

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Solid Waste Management Permit; G

Regulatory Notifications; G

Environmental Protection Plan; G

Stormwater Notice of Intent (for NPDES coverage under the general permit for construction activities); G

Dirt and Dust Control Plan; G

Employee Training Records; G

Environmental Manager Qualifications; G

SD-06 Test Reports

Laboratory Analysis

Inspection Reports

Solid Waste Management Report; G

SD-07 Certificates

Employee Training Records; G

SD-11 Closeout Submittals

Stormwater Pollution Prevention Plan Compliance Notebook; G

Stormwater Notice of Termination (for NPDES coverage under the general permit for construction activities); G

Waste Determination Documentation; G

Disposal Documentation for Hazardous and Regulated Waste; G

Assembled Employee Training Records; G

Solid Waste Management Permit; G

Solid Waste Management Report; G

Hazardous Waste/Debris Management; G

Regulatory Notifications; G

Sales Documentation; G

Contractor Certification

As-Built Topographic Survey

1.4 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this Contract. Comply with federal, state, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

Tests and procedures assessing whether construction operations comply with Applicable Environmental Laws may be required. Analytical work must be performed by qualified laboratories; and where required by law, the laboratories must be certified.

1.5 QUALITY ASSURANCE

1.5.1 Regulatory Notifications

Provide regulatory notification requirements in accordance with federal, state and local regulations. In cases where the Government will also provide public notification (such as stormwater permitting), coordinate with the Contracting Officer. Submit copies of regulatory notifications to the Contracting Officer at least 30 days prior to commencement of work activities. Typically, regulatory notifications must be provided for the following (this listing is not all-inclusive): demolition, renovation, NPDES defined site work, construction, removal or use of a permitted air emissions source, and remediation of controlled substances (asbestos, hazardous waste, lead paint).

The Government will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or

regulations, permits, and other elements of the Contractor's Environmental Protection Plan. The Contractor shall, after receipt of such notice, inform the Government of the proposed corrective action and take such action when approved by the Government. The Government 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 Contractor for any such suspensions. This is in addition to any other actions the Government may take under the contract or in accordance with the Federal Acquisition Regulation or other Federal law.

1.5.2 Environmental Brief

Attend an environmental brief to be included in the preconstruction meeting. Provide the following information: types, quantities, and use of hazardous materials that will be brought onto the Site; and types and quantities of wastes/wastewater that may be generated during the Contract. Discuss the results of the Preconstruction Survey at this time.

Prior to initiating any work on site, meet with the Contracting Officer to discuss the proposed Environmental Protection Plan (EPP). Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural and cultural resources, required reports, required permits, permit requirements (such as mitigation measures), and other measures to be taken.

1.5.3 Environmental Manager

Appoint in writing an Environmental Manager for the project site. The Environmental Manager is directly responsible for coordinating contractor compliance with federal, state, and local requirements. The Environmental Manager must ensure compliance with Hazardous Waste Program requirements (including hazardous waste handling, storage, manifesting, and disposal); implement the EPP; ensure environmental permits are obtained, maintained, and closed out; ensure compliance with Stormwater Program requirements; ensure compliance with Hazardous Materials (storage, handling, and reporting) requirements; and coordinate any remediation of regulated substances (lead, asbestos, PCB transformers). This can be a collateral position; however, the person in this position must be trained to adequately accomplish the following duties: ensure waste segregation and storage compatibility requirements are met; inspect and manage Satellite Accumulation areas; ensure only authorized personnel add wastes to containers; ensure Contractor personnel are trained in 40 CFR requirements in accordance with their position requirements; coordinate removal of waste containers; and maintain the Environmental Records binder and required documentation, including environmental permits compliance and close-out. Submit Environmental Manager Qualifications to the Contracting Officer.

1.5.4 Employee Training Records

Prepare and maintain Employee Training Records throughout the term of the contract meeting applicable 40 CFR requirements. Provide Employee Training Records in the Environmental Records Binder. Submit these Assembled Employee Training Records to the Contracting Officer at the conclusion of the project, unless otherwise directed.

Train personnel to meet state requirements. Conduct environmental protection/pollution control meetings for personnel prior to commencing construction activities. Contact additional meetings for new personnel and when site conditions change. Include in the training and meeting agenda:

methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, waters of the United States, and endangered species and their habitat that are known to be in the area.

1.5.5 Non-Compliance Notifications

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with federal, state or local environmental laws or regulations, permits, and other elements of the Contractor's EPP. After receipt of such notice, inform the Contracting Officer of the proposed corrective action 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 will be granted or equitable adjustments allowed 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.

1.6 ENVIRONMENTAL PROTECTION PLAN

The purpose of the EPP is to present an overview of known or potential environmental issues that must be considered and addressed during construction. Incorporate construction related objectives and targets from the EPP. Include in the EPP measures for protecting natural and cultural resources, required reports, and other measures to be taken. Meet with the Contracting Officer or Contracting Officer Representative to discuss the EPP and develop a mutual understanding relative to the details for environmental protection including measures for protecting natural resources, required reports, and other measures to be taken. Submit the EPP within 30 days after notice to proceed and not less than 10 days before the preconstruction meeting. Revise the EPP throughout the project to include any reporting requirements, changes in site conditions, or contract modifications that change the project scope of work in a way that could have an environmental impact. No requirement in this section will relieve the Contractor of any applicable federal, state, and local environmental protection laws and regulations. During Construction, identify, implement, and submit for approval any additional requirements to be included in the EPP. Maintain the current version onsite.

The EPP includes, but is not limited to, the following elements:

1.6.1 General Overview and Purpose

1.6.1.1 Descriptions

A brief description of each specific plan required by environmental permit or elsewhere in this Contract such as stormwater pollution prevention plan, spill control plan, solid waste management plan, wastewater management plan, air pollution control plan, contaminant prevention plan, a historical, archaeological, cultural resources, biological resources and wetlands plan, traffic control plan Hazardous, Toxic and Radioactive Waste (HTRW) Plan Non-Hazardous Solid Waste Disposal Plan borrowing material plan.

a. A solid waste disposal plan identifying methods and locations for waste disposal including but not limited to: uncontaminated debris found onsite, garbage and other waste generated by workers, and materials to be removed at the completion of remediation (such as dense graded aggregate (DGA), PPE and liners, common fill, asphalt if contaminated). The plan shall include schedules for disposal. The Contractor shall identify any subcontractors responsible for the transportation and disposal of solid waste at a permitted, commercially operating facilities. Evidence of each the disposal facility's acceptance of the solid waste shall be attached to this plan during the construction (i.e., shipping manifest, delivery receipts). Report the total amount of waste generated and disposed.

b. A waste minimization plan with a list of measures to reduce consumption of energy and natural resources. The plan shall detail the Contractor's actions to comply with and to participate in Federal, State, regional, and local government-sponsored recycling programs to reduce the volume of solid waste at the source. Report the total amount of waste generated and total amount of waste diverted and/or recycled in tons along with the percent that was diverted.

c. A contaminant prevention plan that identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of these materials. In accordance with EM 385-1-1, a copy of the Safety Data Sheets (SDS) and the maximum quantity of each hazardous material to be on site at any given time shall be included in the contaminant prevention plan. As new hazardous materials are brought on site or removed from the Site, the plan shall be updated.

d. A wastewater management plan that identifies the methods and procedures for management and/or discharge of wastewaters which are directly derived from construction activities, such as hydrostatic test water, decontamination water, stormwater that comes into contact with contaminated soil, and water generated from soil dewatering.

e. A spill prevention and response plan that identifies methods and procedures for preventing spills and procedures for addressing spills that occur at the site.

f. A historical, archaeological, and cultural resources plan that defines procedures for identifying and protecting historical, archaeological, and cultural resources known to be on the project site, and/or identifies procedures to be followed if historical, archaeological, and cultural resources not previously known to be on site are discovered during construction. The plan shall include methods to ensure the protection of known or discovered resources and shall identify lines of communication between Contractor personnel and the Government.

1.6.1.2 Duties

The duties and level of authority assigned to the person(s) on the job site who oversee environmental compliance, such as who is responsible for

adherence to the EPP, who is responsible for spill cleanup and training personnel on spill response procedures, who is responsible for manifesting waste to be removed from the site, and who is responsible for training the Contractor's environmental protection personnel.

1.6.1.3 Procedures

A copy of any standard or project-specific operating procedures that will be used to effectively manage and protect the environment on the project site.

1.6.1.4 Communications

Communication and training procedures that will be used to convey environmental management requirements to Contractor employees and subcontractors.

1.6.1.5 Contact Information

Emergency contact information contact information (office phone number, cell phone number, and e-mail address).

1.6.2 General Site Information

1.6.2.1 Drawings

Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, jurisdictional wetlands, material storage areas, structures, sanitary facilities, storm drains and conveyances, and stockpiles of excess soil.

1.6.2.2 Work Area

Work area plan showing the proposed activity in each portion of the area and identify the areas of limited use or nonuse. Include measures for marking the limits of use areas, including methods for protection of features to be preserved within authorized work areas and methods to control runoff and to contain materials on site, and a traffic control plan.

1.6.2.3 Documentation

A letter signed by an officer of the firm appointing the Environmental Manager and stating that person is responsible for managing and implementing the Environmental Program as described in this contract. Include in this letter the Environmental Manager's authority to direct the removal and replacement of non-conforming work.

1.6.3 Management of Natural Resources

a. Land resources

b. Tree protection

c. Replacement of damaged landscape features

d. Temporary construction

e. Stream crossings

f. Fish and wildlife resources

g. Wetland areas

1.6.4 Protection of Historical and Archaeological Resources

a. Objectives

b. Methods

1.6.5 Stormwater Management and Control

a. Ground cover

b. Erodible soils

c. Temporary measures

(1) Structural Practices

(2) Temporary and permanent stabilization

d. Effective selection, implementation and maintenance of Best Management Practices (BMPs)

1.6.6 Protection of the Environment from Waste Derived from Contractor Operations

Control and disposal of solid and sanitary waste. Control and disposal of hazardous waste.

This item consist of the management procedures for hazardous waste to be generated. The elements of those procedures will coincide with the Hazardous Waste Management Plan. The Contracting Officer will provide a copy of the Hazardous Waste Management Plan. As a minimum, include the following:

a. List of the types of contaminated wastes expected to be generated.

b. Procedures to ensure a written waste determination is made for appropriate wastes that are to be generated.

c. Sampling/analysis plan, including laboratory method(s) that will be used for waste determinations and copies of relevant laboratory certifications.

d. Methods and proposed locations for waste accumulation/storage.

e. Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted).

f. Management procedures and regulatory documentation ensuring disposal of waste complies with Land Disposal Restrictions (40 CFR 268).

g. Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and similar.

h. Used oil management procedures in accordance with 40 CFR 279; Waste

minimization procedures.

i. Plans for the disposal of waste by permitted facilities; and Procedures to be employed to ensure required employee training records are maintained.

1.6.7 Prevention of Releases to the Environment

Procedures to prevent releases to the environment

Notifications in the event of a release to the environment

1.6.8 Regulatory Notification and Permits

List what notifications and permit applications must be made. Some permits require up to 180 days to obtain. Demonstrate that those permits have been obtained or applied for by including copies of applicable environmental permits. The EPP will not be approved until the permits have been obtained.

1.6.9 Clean Air Act Compliance

1.6.9.1 Haul Route

Submit truck and material haul routes along with a Dirt and Dust Control Plan for controlling dirt, debris, and dust on surrounding roadways. As a minimum, identify in the plan the subcontractor and equipment for cleaning along the haul route and measures to reduce dirt, dust, and debris from roadways.

1.6.9.2 Pollution Generating Equipment

Identify air pollution generating equipment or processes that may require federal, state, or local permits under the Clean Air Act. Determine requirements based on any current permits and the impacts of the project. Provide a list of all fixed or mobile equipment, machinery or operations that could generate air emissions during the project to the Contracting Officer.

1.6.9.3 Stationary Internal Combustion Engines

Identify portable and stationary internal combustion engines that will be supplied, used or serviced. Comply with 40 CFR 60 Subpart IIII, 40 CFR 60 Subpart JJJJ, 40 CFR 63 Subpart ZZZZ, and local regulations as applicable. At minimum, include the make, model, serial number, manufacture date, size (engine brake horsepower), and EPA emission certification status of each engine. Maintain applicable records and log hours of operation and fuel use. Logs must include reasons for operation and delineate between emergency and non-emergency operation.

1.6.9.4 Refrigerants

Identify management practices to ensure that heating, ventilation, and air conditioning (HVAC) work involving refrigerants complies with 40 CFR 82 requirements. Technicians must be certified, maintain copies of certification on site, use certified equipment and log work that requires the addition or removal of refrigerant. Any refrigerant reclaimed is the property of the Government, coordinate with the Contracting Officer to determine the appropriate turn in location.

1.6.9.5 Air Pollution-engineering Processes

Identify planned air pollution-generating processes and management control measures (including, but not limited to, spray painting, abrasive blasting, demolition, material handling, fugitive dust, and fugitive emissions). Log hours of operations and track quantities of materials used.

1.6.9.6 Monitoring

For the protection of public health, monitor and control contaminant emissions to the air from remedial action area sources to minimize risks that might be posed to the community during implementation of the remedial alternative in accordance with the 01 36 20 PERIMETER AIR MONITORING and 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES.

1.6.9.7 Compliant Materials

Provide the Government a list of and SDSs for all hazardous materials proposed for use on site. Materials must be compliant with all Clean Air Act regulations for emissions including solvent and volatile organic compound contents, and applicable National Emission Standards for Hazardous Air Pollutants requirements. The Government may alter or limit use of specific materials as needed to meet permit requirements for emissions.

1.7 LICENSES AND PERMITS

The Contractor shall be responsible for obtaining and complying with all environmental permits/permit equivalencies and commitments required by Federal, State, regional, and local environmental laws and regulations.

1.8 ENVIRONMENTAL RECORDS BINDER

Maintain on-site a separate three-ring Environmental Records Binder and submit at the completion of the project. Make separate parts within the binder that correspond to each submittal listed under paragraph CLOSEOUT SUBMITTALS in this section.

1.9 SOLID WASTE MANAGEMENT PERMIT

Provide the Contracting Officer with written notification of the quantity of anticipated solid waste or debris that is anticipated or estimated to be generated by construction. Include in the report the locations where various types of waste will be disposed or recycled. Include letters of acceptance from the receiving location or as applicable; submit one copy of the receiving location state and local Solid Waste Management Permit or license showing such agency's approval of the disposal plan before transporting wastes off Government property.

1.9.1 Solid Waste Management Report

Monthly, submit a solid waste disposal report to the Contracting Officer. For each waste, the report will state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste.

1.10 FACILITY HAZARDOUS WASTE GENERATOR STATUS

The Site is designated as a Large Quantity Generator. Meet the regulatory

requirements of this generator designation for any work conducted within the boundaries of the Site. Comply with provisions of federal, state, and local regulatory requirements applicable to this generator status regarding training and storage, handling, and disposal of construction derived wastes.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitats. Prior to the commencement of activities, consult with the Contracting Officer, regarding rare species or sensitive habitats that need to be protected. The protection of rare, threatened, and endangered animal and plant species identified, including their habitats, is the Contractor's responsibility.

Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work or as otherwise specified. Confine construction activities to within the limits of the work indicated or specified.

The Contractor shall be responsible for obtaining and complying with all environmental permits/permit equivalencies and commitments required by Federal, State, regional, and local environmental laws and regulations.

3.1.1 Flow Ways

Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as specified in 31 23 18 TEMPORARY BYPASS PUMPING SYSTEM and permitted.

3.1.2 Vegetation

Except in areas to be cleared as described in 31 11 00 CLEARING AND GRUBBING, do not remove, cut, deface, injure, or destroy trees, shrubs, or other vegetation without the Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Contracting Officer. Where such use of attached ropes, cables, or guys is authorized, the Contractor is responsible for any resultant damage.

Protect existing trees that are to remain to ensure they are not injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. Coordinate with the Contracting Officer to determine appropriate action for trees and other landscape features scarred or damaged by equipment operations.

3.1.3 Streams

Stream crossings must allow movement of materials or equipment without violating water pollution control standards of the federal, state, and

local governments. Construction of stream crossing structures must be in compliance with any required permits including, but not limited to, Clean Water Act Section 404, and Section 401 Water Quality.

The Contracting Officer's approval and appropriate permits are required before any equipment will be permitted to ford live streams. In areas where frequent crossings are required, install temporary culverts or bridges as described in the Drawings. Obtain Contracting Officer's approval prior to installation. Remove temporary culverts or bridges upon completion of work, and repair the area to its original condition unless otherwise required by the Contracting Officer.

3.2 STORMWATER

Do not discharge stormwater from construction sites to the sanitary sewer. If the water is noted or suspected of being contaminated, it may only be released to the storm drain system if the discharge is specifically permitted.

3.2.1 Construction General Permit

Provide a Construction General Permit as required by 40 CFR 122.26 or the State of New Jersey General Permit. Under the terms and conditions of the permit, install, inspect, maintain BMPs, prepare stormwater erosion and sediment control inspection reports, and submit SWPPP inspection reports. Maintain construction operations and management in compliance with the terms and conditions of the general permit for stormwater discharges from construction activities.

3.2.1.1 Stormwater Pollution Prevention Plan

Submit a project-specific Stormwater Pollution Prevention Plan (SWPPP) to the Contracting Officer for approval, prior to the commencement of work. The SWPPP must meet the requirements of 40 CFR 122.26 and the New Jersey State General Permit for stormwater discharges from construction sites.

Include the following:

a. Comply with terms of the state general permit for stormwater discharges from construction activities. Prepare SWPPP in accordance with state requirements.

b. Select applicable BMPs from EPA Fact Sheets located at http://water.epa.gov/polwaste/npdes/swbmp/Construction-Site-StormWater-Run-Off-Control.cfm or in accordance with applicable state or local requirements.

c. Include a completed copy of the Notice of Intent, BMP Inspection Report Template, and Stormwater Notice of Termination, except for the effective date.

3.2.1.2 Stormwater Notice of Intent for Construction Activities

Prepare and submit the Notice of Intent for NPDES coverage under the general permit for construction activities to the Contracting Officer for review and approval.

Submit the approved NOI and appropriate permit fees onto the appropriate

federal or state agency for approval. No land disturbing activities may commence without permit coverage. Maintain an approved copy of the SWPPP at the onsite construction office, and continually update as regulations require, reflecting current site conditions.

3.2.1.3 Inspection Reports

Submit "Inspection Reports" to the Contracting Officer in accordance with the State of New Jersey Construction General Permit.

3.2.1.4 Stormwater Pollution Prevention Plan Compliance Notebook

Create and maintain a three ring binder of documents that demonstrate compliance with the Construction General Permit. Include a copy of the permit Notice of Intent, proof of permit fee payment, SWPPP and SWPPP update amendments, inspection reports and related corrective action records, copies of correspondence with the the New Jersey Department of Environmental Protection (NJDEP), and a copy of the permit Notice of Termination in the binder. At project completion, the notebook becomes property of the Government. Provide the compliance notebook to the Contracting Officer.

3.2.1.5 Stormwater Notice of Termination for Construction Activities

Submit a Notice of Termination to the Contracting Officer for approval once construction is complete and final stabilization has been achieved on all portions of the site for which the permittee is responsible. Once approved, submit the Notice of Termination to the appropriate state or federal agency. Prepare as-built topographic survey information required by the permitting agency for certification of the stormwater management system, and provide to the Contracting Officer.

3.2.2 Erosion and Sediment Control Measures

Provide erosion and sediment control measures in accordance with federal, state, and local laws and regulations. Preserve vegetation to the maximum extent practicable. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of construction activities. The area of bare soil exposed at any one time by construction operations should be kept to a minimum. Construct or install temporary and permanent erosion and sediment control best management practices (BMPs) in accordance with the Contractor's approved Soil Erosion Sediment Control plan and as specified in Section 01 57 13 EROSION AND SEDIMENT CONTROLS. BMPs may include, but are not limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, and diversion channels and piping. The Contractor's BMPs must be in accordance with the New Jersey Pollutant Discharge Elimination System (NJPDES) Request for Authorization (RFA) for Stormwater Discharge during construction, which shall be reviewed by the Bureau of Nonpoint Pollutant Control, Division of Water Quality, New Jersey Department of Environmental Protection (NJDEP). Remove any temporary measures after the area has been stabilized.

Erosion control inspection reports may be compiled as part of a stormwater pollution prevention plan inspection reports.

3.2.3 Work Area Limits

Site boundaries and project phasing are noted in the Drawings. Mark the areas that need not be disturbed under this Contract prior to commencing construction activities. Mark or fence isolated areas within the general work area that are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers must be visible in the dark. Personnel must be knowledgeable of the purpose for marking and protecting particular objects.

3.2.4 Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Contracting Officer. Move or relocate the Contractor facilities only when approved by the Contracting Officer. Provide erosion and sediment controls for onsite borrow and spoil areas to prevent sediment from entering nearby waters. Control temporary excavation and embankments for plant or work areas to protect adjacent areas.

3.3 SURFACE AND GROUNDWATER

3.3.1 Cofferdams, Diversions, and Dewatering

Construction operations for dewatering and excavation must be constantly controlled to maintain compliance with existing state water quality standards and designated uses of the surface water body as specified in Sections 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL and 31 23 18 TEMPORARY BYPASS PUMPING SYSTEM. Comply with the State of New Jersey water quality standards and anti-degradation provisions. Do not discharge excavation ground water to the sanitary sewer, storm drains, or to surface waters without prior specific authorization in writing from the Contracting Officer. Discharge of contaminated substances will not be permitted under any circumstances. Use sediment control BMPs to prevent construction site runoff from directly entering any storm drain or surface waters.

If the construction dewatering is noted or suspected of being contaminated, it may only be released to the storm drain system if the discharge is specifically permitted. Obtain authorization for any contaminated groundwater release in advance from the Contracting Officer and the federal or state authority, as applicable. Discharge of hazardous substances will not be permitted under any circumstances.

3.3.2 Waters of the United States

Do not enter, disturb, destroy, or allow discharge of contaminants into waters of the United States except as authorized herein. The protection of waters of the United States shown on the drawings in accordance with paragraph LICENSES AND PERMITS is the Contractor's responsibility. Authorization to enter specific waters of the United States identified does not relieve the Contractor from any obligation to protect other waters of the United States within, adjacent to, or in the vicinity of the construction site and associated boundaries.

3.4 PROTECTION OF CULTURAL RESOURCES

3.4.1 Archaeological Resources

Areas identified in the Phase IA investigation report as archaeologically sensitive for the presence of Pre-Contact and Contact period archaeological sites and identified resources associated with the early twentieth century Spicer Manufacturing Corporation located within the project's Area of Potential Effect are shown on the Drawings. The resources include a previously identified Native American archaeological site located in the northeastern portion of the Area of Potential Effect. The Phase IB investigation will determine whether other such sites and resources are in fact present within the Area of Potential Effect. Protection and preservation of sensitive areas and identified resources are the responsibility of the Contractor under the direction the Contracting Officer's cultural resource specialist in consultation with the New Jersey State Office of Historic Preservation and the United States Environmental Protection Agency for the duration of the cultural resource assessment process. If, during excavation or other construction activities, any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, activities that may damage or alter such resources will be suspended. Resources covered by this paragraph include, but are not limited to: human skeletal remains or burials; artifacts; shell midden, bone, charcoal, burnt earth, or other deposits; foundations, pavings, walls, or other constructed features; and any features related to agricultural or other historic human activities within the Area of Potential Effect. Upon such discovery or find, immediately notify the Contracting Officer 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. All activities that may result in impact to or the destruction of these resources will cease while a determination is made. The area will be secure employees or other persons prevented from trespassing on, removing, or otherwise disturbing such resources. The Government retains ownership and control over archaeological and cultural resources.

3.4.2 Historical Architectural/Engineering Resources

The only historical architectural/engineering resources present within the Area of Potential Effect are the remnants of a condenser pond, its dam remains, inflow/outflow pipe, and other facilities associated with the early twentieth century Spicer Manufacturing Company's powerhouse as well as a causeway for a railroad siding associated with the company. The locations of these resources are shown on the Drawings. The Phase IB investigation will determine whether further documentation of such resources is warranted. Protection and preservation of the Spicer era related historic resources are the responsibility of the contractor under the direction of the Contracting Officer's cultural resource specialist in consultation with the New Jersey State Office of Historic Preservation and the United States Environmental Protection Agency. No Historic period residential resources are located within the Area of Potential Effect. No visual impacts to Historic properties located in the vicinity of the Area of Potential Effect are anticipated by excavation or other remedial activities.

Existing historical resources within the work area are shown on the drawings. Protect these resources and be responsible for their preservation during the life of the Contract.

3.5 AIR RESOURCES

Equipment operation, activities, or processes will be in accordance with 40 CFR 64 and state air emission and performance laws and standards.

3.5.1 Preconstruction Air Permits

Notify the Contracting Officer, at least 6 months prior to bringing equipment, assembled or unassembled, onto the Site, so that air permits can be secured. Necessary permitting time must be considered in regard to construction activities. Clean Air Act (CAA) permits must be obtained by Contractor prior to bringing equipment, assembled or unassembled, onto the Site.

Confirm that these permits have been obtained.

3.5.2 Burning

Burning is prohibited on the Government premises.

3.5.3 Accidental Venting of Refrigerant

Accidental venting of a refrigerant is a release and must be reported immediately to the Contracting Officer.

3.5.4 EPA Certification Requirements

Heating and air conditioning technicians must be certified through an EPA-approved program. Maintain copies of certifications at the employees' places of business; technicians must carry certification wallet cards, as provided by environmental law.

3.5.5 Dust Control

Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations as described in the Dirt and Dust Control Plan. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster.

3.5.5.1 Particulates

Dust particles, aerosols and gaseous by-products from construction activities, and processing and preparation of materials (such as from asphaltic batch plants) must be controlled at all times, including weekends, holidays, and hours when work is not in progress as described in Sections 01 36 20 PERIMETER AIR MONITORING and 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES. Maintain excavations, stockpiles, haul roads, permanent and temporary construction roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates that would exceed 40 CFR 50, state, and local air pollution standards or that would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators, or other methods will be permitted to control particulates in the work area. Sprinkling, to be

efficient, must be repeated to keep the disturbed area damp. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with state and local visibility regulations.

3.5.6 Odors

Control odors from construction activities. The odors must be in compliance with state regulations and local ordinances and may not constitute a health hazard or nuisance.

3.6 WASTE MINIMIZATION

Minimize the use of hazardous materials and the generation of waste. Include procedures for pollution prevention/ hazardous waste minimization in the Hazardous Waste Management Section of the EPP. Obtain a copy of the Pollution Prevention/Hazardous Waste Minimization Plan for reference material when preparing this part of the EPP. If no written plan exists, obtain information by contacting the Contracting Officer. Describe the anticipated types of the hazardous materials to be used in the construction when requesting information.

3.6.1 Salvage, Reuse and Recycle

Identify anticipated materials and waste for salvage, reuse, and recycling. Describe actions to promote material reuse, resale or recycling. To the extent practicable, all scrap metal must be sent for reuse or recycling and will not be disposed of in a landfill.

Include the name, physical address, and telephone number of the hauler, if transported by a franchised solid waste hauler. Include the destination and, unless exempted, provide a copy of the state or local permit (cover) or license for recycling.

3.7 WASTE MANAGEMENT AND DISPOSAL

3.7.1 Waste Determination Documentation

Complete a Waste Determination form (provided at the pre-construction conference) for Contractor-derived wastes to be generated. All potentially hazardous solid waste streams that are not subject to a specific exclusion or exemption from the hazardous waste regulations (e.g. scrap metal, domestic sewage) or subject to special rules, (lead-acid batteries and precious metals) must be characterized in accordance with the requirements of 40 CFR 261 or corresponding applicable state or local regulations. Base waste determination on user knowledge of the processes and materials used, and analytical data when necessary. Attach support documentation to the Waste Determination form. As a minimum, provide a Waste Determination form for the following waste (this listing is not inclusive): oil- and latex -based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and containers of the original materials. Segregate hazardous waste from other materials and wastes, protect it from the weather by placing it in a safe covered location, and take precautionary measures such as berming or other appropriate measures against accidental spillage and flood. Storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 - 178 and State and local laws and regulations are the Contractor's responsibility. Transport Contractor-generated hazardous waste

in accordance with Environmental Protection Agency (EPA) and Department of Transportation (DOT) laws and regulations. Dispose of hazardous waste in compliance with Federal, State, and local laws and regulations.

3.7.1.1 Sampling and Analysis of Waste

3.7.1.1.1 Waste Sampling

Sample waste in accordance with EPA SW-846. Clearly mark each sampled drum or container with the Contractor's identification number, and cross reference to the chemical analysis performed.

3.7.1.1.2 Laboratory Analysis

Follow the analytical procedure and methods in accordance with the 40 CFR 261. Provide analytical results and reports performed to the Contracting Officer.

3.7.1.1.3 Analysis Type

Identify hazardous waste by analyzing for the following characteristics: ignitability, corrosivity, reactivity, toxicity based on TCLP results, and other parameters as required by approved disposal facility.

3.7.2 Solid Waste Management

3.7.2.1 Solid Waste Management Report

Provide copies of the waste handling facilities' weight tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, a statement indicating the disposal location for the solid waste that is signed by an employee authorized to legally obligate or bind the firm may be submitted. The Contractor certification must include the receiver's tax identification number and business, EPA or state registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained for the Contractor's own use, submit the information previously described in this paragraph on the solid waste disposal report. Prices paid or received do not have to be reported to the Contracting Officer unless required by other provisions or specifications of this Contract or public law.

3.7.2.2 Control and Management of Solid Wastes

Pick up solid wastes, and place in covered containers that are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with non-hazardous solid waste. Transport solid waste off Government property and dispose of it in compliance with 40 CFR 260, state, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill is the minimum acceptable offsite solid waste disposal option. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate. Solid waste disposal offsite must comply with most stringent local, state, and federal requirements, including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

Manage hazardous material used in construction, including but not limited to, aerosol cans, waste paint, cleaning solvents, contaminated brushes, and

used rags, in accordance with 49 CFR 173.

3.7.3 Control and Management of Hazardous Waste

Do not dispose of hazardous waste on Government property. Do not discharge any waste to a sanitary sewer, storm drain, or to surface waters or conduct waste treatment or disposal on Government property without written approval of the Contracting Officer.

3.7.3.1 Hazardous Waste/Debris Management

Identify construction activities that will generate hazardous waste or debris. Provide a documented waste determination for resultant waste streams. Identify, label, handle, store, and dispose of hazardous waste or debris in accordance with federal, state, and local regulations, including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268.

Manage hazardous waste in accordance with the approved Hazardous Waste Management Section of the EPP. Store hazardous wastes in approved containers in accordance with 49 CFR 173 and 49 CFR 178. Hazardous waste generated within the confines of Government facilities is identified as being generated by the Government. Prior to removal of any hazardous waste from Government property, hazardous waste manifests must be signed by personnel from the Contracting Officer. Do not bring hazardous waste onto Government property. Provide the Contracting Officer with a copy of waste determination documentation for any solid waste streams that have any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D.

3.7.3.2 Waste Storage/Satellite Accumulation/90 Day Storage Areas

Accumulate hazardous waste at satellite accumulation points and in compliance with 40 CFR 262.34 and applicable state or local regulations. Individual waste streams will be limited to 55 gallons of accumulation (or 1 quart for acutely hazardous wastes). If the Contractor expects to generate hazardous waste at a rate and quantity that makes satellite accumulation impractical, the Contractor may request a temporary 90 day accumulation point be established. Submit a request in writing to the Contracting Officer and provide the following information (Attach Site Plan to the Request):

Contract Number	
Contractor	
Haz/Waste or Regulated Waste POC	
Phone Number	
Type of Waste	
Source of Waste	
Emergency POC	
Phone Number	
Location of the Site	

Attach a Waste Determination form for the expected waste streams. Allow 10 working days for processing this request. Additional compliance requirements (e.g. training and contingency planning) that may be required are the responsibility of the Contractor. Barricade the designated area where waste is being stored and post a sign identifying as follows:

"DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"

3.7.3.3 Hazardous Waste Disposal

3.7.3.3.1 Responsibilities for Contractor's Disposal

Provide hazardous waste manifest to the Contracting Officer for review, approval, and signature prior to shipping waste off Government property.

3.7.3.3.1.1 Services

Provide service necessary for the final treatment or disposal of the hazardous material or waste in accordance with 40 CFR 260, local, and state, laws and regulations, and the terms and conditions of the Contract within 60 days after the materials have been generated. These services include necessary personnel, labor, transportation, packaging, detailed analysis (if required for disposal or transportation, include manifesting or complete waste profile sheets, equipment, and compile documentation).

3.7.3.3.1.2 Samples

Obtain a representative sample of the material generated for each job done to provide waste stream determination.

3.7.3.3.1.3 Analysis

Analyze each sample taken and provide analytical results to the Contracting Officer. See paragraph WASTE DETERMINATION DOCUMENTATION.

3.7.3.3.1.4 Labeling

Determine the Department of Transportation's (DOT's) proper shipping names for waste (each container requiring disposal) and demonstrate to the Contracting Officer how this determination is developed and supported by the sampling and analysis requirements contained herein. Label all containers of hazardous waste with the words "Hazardous Waste" or other words to describe the contents of the container in accordance with 40 CFR 262.31 and applicable state or local regulations.

3.7.3.4 Universal Waste Management

Manage the following categories of universal waste in accordance with federal, state, and local requirements instructions:

a. Batteries as described in 40 CFR 273.2

b. Lamps as described in 40 CFR 273.5

c. Mercury-containing equipment as described in 40 CFR 273.4

Mercury is prohibited in the construction of this facility, unless specified otherwise, and with the exception of mercury vapor lamps and fluorescent lamps. Dumping of mercury-containing materials and devices

such as mercury vapor lamps, fluorescent lamps, and mercury switches, in rubbish containers is prohibited. Remove without breaking, pack to prevent breakage, and transport out of the activity in an unbroken condition for disposal as directed.

3.7.3.5 Electronics End-of-Life Management

Recycle or dispose of electronics waste, including, but not limited to, used electronic devices such computers, monitors, hard-copy devices, televisions, mobile devices, in accordance with 40 CFR 260-262, state, and local requirements, and Contracting Officer's instructions.

3.7.3.6 Disposal Documentation for Hazardous and Regulated Waste

Contact the Contracting Officer for the facility RCRA identification number that is to be used on each manifest.

3.7.4 Releases/Spills of Oil and Hazardous Substances

3.7.4.1 Response and Notifications

Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated in accordance with 40 CFR 300. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the Contracting Officer and the state or local authority.

Submit verbal and written notifications as required by the federal (40 CFR 300.125 and 40 CFR 355), state, local regulations and instructions. Provide copies of the written notification and documentation that a verbal notification was made within 20 days. Spill response must be in accordance with 40 CFR 300 and applicable state and local regulations. Contain and clean up these spills without cost to the Government.

3.7.4.2 Clean Up

Clean up hazardous and non-hazardous waste spills. Reimburse the Government for costs incurred including sample analysis materials, clothing, equipment, and labor if the Government will initiate its own spill cleanup procedures, for Contractor- responsible spills, when: Spill cleanup procedures have not begun within one hour of spill discovery/occurrence; or, in the Government's judgment, spill cleanup is inadequate and the spill remains a threat to human health or the environment.

3.7.5 Mercury Materials

Immediately report to the Environmental Office and the Contracting Officer instances of breakage or mercury spillage. Clean mercury spill area to the satisfaction of the Contracting Officer.

Do not recycle a mercury spill cleanup; manage it as a hazardous waste for disposal.

3.7.6 Wastewater

3.7.6.1 Disposal of wastewater must be as specified below.

3.7.6.1.1 Treatment

Do not allow wastewater from construction activities, such as onsite stormwater that has come in contact with contaminated soils, material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, and forms to enter water ways or to be discharged prior to being treated to remove pollutants. Dispose of the construction-related waste water off-Government property in accordance with 40 CFR 403, state, regional, and local laws and regulations.

3.7.6.1.2 Surface Discharge

For discharge of ground water, obtain a state or federal permit specific for pumping and discharging ground water prior to surface discharging.

3.8 HAZARDOUS MATERIAL MANAGEMENT

Include hazardous material control procedures in the Safety Plan, in accordance with Section 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES. Address procedures and proper handling of hazardous materials, including the appropriate transportation requirements. Do not bring hazardous material onto Government property that does not directly relate to requirements for the performance of this contract. Submit an SDS and estimated quantities to be used for each hazardous material to the Contracting Officer prior to bringing the material on the Site. Typical materials requiring SDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. Use hazardous materials in a manner that minimizes the amount of hazardous waste generated. Containers of hazardous materials must have National Fire Protection Association labels or their equivalent. Certify that hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste, in accordance with 40 CFR 261.

3.9 PREVIOUSLY USED EQUIPMENT

Clean previously used construction equipment prior to bringing it onto the project site. Equipment must be free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the U.S. Department of Agriculture jurisdictional office for additional cleaning requirements.

3.10 CONTROL AND MANAGEMENT OF LEAD-BASED PAINT (LBP)

Manage and dispose of lead-contaminated waste in accordance with 40 CFR 745. Manifest any lead-contaminated waste and provide the manifest to the Contracting Officer.

3.11 CONTROL AND MANAGEMENT OF POLYCHLORINATED BIPHENYLS (PCBS)

Manage and dispose of PCB-contaminated waste in accordance with 40 CFR 761 and Sections 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS and 02 81 00 TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIALS.

3.12 PETROLEUM, OIL, LUBRICANT (POL) STORAGE AND FUELING

POL products include flammable or combustible liquids, such as gasoline, diesel, lubricating oil, used engine oil, hydraulic oil, mineral oil, and cooking oil. Store POL products and fuel equipment and motor vehicles in a manner that affords the maximum protection against spills into the environment. Manage and store POL products in accordance with EPA 40 CFR 112, and other federal, state, regional, and local laws and regulations. Use secondary containments, dikes, curbs, and other barriers, to prevent POL products from spilling and entering the ground, storm or sewer drains, stormwater ditches or canals, or navigable waters of the United States. Describe in the EPP (see paragraph ENVIRONMENTAL PROTECTION PLAN) how POL tanks and containers must be stored, managed, and inspected and what protections must be provided. Storage of fuel on the project site must be in accordance with EPA, state, and local laws and regulations and paragraph OIL STORAGE INCLUDING FUEL TANKS.

3.12.1 Used Oil Management

Manage used oil generated on site in accordance with 40 CFR 279. Determine if any used oil generated while onsite exhibits a characteristic of hazardous waste. Used oil containing 1,000 parts per million of solvents is considered a hazardous waste and disposed of at the Contractor's expense. Used oil mixed with a hazardous waste is also considered a hazardous waste. Dispose in accordance with paragraph HAZARDOUS WASTE DISPOSAL.

3.12.2 Oil Storage Including Fuel Tanks

Provide secondary containment and overfill protection for oil storage tanks. A berm used to provide secondary containment must be of sufficient size and strength to contain the contents of the tanks plus 5 inches freeboard for precipitation. Construct the berm to be impervious to oil for 72 hours that no discharge will permeate, drain, infiltrate, or otherwise escape before cleanup occurs. Use drip pans during oil transfer operations; adequate absorbent material must be onsite to clean up any spills and prevent releases to the environment. Cover tanks and drip pans during inclement weather. Provide procedures and equipment to prevent overfilling of tanks. If tanks and containers with an aggregate aboveground capacity greater than 1320 gallons will be used onsite (only containers with a capacity of 55 gallons or greater are counted), provide and implement a SPCC plan meeting the requirements of 40 CFR 112. Do not bring underground storage tanks to the Site for Contractor use during a project. Submit the SPCC plan to the Contracting Officer for approval.

Monitor and remove any rainwater that accumulates in open containment dikes or berms. Inspect the accumulated rainwater prior to draining from a containment dike to the environment, to determine there is no oil sheen present.

3.13 INADVERTENT DISCOVERY OF PETROLEUM-CONTAMINATED SOIL OR HAZARDOUS WASTES

If petroleum-contaminated soil, or suspected hazardous waste is found during construction that was not identified in the Contract documents, immediately notify the Contracting Officer. Do not disturb this material until authorized by the Contracting Officer.

3.14 SOUND INTRUSION

Make the maximum use of low-noise emission products, as certified by the EPA. The Contractor shall keep construction activities under surveillance and control to minimize environmental damage by noise and in accordance with levels established in the site APP/SSHP. The Contractor shall comply with the noise control regulations of the State of New Jersey and local ordinances. Blasting or use of explosives are not permitted without written permission from the Contracting Officer, and then only during the designated times.

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the State of New Jersey rules.

3.15 VIBRATION MONITORING

Vibration monitoring is required for intrusive construction and excavation activities within 100 feet of residential/commercial structures and property. Documentation of conditions before and after work shall be documented as described in Section 01 30 00 ADMINISTRATIVE REQUIREMENTS.

3.16 POST CONSTRUCTION CLEANUP

Clean up areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing by the Contracting Officer, remove traces 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. Grade parking area and similar temporarily used areas to conform with surrounding contours.

-- End of Section --

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SECTION 01 58 00

PROJECT IDENTIFICATION
08/09

PART 1 GENERAL

1.1 SCOPE OF WORK

Furnish all labor, equipment, materials and incidentals required to provide and erect a U.S. Environmental Protection Agency (EPA)/U.S. Army Corps of Engineers (USACE) project site sign, safety signs and a bulletin board.

The Contractor shall provide and erect an EPA/USACE project site sign and safety signs meeting the requirements of this Section at a location to be determined by the Government. The sign requirements are shown at the end of this Section. Wording to be included on each sign shall be provided by the Government after contract award.

1.2 REFERENCES

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

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA 29 CFR 1903.2(a)(1)	Posting of Notice; Availability of the Act, Regulations and Applicable Standards

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP 310-1-6a	(2006) Sign Standards Manual, VOL 1
EP 310-1-6b	(2006) Sign Standards Manual, VOL 2, Appendices

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.Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Preliminary One Line Drawings Of Project Rendering; G

Sign Legend Orders; G

SD-04 Samples

Final Rendering Sample; G

Final Framed Rendering and Copies; G

1.4 QUALITY ASSURANCE

1.4.1 Rendering

Provide the project rendering in accordance with the following drawing stages as required in the paragraph SUBMITTALS. The following submittal data is required to properly identify the appropriate view and approve the final rendering of the facility. The final painted rendering will be used to produce the image for the signboard and framed photographic copies provided to the Contracting Officer.

1.4.1.1 Preliminary One Line Drawings

Provide three different views of the facility in a preliminary single line drawing (black and white) format. These three views will represent the best angles at which to view the proposed facility showing the best design features and the three dimensional character of the facility.

1.4.1.2 Final Rendering Sample

Provide a photographic copy (8 by 10 inches minimum size) of final rendering for approval of color, landscaping, and foreground/background development prior to final submittal.

1.4.1.3 Final Framed Rendering and Copies

Provide final full color rendering of the proposed facility as specified.

1.5 PROJECT SIGN

Prior to initiating any work on site, provide one project identification sign at the location designated. Construct the sign in accordance with project sign detail attached at the end of this section,. Maintain sign throughout the life of the project. Upon completion of the project, remove the sign from the site. Provide color rendering of the project. Reproduce the rendering on the signboard or enclose a copy of the rendering under a water-proof, transparent cover, and caulk for weather protection.

1.5.1 Construction Project Signs (USACE)

Furnish the construction project sign package, maintain the signs during construction, and remove the signs from the job site upon completion of the project. The construction project sign package consists of two signs: one for project identification and the other to show the on-the-job safety performance of the contractor. The package shall conform to the requirements of EP 310-1-6a and EP 310-1-6b, specifically Section 16. Submit the sign legend orders as described in Section 16 of EP 310-1-6a prior to erecting the signs.

PART 2 PRODUCTS

2.1 MATERIALS

Materials shall conform to the requirements as shown on the drawings at the end of this section and shall be suitable for use in an unprotected exterior environment.

The Contractor may modify and reuse existing signs from previous project

phases. Dollar amounts and wording changes will be provided by the Government after contract award.

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall place signs on the work area fence surrounding the property that bear the legend, in letters at least four inches high:

WARNING
HAZARDOUS WORK AREA
DO NOT ENTER UNLESS AUTHORIZED

The Contractor shall post hazard warning banners at areas of special hazard including, but not limited to, the perimeter of the Exclusion Zone. The Contractor shall provide all signs required on the Contract Documents. Letters shall be at least four inches high.

3.2 INSTALLATION REQUIREMENTS

The EPA/USACE project site sign and the safety signs are to be mounted on 4-inch by 4-inch by 12-foot treated timbers and set firmly into the ground above prevailing grade to permit public viewing. Signs shall be installed during site mobilization in accordance with the requirements of EP 310-1-6a included in Appendix A.

3.3 BULLETIN BOARD

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

The Contractor shall post and maintain a notice or notices, to be furnished by the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor, informing employees of the protections and obligations provided for in the Occupational Safety and Health Act as per OSHA 29 CFR 1903.2(a)(1). The Contractor shall post such notice or notices in a conspicuous place or places where notices to employees are customarily posted. The Contractor shall take steps to ensure that such notices are not altered, defaced, or covered by other material.

3.4 CLOSURE REQUIREMENTS

The EPA/USACE project site sign, bulletin board and the safety signs are to be removed from the Site after contract completion.

3.5 SUPPLEMENTARY INFORMATION

Project Sign Details provided in Appendix A: Supplementary Information.

-- End of Section --

SECTION 01 67 00

GREEN REMEDIATION
09/17

PART 1 GENERAL

1.1 SCOPE OF WORK

A. This section covers the requirements for performing green remediation practices at the site, including furnishing all labor, materials, equipment and incidentals required to complete the work described herein. Contractor shall implement the EPA Region 2 Touchstone Practices to the maximum extent practicable (refer to the most current version found at https://www.epa.gov/sites/production/files/2016-08/documents/region_2_clean_green_policy_metrics_touchstone_pr The Touchstone practices are:

1. Use of 100 percent of electricity from renewable sources.

2. Clean diesel fuels and technologies.

3. Material reuse, reduction or recycling.

4. Industrial materials reuse or recycling within regulatory requirements:

a. Construction and demolition materials.
b. Recycle and reuse of organic materials generated on site.

5. Capture geothermal energy with pump and treat remediation systems to heat/cool structures.

B. The Contractor shall incorporate green remediation practices during construction activities whenever feasible in accordance with the EPA Region 2 "Clean & Green" Policy, issued on March 17, 2009.

C. The overall goal for design, construction, and operation is to produce a treatment system that meets the functional needs and incorporates the principles of sustainability. Specifically:

1. Preserve and restore the site ecosystem and biodiversity; avoid site degradation and erosion. Minimize offsite environmental impact.

2. Use the minimum amount of energy, water, and materials feasible to meet the design intent. Select energy and water efficient equipment and strategies.

3. Use environmentally preferable products and decrease toxicity level of materials used.

4. Use renewable energy and material resources.

5. Optimize operational performance (through commissioning efforts) in order to ensure energy efficient equipment operates as intended.

6. Consider the durability, maintainability, and flexibility of

building systems.

7. Manage construction site and storage of materials to ensure no negative impact on the indoor environmental quality of the building.

8. Reduce construction waste through reuse, recycling, and supplier take-back.

9. Use of regional materials extracted, harvested or recovered, and manufactured near the project site (within 500 mile radius).

10. Use of low emitting materials for adhesives, sealants, paints, coatings, composite wood, agrifiber products, ceiling and wall systems.

11. Use of roofing materials with SRI greater than or equal to 29 to minimize heat island effect.

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Renewable Energy Program; G

Fuel Purchase Program; G

GAC Regeneration Facility Information; G

Recycling Facility Information; G

Paper Product Literature; G

SD-07 Certificates

Green Remediation Documentation

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 RENEWABLE ENERGY

Purchase 100 percent renewable energy through the local utility provider, Public Service Electricity and Gas (PSE&G) for all electricity used during the remedial construction and operation and maintenance of the treatment system.

Submit details regarding the renewable energy program that will be used to

purchase renewable energy through the local energy supplier for all site activities, including the renewable energy supplier; type and percentage of renewable energy to be used, (solar, wind, etc.); and method of supply (direct or Renewable Energy Certificates {RECs}).

3.2 FUEL

A. Only ultra-low sulfur diesel (ULSD) fuel shall be used.

B. Vehicle idling time shall not be allowed for more than 5 minutes, including, but not limited to, drill rigs and earth moving equipment.

C. Fuel: Submit details of the fuel purchase program regarding the fuel providers and the type of fuels including sulfur content to be purchased during the construction activities.

3.3 MATERIAL REUSE, REDUCTION, AND RECYCLING

A. Use low-flow toilet in the plant.

B. Use portion of the treated water as grey water for non-potable use (e.g., bathroom sinks, toilet flushing, washdown, etc.).

C. One-hundred percent of the copy papers, file folders, and paper office supplies shall come from recycled sources. Required recovered materials content ranges shall be as recommended by EPA's Comprehensive Procurement Guidelines (CPGs) at http://www.epa.gov/epawaste/conserve/tools/cpg/index.htm. Submit paper product literature for all paper copy papers, file folders, and paper office supplies indicating the supplies meet the minimum requirements for recycled content as specified herein.

D. Spent GAC from the treatment system GAC units that passes Toxicity Characteristic Leaching Procedure (TCLP) testing shall be considered non-hazardous and shall be recycled at an approved carbon generation facility. All waste characterization sampling, handling, transportation, and disposal activities shall be performed in accordance with Sections 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL 02 81 00 and TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIAL. Provide GAC regeneration facility information for disposal of non-hazardous spent carbon, including any applicable permits and licenses.

E. Energy Recycling - Capture geothermal energy with pump and treat remediation systems to heat/cool structures.

F. Use the minimum amount of energy, water, and materials feasible to meet the design intent. Select energy and water-efficient equipment and strategies.

G. Optimize operational performance in order to ensure energy efficient equipment operates as intended. Consider the durability, maintainability, and flexibility of building systems.

H. Manage construction site and storage of materials to ensure no negative impact on the indoor environmental quality of the building.

I. Reduce construction waste through reuse, recycling, and supplier take back. Provide recycling facility information for disposal of

non-hazardous demolished concrete, including any applicable permits and licenses.

J. Green Remediation Documentation

Submit documentation to support the green remediation activities implemented, including, but not limited to:

a. Receipts for 100 percent renewable energy purchased.

b. Receipts for fuel purchased by Contractor and its subcontractors to support that only ULSD fuel was consumed.

c. Disposal certificates for waste sent to recycling and regeneration facilities.

d. Receipts for paper products purchased which indicate that the purchased products contain the required recycled content.

3.4 SITE RESTORATION

Preserve and restore the site ecosystem and biodiversity; avoid site degradation and erosion. Minimize offsite environmental impact.

-- End of Section --

SECTION 01 78 00

CLOSEOUT SUBMITTALS
08/11

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 within the text by the basic designation only.

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

OSWER Directive 9320.2-22	(2011) Close Out Procedures for National Priorities List Sites

U.S. ARMY CORPS OF ENGINEERS (USACE)

ERDC/ITL TR-12-1	(2015) A/E/C Graphics Standard, Release 2.0
ERDC/ITL TR-12-6	(2015) A/E/C CAD Standard - Release 6.0

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-300-08	(2009, with Change 2) Criteria for Transfer and Acceptance of DoD Real Property

1.2 DEFINITIONS

1.2.1 As-Built Drawings

As-built drawings are developed and maintained by the Contractor and depict actual conditions, including deviations from the Contract Documents. These deviations and additions may result from coordination required by, but not limited to: contract modifications; official responses to Contractor submitted Requests for Information; direction from the Contracting Officer; designs which are the responsibility of the Contractor, and differing site conditions. Maintain the as-builts throughout construction as red-lined hard copies on site and red-lined PDF files. These files serve as the basis for the creation of the record drawings.

1.2.2 Record Drawings

The record drawings are the final compilation of actual conditions reflected in the as-built drawings.

1.2.3 Remedial Action Report (RAR)

A remedial action report documents remediation activities at a large remedial unit and provides evidence that the remediation objectives have been achieved.

1.3 SOURCE DRAWING FILES

Request the full set of electronic drawings, in the source format, for

Record Drawing preparation, after award and at least 30 days prior to required use.

1.3.1 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction data for the referenced project. Any other use or reuse shall be at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor must make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the Government, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic CAD drawing files are not construction documents. Differences may exist between the CAD files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic CAD files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished Source drawing files, the signed and sealed construction documents govern. The Contractor is responsible for determining if any conflict exists. Use of these Source Drawing files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor uses, duplicates or modifies these electronic source drawing files for use in producing construction data related to this contract, remove all previous indicia of ownership (seals, logos, signatures, initials and dates).

1.4 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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Warranty Management Plan; G

SD-08 Manufacturer's Instructions

Posted Instructions

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G

SD-11 Closeout Submittals

As-Built Drawings; G

Record Drawings; G

As-Built Record of Equipment and Materials

Final Approved Shop Drawings

Construction Contract Specifications

Interim DD FORM 1354; G

Checklist for DD FORM 1354; G

Final Decontamination Certification; G

Certification Of Clearing; G

Remedial Action Report (RAR); G

Initial Contamination Results; G

Pre-Demolition Survey Results; G

In-Place Excavation Volume Summary; G

Waste Disposal Summary; G

Project Costs Summary; G

1.5 QUALITY CONTROL

Additions and corrections to the contract drawings must be equal in quality and detail to that of the originals. Line colors, line weights, lettering, layering conventions, and symbols must be the same as the original line colors, line weights, lettering, layering conventions, and symbols.

1.6 WARRANTY MANAGEMENT

1.6.1 Warranty Management Plan

Develop a warranty management plan which contains information relevant to the clause Warranty of Construction. At least 30 days before the planned pre-warranty conference, submit one set of the warranty management plan. Include within the warranty management plan all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan must be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below must include due date and whether item has been submitted or was accomplished. Warranty information made available during the construction phase must be submitted to the Contracting Officer for approval prior to each monthly pay estimate. Assemble approved information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period will begin on the date of project acceptance and continue for the full product warranty period. A joint 4 month and 9 month warranty inspection will be conducted, measured from time of acceptance, by the Contractor, Contracting Officer and the Customer Representative. Include within the warranty management plan, but not limited to, the following:

a. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the Contractors, subcontractors, or suppliers involved.

b. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.

c. Listing and status of delivery of all Certificates of Warranty for extended warranty items.

d. A list for each warranted equipment, item, feature of construction or system indicating:

1. Name of item.
2. Model and serial numbers.
3. Type of Material.
4. Location where installed.
5. Name, addresses, and phone numbers of suppliers.
6. Terms of warranty. Include one-year overall warranty of construction, including the starting date of warranty of construction. Items which have extended warranties must be indicated with separate warranty expiration dates.
7. Cross-reference to warranty certificates as applicable.
8. Starting point and duration of warranty period.
9. Summary of maintenance procedures required to continue the warranty in force.
10. Organization, names and phone numbers of persons to call for warranty service.
11. Typical response time expected for various warranted materials.

e. The plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.

f. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

1.6.2 New Jersey American Water Guarantees and Warranties

a. The Contractor expressly warrants that all workmanship and materials performed or furnished under this Contract will conform to the Specifications, Drawings, samples and other applicable descriptions furnished or adopted by the Contractor and with all applicable laws, provisions and requirements of the Contract Documents. Remedy any defects due to faulty materials or workmanship which are discovered within a period of one (1) year from the date of acceptance of the work in this project and pay for any damage resulting from faulty materials or workmanship. New Jersey American Water (NJAW) shall give notice of observed defects with reasonable promptness. The Contractor warranty hereunder is in addition to, and not in limitation of, any obligations found elsewhere in the Contract Documents, any special guarantees provided by the Contractor or Contractor suppliers, and any obligations imposed by law.

b. In addition to the above requirements, assign material and equipment guarantees and warranties from all manufacturers and suppliers to NJAW and deliver copies of such guarantees and warranties and the necessary assignments to NJAW in order to assure NJAW of the full benefit of such guarantees and warranties.

1.6.3 Pre-Warranty Conference

Prior to contract completion, and at a time designated by the Contracting Officer, meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty will be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contact will be located within the local service area of the warranted construction, be continuously available, and be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in connection with other portions of this provision.

1.6.4 Contractor's Response to Construction Warranty Service Requirements

Following oral or written notification by the Contracting Officer, respond to construction warranty service requirements in accordance with the "Construction Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. Include within the report the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframe specified, the Government will perform the work and back charge the construction warranty payment item established.

a. First Priority Code 1. Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.

b. Second Priority Code 2. Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.

c. Third Priority Code 3. All other work to be initiated within 3 work days and work continuously to completion or relief.

d. The "Construction Warranty Service Priority List" is as follows:

Code 3-Electrical
Street lights.

Code 3-All other work not listed above.

1.7 PERFORMANCE BOND

The Performance Bond must remain effective throughout the construction period.

a. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will

charge the remaining construction warranty funds of expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

b. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Contracting Officer will have the right to recoup expenses from the bonding company.

c. Following oral or written notification of required construction warranty repair work, respond in a timely manner. Written verification will follow oral instructions. Failure to respond will be cause for the Contracting Officer to proceed against the Contractor.

PART 2 PRODUCTS

2.1 GOVERNMENT FURNISHED MATERIALS

The Government will provide an optical disc (CD or DVD) at the preconstruction conference that contains the following:

a. One set of "as-designed" electronic CAD files in the specified software and format revised to reflect all amendments and the final contract PDF drawings. The CAD files are provided to enable preparation of as-built or as-constructed drawings. If discrepancies exist between the CAD files and the contract PDF drawings, correct the CAD files to show the contract PDF drawings.

b. A submittal register data file in comma separated value (CSV) format for import into the Resident Management System (RMS).

2.2 SYSTEM DESCRIPTION

Prepare the CAD drawing files in AutoCAD Release 2016 format compatible with a Windows 7 and higher operating system.

2.2.1 Additional Drawings

If additional drawings are required, prepare them using the specified electronic file format applying the same graphic standards specified for original drawings. The title block and drawing border to be used for any new final record drawings must be identical to that used on the contract drawings.

2.2.1.1 Sheet Numbers and File Names

If a sheet needs to be added between two sequential sheets, append a Supplemental Drawing Designator in accordance with ERDC/ITL TR-12-6 Adding a drawing sheet, and ERDC/ITL TR-12-1 Adding or deleting drawing sheets and index sheet procedures.

PART 3 EXECUTION

3.1 MAINTENANCE OF RECORD DOCUMENTS

a. Maintain in Contractor's field office, in clean, dry, legible, and easily accessible complete sets of the following record documents for

the remedial area:

(1) Contract Drawings and Specifications

(2) Shop Drawings, Samples, and other Contractor Submittals including records of test results approved or accepted as applicable by the Army Corp of Engineers

(3) Change Orders, Work Change Directives, Field Orders, photographic documentation, and survey data

(4) Construction schedule, progress record, and record drawings showing progress of work

(5) Work Plans and Work Plan Addenda

(6) Written reports of any significant Quality Assurance Problems

(7) Daily work activity summary reports, including:

a. Field test records

b. Photographs

c. Videotape

d. Reports on any emergency response plan

e. Manifest documents and variance reports

f. Records of all site work

g. Chain-of-custody documents

h. Truckload tickets and shipping papers (manifests)

i. All laboratory analytical results

j. Soil screening measurements

k. All safety and accident incidents

l. Reports on all spill incidents

m. Air monitoring reports and data

n. Other items as may be required by the Contracting Officer

(8) All other documents pertinent to the Work

b. Make record documents available for inspection upon request of the Contracting Officer or the USEPA.

c. Do not use record documents for purpose other than serving as Project record. Do not remove record documents from Contractor's field office without the Contracting Officer's approval.

3.2 AS-BUILT DRAWINGS

Provide and maintain two black line print copies of the PDF contract drawings for As-Built Drawings. Separate documentation shall be provided for the soil remediation and the water line construction projects.

3.2.1 Markup Guidelines

Make comments and markup the drawings complete without reference to letters, memos, or materials that are not part of the As-Built drawing. Show what was changed, how it was changed, where item(s) were relocated and change related details. These working as-built markup prints must be neat, legible and accurate as follows:

a. Use base colors of red, green, and blue. Color code for changes as follows:

   (1) Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes.

   (2) Deletions (Red) - Over-strike deleted graphic items (lines), lettering in notes and leaders.

   (3) Additions (Green) - Added items, lettering in notes and leaders.

b. Provide a legend if colors other than the "base" colors of red, green, and blue are used.

c. Add and denote any additional equipment or material facilities, service lines, incorporated under As-Built Revisions if not already shown in legend.

d. Use frequent written explanations on markup drawings to describe changes. Do not totally rely on graphic means to convey the revision.

e. Use legible lettering and precise and clear digital values when marking prints. Clarify ambiguities concerning the nature and application of change involved.

f. Wherever a revision is made, also make changes to related section views, details, legend, profiles, plans and elevation views, schedules, notes and call out designations, and mark accordingly to avoid conflicting data on all other sheets.

g. For deletions, cross out all features, data and captions that relate to that revision.

h. For changes on small-scale drawings and in restricted areas, provide large-scale inserts, with leaders to the applicable location.

i. Indicate one of the following when attaching a print or sketch to a markup print:

   1) Add an entire drawing to contract drawings

   2) Change the contract drawing to show

   3) Provided for reference only to further detail the initial design

j. Incorporate all shop and fabrication drawings into the markup drawings.

3.2.2 As-Built Drawings Content

Revise As-Built Drawings in accordance with ERDC/ITL TR-12-1. Provide 2 sets of paper copies from PDF drawings to show the as-built conditions by red-line process during the execution of the project. Keep these working as-built markup drawings current on a weekly basis and at least one set available on the jobsite at all times. Changes from the contract drawings which are made during construction or additional information which might be uncovered in the course of construction must be accurately and neatly recorded as they occur by means of details and notes. Submit the working as-built markup drawings for approval prior to submission of each monthly pay estimate. For failure to maintain the working and final record drawings as specified herein, the Contracting Officer will withhold 10 percent of the monthly progress payment until approval of updated drawings. Show on the as-built drawings, but not limited to, the following information:

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, show by offset dimensions to two permanently fixed surface features the end of each run including each change in direction on the record drawings. Locate valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Also record the average depth below the surface of each run.

b. Excavation - The actual surveyed horizontal limits and elevations of the excavation areas as described in Section 01 92 00 SURVEYING.

c. Correct grade, elevations, inverts, cross section, or alignment of pipelines, roads, earthwork (including the presence of bedrock), structures or utilities if any changes were made from contract plans

d. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to shop drawings, fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

e. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

f. Changes or Revisions which result from the final inspection.

g. Where contract drawings or specifications present options, show only the option selected for construction on the working as-built markup drawings.

h. If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, furnish a contour map of the final borrow pit/spoil area elevations.

i. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

j. Changes in location of equipment and architectural features.

k. Modifications (include within change order price the cost to change working as-built markup drawings to reflect modifications).

l. Actual location of anchors, thrust blocks, construction and control joints, etc., in concrete.

m. Unusual or uncharted obstructions that are encountered in the contract work area during construction.

n. Location, extent, thickness, and size of stone protection particularly where it will be normally submerged by water.

3.3 RECORD DRAWING FILES

If additional drawings are required, prepare them using the specified electronic file format applying the same graphic standards specified for original drawings. The title block and drawing border to be used for any new final record drawings must be identical to that used on the contract drawings. Accomplish additions and corrections to the contract drawings using CAD files. Provide all program files and hardware necessary to prepare final PDF record drawings. The Contracting Officer will review final PDF record drawings for accuracy and return them to the Contractor for required corrections, changes, additions, and deletions.

3.3.1 Rename the CAD Drawing files

Rename the CAD Drawing files using the contract number as the Project Code field, (e.g., W91238-15-C-10A-102.DWG) as instructed in the Pre-Construction conference. Use only those renamed files for the Marked-up changes. Make all changes on the layer/level as the original item.

a. For AutoCAD files (DWG), enter all as-built delta changes and notations on the AS-BUILT layer. For MicroStation files (DGN), enter all as-built delta changes and notations on:

   - Level #63
   - Level/Layer Name contains: ANNO-REVS
   - Level/Layer Description: Revisions

b. When final revisions have been completed, show the wording "RECORD DRAWING AS-BUILTS" followed by the name of the Contractor in letters at least 3/16 inch high on the cover sheet drawing. Date RECORD DRAWING AS-BUILTS" drawing revisions in the revision block.

c. Within 30 days after Government approval of all of the working record drawings for a phase of work, prepare the final CAD record drawings for that phase of work and submit PDF drawing files and two sets of prints for review and approval. The Government will promptly return one set of prints annotated with any necessary corrections. Within 30 days revise the CAD files accordingly at no additional cost and submit one set of final prints for the completed phase of work to the Government. Within 30 days of substantial completion of all phases of work, submit the final record drawing package for the entire project. Submit one set of electronic CAD files, and one set of the approved working record PDF files on three optical discs with two sets of prints. The CAD files must be complete in all details and identical in form and function to the CAD drawing files supplied by the Government. Prepare

AutoCAD files for transmittal using e-Transmit. Prepare MicroStation files for transmittal using the Packager (Archive). Make any transactions or adjustments necessary to accomplish this. The Government reserves the right to reject any drawing files it deems incompatible with the customer's CAD system. Paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit final record PDF drawing files, CAD files and marked prints as specified within the timeframe indicated above will be cause for withholding any payment due under this contract. Approval and acceptance of final record drawings must be accomplished before final payment is made.

3.4 FINAL APPROVED SHOP DRAWINGS

Submit final approved project shop drawings 30 days after transfer of the completed facility.

3.5 RECORD DRAWINGS

Prepare final record drawings after the completion of each definable phase of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project). Transfer the changes from the approved working as-built markup drawings to the original electronic CAD drawing files. Modify the as-built CAD drawing files to correctly show the features of the project as-built by bringing the working CAD drawing set into agreement with approved working as-built markup drawings, and adding such additional drawings as may be necessary. Refer to ERDC/ITL TR-12-1 Chapter 11 Drawing Revisions. Jointly review the working as-built markup drawings with printouts from working as-built CAD drawing PDF files for accuracy and completeness. Monthly review of working as-built CAD drawing PDF file printouts must cover all sheets revised since the previous review. These PDF drawing files are part of the permanent records of this project. Any drawings damaged or lost must be satisfactorily replaced at no expense to the Government.

a. Drawing revisions (include within change order price the cost to change working and final record drawings to reflect revisions) and compliance with the following procedures.

   (1) Follow directions in the revision for posting descriptive changes.

   (2) The revision delta size must be 5/16 inch unless the area where the delta is to be placed is crowded. Use a smaller size delta for crowded areas.

   (3) Place a revision delta at the location of each deletion.

   (4) For new details or sections which are added to a drawing, place a revision delta by the detail or section title.

   (5) For minor changes, place a revision delta by the area changed on the drawing (each location).

   (6) For major changes to a drawing, place a revision delta by the title of the affected plan, section, or detail at each location.

   (7) For changes to schedules or drawings, place a revision delta either by the schedule heading or by the change in the schedule.

3.5.1 Final Record Drawing Package

Submit the final record PDF and CAD drawings package for the entire project within 20 days of substantial completion of all phases of work. Submit one set of ANSI D size PDF and CAD files on optical disc, read-only memory (ROM), two sets of ANSI D size prints and one set of the approved working record drawings. The package must be complete in all details and identical in form and function to the contract drawing files supplied by the Government.

3.6 CONSTRUCTION CONTRACT SPECIFICATIONS

Submit final PDF file record construction contract specifications, including revisions thereto, 30 days after transfer of the completed facility.

3.7 AS-BUILT RECORD OF EQUIPMENT AND MATERIALS

Furnish one copy of preliminary record of equipment and materials used on the project 15 days prior to final inspection. This preliminary submittal will be reviewed and returned 2 days after final inspection with Government comments. Submit Two sets of final record of equipment and materials 10 days after final inspection.

3.8 OPERATION AND MAINTENANCE MANUALS

Provide project operation and maintenance manuals for necessary pieces of equipment. Provide four electronic copies of the Operation and Maintenance Manual files and one hard copy of the Operation and Maintenance Manuals. Submit to the Contracting Officer for approval within 30 calendar days of the Beneficial Occupancy Date (BOD). Update and resubmit files for final approval at BOD.

3.9 REAL PROPERTY RECORD

Near the completion of Project, but a minimum of 60 days prior to final acceptance of the work, complete and submit an accounting of all installed property with Interim DD FORM 1354. Include any additional assets, improvements, and alterations from the Draft DD FORM 1354. Contact the Contracting Officer for any project specific information necessary to complete the DD FORM 1354. Refer to UFC 1-300-08 for instruction on completing the DD FORM 1354. For information purposes, a blank fillable PDF DD FORM 1354 may be obtained at the following: http://www.dtic.mil/whs/directives/forms/eforms/dd1354.pdf

Submit the completed Checklist for DD FORM 1354 of Installed Building Equipment items. Attach this list to the updated DD FORM 1354.

3.10 REMEDIAL CLOSEOUT PACKAGE

The Remedial Closeout Package shall consist of certification of decontamination of the entire site, removal of temporary facilities and clearing of the remedial area, and submittal of a Remedial Action Report that summarizes all remedial activities. Submit the following Remedial Closeout Information, within 30 days of Final Acceptance Certification for the remedial unit:

a. Substantial Completion Notice
b. Final Decontamination Certification

c. Certification of Clearing
d. Remedial Action Report
e. Final Acceptance Certification

3.10.1 Substantial Completion Administrative Provision

Prior to substantial completion of a remedial unit, the Contracting Officer will present a punch list of work items to be completed in accordance with the Contract Documents. When this punch list is substantially complete, submit written notice with a list of items to be completed or corrected, and the estimated dates of the completion or correction. Should inspection by the Contracting Officer indicate that the work is not substantially complete, notification will be made in writing, listing observed deficiencies. Remedy the deficiencies and send a new written notice of substantial completion. This procedure shall continue until such time when the Contracting Officer is satisfied with such repairs and corrections. When the Contracting Officer finds the work to be substantially complete, he will prepare a Certification of Substantial Completion with a list of deficiencies which require timely correction in accordance with provisions of General Conditions.

3.10.2 Final Decontamination

Decontaminate, without exception, all facilities, equipment, and materials prior to final removal from the site. This includes waste and material, transport vehicles, and all site equipment. Pay special attention to the removal of material on and within the tracks and sprockets of crawler equipment and the tires and axles of trucks and rubber mounted equipment. Tools and items for which decontamination is difficult or impossible to verify shall remain on site, until completion of the work, for subsequent disposal at an approved disposal facility. Examples of such equipment or materials may include wire, rope, lumber, some personnel protective equipment, etc. Upon completion of work, submit to the Contracting Officer a Final Decontamination Certification consisting of written notification that final decontamination of the remedial unit is complete.

3.10.3 Clearing the Remedial Area

Remove and dispose of all waste such as excess construction material, wood, bituminous concrete, debris, and any other foreign material. Disconnect all temporary site facilities, utilities, and signs. Remove all Contractor construction roads and parking areas, unless otherwise needed for additional remedial units. Restore the site to conditions that existed prior to construction. Upon completion of work, submit to the Contracting Officer a Certification of Clearing consisting of written notification that clearing of the remedial unit is complete.

3.10.4 Remedial Action Report

Within 30 days of substantial completion of the project area, prepare and submit a Remedial Action Report (RAR) to the Contracting Officer. The government will use the Remedial Action Report to document completion of a (contract) and indicate that the particular properties have met cleanup objectives as well as summary information for subsequent inclusion in the Superfund Site Closeout Report. Prepare the Remedial Action Report in accordance with EPA OSWER Directive 9320.2-22.

Items that were submittals required as part of the Work under other Sections of these specifications shall be compiled and included in the RAR

documents as Appendices, regardless of having been submitted previously, so that the RAR provides a complete record of remediation activities. These submittals include the following:

a. Initial Contamination Results
b. Pre-Demolition Survey Results
c. Post-Excavation Survey
d. Post-restoration Survey
e. In-Place Excavation Volume Summary
f. Waste Disposal Summary
g. Post-Excavation Analytical Results
h. Project Costs Summary
i. Project Record Drawings

In addition, the RAR narrative will include, at a minimum, the following additional information:

a. Cover letter signed by responsible company official certifying that all services involved have been performed in accordance with terms and conditions of the contract documents and regulatory requirements;
b. Site conditions and ground water elevations;
c. excavation logs;
d. field screening readings;
e. quantity of materials removed from each area of contamination;
f. quantity of water/product removed during dewatering;
g. sample reports containing sample identification for sampling locations (indicate reference benchmark used), date, time, method of preservation, sampling methods, contamination level, name of individual sampler, identification of laboratory and quality control procedures;
h. sample chain-of-custody forms; and
i. source of backfill.

Provide the following as attachments to the RAR:

a. Copies of all chemical and physical test results.
b. Copies of all manifests and land disposal restriction notifications.
c. Copies of all certifications of final disposal signed by the responsible disposal facility official.
d. Waste profile sheets.
e. Scale drawings showing limits of each excavation, limits of contamination, known underground utilities within 50 feet of excavation, sample locations, and sample identification numbers. On-site stockpile, storage, treatment, loading, and disposal areas shall also be shown on the drawings.
f. Progress Photographs. Color photographs shall be used to document progress of the work. A minimum of four views of the site showing the location of the area of contamination, entrance/exit road, and any other notable site conditions shall be taken before work begins. After work has been started, activities at each work location shall be photographically recorded weekly. Photographs shall be a minimum of 3 by 5 inches and shall include:

    (1) Soil removal and sampling.
    (2) Dewatering operations.
    (3) Unanticipated events such as spills and the discovery of additional contaminated material.
    (4) Contaminated material/water storage, handling, treatment, and transport.
    (5) Site or task-specific employee respiratory and personal protection.

(6) Fill placement and grading.
(7) Post-construction photographs. After completion of work at each site, take a minimum of four views of each excavation site.

A digital version of all photos shown in the report shall be included with the Closure Report. Photographs shall be included in a photograph log that includes the the project name and direction of view for each photograph

3.10.5 Final Acceptance

Upon completion of work, submit to the Contracting Officer written notification that Contract Documents and approved plans have been reviewed, work has been inspected for compliance with Contract Documents and approved plans, work has been completed in accordance with Contract Documents and approved plans, deficiencies listed with Certificate of Substantial Completion have been corrected, the results show cleanup goals were met, and work is complete and ready for final inspection. Should the Contracting Officer find work incomplete, he will promptly provide written notification, listing observed deficiencies. Remedy the deficiencies and send a second request for certification of Final Completion. This procedure will continue until such time when the Contracting Officer is satisfied with such repairs and corrections. When the Contracting Officer finds work is complete, he will consider closeout submittals, and a Final Acceptance Certification will be issued. When the Final Acceptance Certification is received and when closeout submittals have been approved, submit the final invoice for final payment.

-- End of Section --

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SECTION 01 92 00

SURVEYING

PART 1 GENERAL

1.1 SCOPE OF WORK

Contractor shall develop and make detail surveys and measurements required for construction and site restoration, including preconstruction, postconstruction, and topographic surveys. Since sediment removal will be performed in dry conditions, the topographic survey measures described herein shall apply.

1.2 REFERENCES

FEDERAL GEODETIC CONTROL COMMITTEE

FGCC 1984	(1984) Standards and Specifications for Geodetic Control Networks

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Land Surveyor Statement Of Qualifications

SD-02 Shop Drawings

Pre-Excavation Site Drawings; G

SD-07 Certificates

Surveyor Elevation/Location Certifications; G

Surveyor Quantities Certification; G

SD-11 Closeout Submittals

Post-Excavation Elevation Survey; G

Post-Excavation Delineation Survey; G

Post-Excavation Analytical Confirmatory Sampling Locations; G

Prepared Subgrade Survey; G

Final Restoration Survey; G

Planting Plan As-Builts; G

Surveyor Field Notes and Records Data; G

Submit original and one copy of Surveyor's field book, calculations, and graphical layouts to the Contracting Officer upon completion of each phase of survey work. Include an accurate log of control and survey work as it progresses, all field notes, notations, and descriptions used and compiled during the field survey.

Surveyor In-Place Volume Calculations; G

1.4 QUALITY CONTROL

Maintain responsibility for all surveying performed at the site. The surveyor shall be a qualified and Registered Land Surveyor in the State of New Jersey. The surveyor shall have a minimum of five years of experience in construction surveying and layout and maintenance of record construction drawings, with a record of performing horizontal and vertical control requirements as stated in this section. Submit to Contracting Officer prior to start of work.

Submit Surveyor Elevation/Location Certifications verifying accuracy of survey work to the Contracting Officer. Certificates signed by the Surveyor stating that elevations and locations of site construction features are in conformance, or nonconformance, with Contract Documents shall be submitted to the Contracting Officer at the completion of each phase of work requiring services of the Surveyor.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL

Provide required surveying equipment, including transit, theodolite, or total station; level; stakes; and surveying accessories. Provide all material required for benchmarks, control points, batter boards, grade stakes, and structure and elevation stakes.

Establish required lines and grades for excavation, site restoration, and construction of all facilities, structures, water lines, and site improvements, including outdoor electrical equipment and feeders.

Prior to backfilling operations, survey, locate, and record on a copy of the Contract Documents accurate representation of buried Work and Underground Facilities provided and encountered. Confirm with Contracting Officer that all required survey documentation work has been completed prior to the start of backfilling operations.

Locate the actual location of Work to be indicated on as-built and record documents.

Contractor shall be solely responsible for all locations, dimensions and levels.

Safeguard all points, stakes, grade marks, monuments and benchmarks made or

established for the work. Re-establish same if disturbed.

Keep transit and leveling instruments on the site at all times and a skilled instrument person available whenever necessary for layout of the work.

Keep professional, accurate, well organized, and legible notes of all measurements and calculations, described herein.

3.2 INSPECTION

3.2.1 Existing Conditions

Verify and define the existing conditions, contours, and location of structures within the construction limits as defined on the Drawings, for use and inclusion in the Excavation and Material Handling Plan as defined in Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

3.2.2 Work Control Points

Confirm and maintain the exact location of all existing permanent benchmarks on the site and establish new benchmarks as necessary. Obtain approval of the Contracting Officer prior to removing any benchmarks. Identify the coordinates for all work site reference and survey control points prior to the start of work and submit to Contracting Officer. All work shall be referenced to and established from these control points, re-established where necessary, and maintained throughout the life of the contract. Horizontal and vertical control points shall be referenced to the permanent control monuments, and/or benchmarks, to an accuracy of 0.1 ft. Any errors or apparent discrepancies found on the Drawings or Specifications shall be called to the Contracting Officer's attention for interpretation prior to proceeding with the work. The Contracting Officer must be promptly notified of any discrepancies discovered. Provide control points at each location of work using closed traverse and leveling loops. Establish, place, and replace, as required, such additional stakes, markers, and other controls as may be necessary for control, intermediate checks, and guidance of construction operations.

3.3 SURVEY CHECKS

Provide the Contracting Officer with survey level, tripod, rod, and measuring tape to perform survey checks of the work. Provide an individual to assist Contracting Officer in performing survey checks.

3.4 RECORD TOPOGRAPHIC DOCUMENTATION

Measure and record elevations at all horizontal and vertical inflection points in each excavation cell as defined in the Drawings, prior to backfill. Survey points documenting post-excavation surfaces shall be documented at a frequency such that no more than 100 sq ft is represented (i.e., measure one elevation per 10 ft x 10 ft surface).

Plot required survey information on a reproducible map at a scale of 1-inch = 20 feet with 1-foot elevation contours. Mapping shall conform to the National Map Accuracy Specifications and shall bear the seal of a licensed land surveyor registered in New Jersey. The map shall contain a title block with the name and address of the Contractor and the signature of the registered surveyor. Record Drawings shall include labeled contour lines, property line locations including bearings and distances, horizontal grid

systems, cross-sections and details, and any field changes of elevations, dimensions, and details. Indicate locations of physical features on site including: structures, utilities, roadways, driveways, garages, and fences. Indicate on a separate drawing excavation limits and verification of sampling points. Utilize AutoCAD Release 2014 compatible electronic files for all maps. Photogrammetric base mapping may be utilized as the base for this mapping effort using a photo negative scale of no less than 1:2400. Prepare all as-built and record maps and drawings in accordance with the requirements of Section 01 78 00 CLOSEOUT SUBMITTALS. Provide data on compact discs or DVD. In addition to AutoCAD drawings, compact discs shall contain for each drawing all surveyed points with their northing, easting, elevation, description; and all drawing support files (i.e., shapes, fonts, etc.).

3.4.1 Pre-Excavation Site Drawings

Prepare topographic maps and records of elevations, boundaries of individual excavation cells, Wetland Herbicide Treatment Areas, horizontal control points for excavation support, site properties, property boundary surveys, impacted streets, and utilities.

Submit each property map to the Contracting Officer 30 days prior to the start of work on that work area.

3.4.2 Post-Excavation Survey

3.4.2.1 Post-Excavation Elevation Survey

Post-excavation elevations shall be confirmed to be at or below design elevations as described in the Drawings with an accuracy tolerance of 0 to -0.2 feet.

Prepare and submit within 30 days of completion of excavations a topographic map of the excavation depths. Provide in-place excavation volume and all calculations to verify the In-Place Volume Calculations. Submit Surveyor Quantities Certification signed and sealed by the Surveyor stating the accuracy of quantities excavated.

3.4.2.2 Post-Excavation Delineation Survey

Measure and record elevation and coordinates at each Pre-Design Investigation Sample Location as described in the Drawings.

Prepare and submit within 10 days of completion, maps showing the location of all sample locations.

3.4.3 Post-Excavation Analytical Confirmatory Sampling Locations

Measure and record the elevation and coordinates for the five discrete sample points of the composite sample collected for analysis as identified in the Drawings.

3.4.4 Restoration Survey

3.4.4.1 Prepared Subgrade Survey

Measure and record elevations of imported subgrade backfill after compaction.

3.4.4.2 Final Restoration Survey

Measure and record elevations and/or coordinates for the following, as indicated in the Drawings:

a. Surface of topsoil

b. Planting Plan As-Builts

3.5 SURVEYOR FIELD NOTES AND RECORDS

Record all fieldwork in a clear, legible, and complete manner. The Field Notes shall contain a complete description of the nature and location of the new and existing points. Include a sketch of the point locations and monument witness points in the Field Notes.

Survey data and records shall be in accordance with recognized professional surveying standards, laws and regulations, and prevailing standards of the State of New Jersey.

Original field notes, computations, and other surveying data shall be recorded in hard-bound field books, and shall be signed and sealed by surveyor.

Completeness and accuracy of survey Work and completeness and accuracy of survey records, including field books, shall be responsibility of Contractor.

Failure to organize and maintain survey records in an appropriate manner that allows reasonable and independent verification of calculations, and to allow identification of elevations, dimensions, and grades of the Work, shall be cause for rejecting the survey records, including field books.

3.6 SURVEY REQUIREMENTS

Establish lines and levels and locate and layout, utilizing total station instrumentation or similar means, all site features to be constructed or executed. These include, but are not limited to, support zone facilities layout and areas of contamination. Re-verify layouts and volumes periodically during construction by the same means.

Prepare a Post-Excavation Survey to identify structural locations and topography for providing an as-built representation of each site.

The surveys shall be performed to locate all structures, culverts, manholes, water bodies (streams, ponds, etc.), fences, signs, poles, trees, brush lines, wells, borings, test pits, and features within the subject properties. The property lines and work boundaries shall be identified and presented on the survey. Topographical data for the site shall be developed and presented with one (1) foot contour intervals and spot elevations for distinct low or high points, curb or wall breach in grade. In addition, rim and invert elevations for culverts, manholes and catch basins shall be detailed.

The locations and orientations of utilities marked out by the utility companies and as part of the Geophysical Surveys shall be presented and accurately located on the completed topographical survey.

All surveys shall be referenced to the New Jersey State Plane Coordinate

System (NJSPCS), North American Datum of 1983 (NAD 1983) and North American Vertical Datum of 1988 (NAVD 88) Datum.

All surveys shall be developed at a scale of 1" = 40 feet with one (1) foot contour elevations. Mapping shall conform to National Map Accuracy Standards.

All surveys shall be developed with sufficient layers to allow for data to be presented in AutoCAD 2014. At a minimum, separate layers shall be developed for the following:

A. Contours with each contour at the appropriate elevation;
B. Spot elevations;
C. Structures (buildings, sidewalks, curbs, sheds, garages, etc.);
D. Roadways;
E. Sanitary sewer systems;
F. Stormwater sewer systems;
G. Gas utilities;
H. Water utilities;
I. Electric utilities;
J. Other utilities;
K. Fences;
L. Property lines;
M. Boring locations;
N. Sample locations;
O. Geophysical locations;
P. Trees and shrubs; and,
Q. Other layers, as required.

Achieve vertical accuracy of 0.1 ft for all surface elevations. Cross reference the vertical measurements recorded during this survey with vertical measurements at two separate horizontal locations previously recorded to verify control and ensure accuracy.

Provide disk-deliverable topographic maps in one-foot contour in AutoCAD format 2014 version. Within 10 working days of the completion of the surveying fieldwork, provide two complete sets of signed and sealed survey maps and computer files of sample locations and reference features utilizing an AutoCAD version up to and including AutoCAD 2014.

3.7 WATER LINE INSTALLATION SURVEY REQUIREMENTS

3.7.1 Control Survey

1. Location and elevation of temporary bench marks to be provided by Contractor. All temporary benchmarks shall be tied to existing permanent benchmarks established at the Site.

2. All horizontal coordinates shall be referenced to the New Jersey State Plane Coordinate System, NAD 83, and the vertical datum shall reference NAD 88.

3. Quality Control: All survey work shall be according to third-order accuracy standards as specified by the Federal Geodetic Control Committee in the "Standards and Specifications for Geodetic Control Networks", published September 1984 (FGCC 1984). The units of measure shall be U.S. Survey Feet.

3.7.2 Reference Points

1. Verify location of all existing reference points prior to starting work. Promptly notify Contracting Officer of any discrepancies discovered.

2. The Contractor shall take all reasonable measures to protect and preserve existing site reference points (benchmarks) during performance of the Work. Reference points shall not be relocated without prior written approval of the Contracting Officer.

3. The Contracting Officer shall be immediately notified of loss, damage, or destruction of any reference point, or any relocation required because of changes in grade or other reasons. Contractor shall pay for restoration of all permanent benchmarks damaged or destroyed at no additional expense to the Government.

3.7.3 Record Documents

1. The Contractor shall prepare record drawings that document the location for all major components of both the 8-inch water line and the 36-inch water line including, but not limited to, the following:

   a. Connection location to existing NJAW pipeline at both ends.
   b. Pipeline route (horizontally and vertically).
   c. All changes in pipeline slope.
   d. All buried utilities uncovered during construction and relation to pipeline.
   e. Location of relocated utilities.
   f. Valves and other control features.
   g. Service line locations for each property impacted.
   h. Fire hydrant connection line and new hydrant.
   i. Final site grading.
   j. Limits on surface restoration such as pavement, seeding, mulching, etc.
   k. Impacts to private property along route.

2. All disturbed areas shall be clearly identified.

3. The Contractor shall submit three paper copies of the as-built drawings to be signed and sealed by a New Jersey licensed surveyor.

4. The Contractor shall also submit an electronic deliverable that includes an electronic copy of the as-built drawings. The electronic copy shall be identical to the submitted paper copies. The Contractor shall also submit a text file or MS Excel file that includes a list of all survey points. For each point, the file shall include a point number, description, X-coordinate, Y-coordinate, and elevation.

3.7.4 Contractor Responsibilities

1. Establish temporary benchmarks convenient to Work and at least every 500 feet along pipeline routes. All temporary benchmarks shall be tied to existing reference points on the property.

2. Establish horizontal reference points or coordinate system with benchmarks and reference points for Contractor's use as necessary

to lay out Work.

3. Establish centerline of pipeline, and baseline from which these facilities may be located.

4. Establish clearing limits, set toe of fill and top of cut stakes, and set bench marks convenient for use as necessary to establish basic layout of the Work.

5. Establish offset stakes indicating locations of pipeline at approximate 200-foot intervals along line and indicate depth of cut when required.

6. Establish location of all utility poles and anchors, grounding grids, and other buried services.

7. Provide additional survey and layout required to layout the Work. Periodically verify layout.

8. Check and establish exact location of existing facilities and utilities prior to construction of new facilities, utilities, and any connections thereto.

9. Retain professional land surveyor or civil engineer registered in State of New Jersey who shall perform or supervise engineering surveying for construction staking and layout. Submit Land Surveyor Statement Of Qualifications for selected individual or firm.

10. Maintain complete accurate log of survey work including detailing the actual conditions of surface and subsurface construction as it progresses as a Record Document. Submit monthly Record Document updates to the Government.

11. On request of Contracting Officer, or at end of project, submit documentation.

12. Provide competent employee(s), tools, stakes, and other equipment and materials to:

    a. Establish control points, lines, and easement boundaries.
    b. Check layout, survey, and measurement work performed by others.
    c. Measure quantities for payment purposes.

3.8 UTILITIES

Prior to the start of any invasive activities, scan the construction site with electromagnetic or sonic equipment and mark the surface of the ground where existing underground utilities are discovered. Verify the elevations of existing piping, utilities, and all type of underground obstructions not indicated or specified to be removed but indicated or discovered during scanning in locations to be traversed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made. Record locations and elevations of all utilities.

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Combined Phase 1 and Phase 2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 14 00	SD-01 Preconstruction Submittals															
			List of Contact Personnel	1.3.1.1	G													
		01 30 00	SD-01 Preconstruction Submittals															
			View Location Map	1.3	G													
			Progress and Completion	1.4	G													
			Pictures															
			Project Organizational Chart	1.6														
		01 31 19	SD-01 Preconstruction Submittals															
			Preconstruction Meeting Agenda	1.1.1														
			Project Schedule	1.1.1	G													
			Schedule Of Submittals	1.1.1	G													
			Schedule Of Values	1.1.1	G													
		01 32 01.00 10	SD-01 Preconstruction Submittals															
			Project Scheduler Qualifications	1.3	G													
			Preliminary Project Schedule	3.4.1	G													
			Initial Project Schedule	3.4.2	G													
			Periodic Schedule Update	3.6.2	G													
		01 33 00	SD-01 Preconstruction Submittals															
			Submittal Register	1.9	G													
		01 35 29.13	SD-01 Preconstruction Submittals															
			Activity Hazard Analysis (AHA)	1.5.1														
			Accident Prevention Plan/Site	1.3														
			Safety And Health Plan															
			(APP/SSHP)															
			Health and Safety Team	1.6														
			Qualifications															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Combined Phase 1 and Phase 2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 35 29.13	Training Certificates	3.3.1														
			SD-02 Shop Drawings															
			Work Zones	3.10.1	G													
			Decontamination Facilities	3.11.1	G													
			SD-03 Product Data															
			Amendments to the APP/SSHP	1.5														
			Exposure Monitoring/Air	3.6														
			Sampling Program															
			Site Control Log	3.10.2														
			SSHO's Daily Inspection Logs	1.10														
			SD-07 Certificates															
			Certificate Of Worker/Visitor	1.9														
			Acknowledgement															
			SD-11 Closeout Submittals															
			Safety And Health Phase-Out	1.11														
			Report															
			Contractor's Daily Quality Control	3.4														
			Report															
			USACE Accident Report Form	1.8														
			3394															
		01 35 45	SD-01 Preconstruction Submittals															
			Uniform Federal Policy Quality	3.3	G													
			Assurance Project Plan															
			SD-06 Test Reports															
			Chemistry Data Package	3.4														
			Chemical Data Final Report	3.7	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Combined Phase 1 and Phase 2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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Cornell – Dubilier Electronics Superfund Site
Operable Unit 4:

Phase 1 - Capacitor Debris Area

Design Specifications

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SECTION 02 61 13

EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL

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 within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D5434	(2012) Field Logging of Subsurface Explorations of Soil and Rock

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
29 CFR 1910.145	(2018) Specifications for Accident Prevention Signs and Tags
EPA 530/F-93/004	(1993; Rev O; Updates I, II, IIA, IIB, and III) Test Methods for Evaluating Solid Waste (Vol IA, IB, IC, and II) (SW-846)
EPA SW-846	(Third Edition; Update IV) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods
Method 8080	Organochlorine Pesticides and PCBs (Polychlorinated Biphenyls)

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

29 CFR 1910.1000	Air Contaminants
40 CFR 302	Designation, Reportable Quantities, and Notification

1.2 DEFINITIONS

1.2.1 PCB and PCBs (Polychlorinated Biphenyls)

PCB and PCBs mean any chemical substance that is limited to the biphenyl

molecule that has been chlorinated to varying degrees or any combination of substances which contain such substance as defined by 40 CFR 761.

1.2.2 PCB-Contaminated Flood Plain Soils, Bound Brook Sediments and Soils containing PCB-contaminated Capacitor Debris

Soil and sediment containing concentrations greater than or equal to 1 parts per million (ppm) PCBs when tested as specified herein.

1.3 DESCRIPTION OF CONTAMINATED MATERIALS

The work consists of excavation, handling, and disposal of PCB-contaminated flood plain soils, Bound Brook sediments, and soils containing PCB-contaminated capacitor debris. Approximate locations of contaminated material are shown on the Drawings and horizontal extents of individual excavation cells shall be confirmed by pre-excavation survey as described in 01 92 00 SURVEYING. After excavation and removal of contaminated soil and sediment as indicated, perform and submit a Post-Excavation Elevation Survey as described in the Drawings and Section 01 92 00 SURVEYING and Post-Excavation Analytical Confirmatory Sampling as described herein.

Contractor shall excavate, handle, and segregate material based the TSCA classifications shown in the Drawings.

Resource Conservation and Recovery Act (RCRA) characterization is the responsibility of the Contractor. Contractor may choose to pre-characterize the excavation material as RCRA and Non-RCRA as described in Subpart 3.12 SAMPLING. Limited RCRA characterization data is provided in Appendix A: Supplementary Information.

Contractor shall characterize and dispose of excavated material under one of the following disposal categories:

Type 1: TSCA, RCRA Material; excavated material containing PCB concentrations greater than or equal to 50 mg/kg and subject to RCRA Subtitle C regulation; Cell Identification Numbers end with a '-T.'

Type 2: TSCA, Non-RCRA Material; excavated material containing PCB concentrations greater than or equal to 50 mg/kg and not subject to RCRA Subtitle C regulation; Cell Identification Numbers end with a '-T.'

Type 3: Non-TSCA, RCRA Material; excavated material containing PCB concentrations less than 50 mg/kg and subject to RCRA Subtitle C regulation

Type 4: Non-TSCA, Non-RCRA Material; excavated material containing PCB concentrations less than 50 mg/kg and not subject to RCRA Subtitle C regulation. Material is not classified as RCRA- or TSCA-regulated but has PCB concentrations above the cleanup criteria identified in the ROD (1 mg/kg). Therefore, this material is unsuitable for reuse as backfill and requires off-site disposal.

Type 5: Non-TSCA, RCRA Material, Other; Excavated material containing PCB concentrations below the cleanup criteria identified in the ROD (1 mg/kg) and subject to RCRA Subtitle C regulation; excavated for slope stability purposes only. Cell Identification Numbers for this material begin with an 'X.'

Type 6: Non-TSCA, Non-RCRA Material, Other; Excavated material containing

PCB concentrations below the cleanup criteria identified in the ROD (1 mg/kg) and not subject to RCRA Subtitle C regulation; excavated for slope stability purposes only. Cell Identification Numbers for this material begin with an 'X.'

Type 7: Water line Trenching Material; excavated material associated with the installation of water line. This includes material outside of limits of contamination and within the OU4: Phase 1 Boundary.

Excavated material from cells with Types 1- 5 must be sampled for waste characterization purposes and shipped for off-site disposal as described in 02 81 00 TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIAL and 01 35 45 CHEMICAL DATA QUALITY CONTROL.

Excavated material from cells with Types 6 and 7 may be used as backfill if approved by Contracting Officer and the requirements described in Sections 32 23 00.00 20 BACKFILL AND COMPACTION and 01 35 45 CHEMICAL DATA QUALITY CONTROL are satisfied.

Submit an Excavation and Onsite Material Handling Plan as specified below. Notify the Contracting Officer within 24 hours, and before excavation, if contaminated material is discovered that has not been previously identified or if other discrepancies between data provided and actual field conditions are discovered. Perform work in accordance with 40 CFR 761,29 CFR 1910.120, and the requirements specified herein.

1.3.1 Existing Conditions

a. Existing conditions, based on data obtained for the site, logs for soils borings and other exploratory operations are included in the Contract Documents or can be provided by Contracting Officer as requested.

   It is the responsibility of the Contractor to verify site conditions, including, but not limited to, subsurface, soil, groundwater, and topographical characteristics as described in 01 92 00 SURVEYING. The Contractor shall immediately notify the Contracting Officer in writing of variations to the existing conditions indicated in the design documents.

b. The approximate locations of known underground and aboveground utility lines and structures are shown on the Drawings. The Contractor is responsible for verifying utility locations and shall immediately notify the Contracting Officer if other utility lines or structures not shown on the Drawings are encountered during execution of the Work.

c. PCB contaminant levels range from "not detected" to greater than 50 ppm.

1.3.2 Scheduling

Notify the Contracting Officer 7 calendar days prior to the start of excavation of contaminated material. The Contracting Officer will be responsible for contacting regulatory agencies in accordance with the applicable reporting requirements.

1.4 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. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance with Section 01 33 00 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Excavation And Onsite Material Handling Plan; G

Excavation Support Plan; G

Dewatering Work Plan; G

Protection Plan; G

SD-07 Certificates

Training Certification; G

CIH Qualifications; G

SD-11 Closeout Submittals

Post-Excavation Elevation Survey; G

Remedial Action Report

1.5 QUALITY ASSURANCE

1.5.1 Excavation and Onsite Material Handling Plan

Submit a Work Plan within 30 calendar days after notice to proceed. No work at the site, with the exception of site inspections and surveys, shall be performed until the Work Plan is approved. Allow 30 calendar days in the schedule for the Government's review. No adjustment for time or money will be made if resubmittals of the Work Plan are required due to deficiencies in the plan. At a minimum, the Work Plan shall include:

a. Schedule of activities.

b. Complete list of equipment related to all aspects of the earthwork.

c. Proposed sequence of excavation, including survey control of removal limits.

d. Propose methods for segregating Project Materials during excavation.

e. Anticipated excavation slopes and limits of temporary excavation support systems.

f. Method of handling and staging

g. Techniques, equipment, and phases of managing contaminated material.

h. Storage methods and locations for liquid and solid contaminated material

i. Techniques and treatment of PCB-contaminated water. For treatment system, include size and location of equipment, catalog data on all

components of system, size and arrangement of filters, type and quantity of filtering material, and method of containment.

j. Names of testing laboratories to be used to accomplish analysis of contaminated solid and liquid materials. Include sampling procedures, testing methods and quality control procedures.

k. Decontamination procedures.

l. Spill contingency plan.

1.5.2 Excavation Support Plan

Submit drawings and calculations, certified by a registered professional engineer, describing the method for shoring of excavations where required in the Drawings and in Section 31 50 00 EXCAVATION SUPPORT AND PROTECTION. Plan shall include material sizes and types, arrangement of member, and the sequence and method of installation and removal. Calculations shall include data and references used.

1.5.3 Dewatering Work Plan

Submit procedures for accomplishing dewatering work, including excavation dewatering and temporary stream diversion.

1.5.4 Training Certification

Instruct employees on the dangers of PCB exposure, on respirator use, decontamination, and applicable OSHA and EPA regulations. Submit Training Certification to Contraction Officer

1.5.5 Certified Industrial Hygienist (CIH)

Obtain the services of an industrial hygienist certified by the American Board of Industrial Hygiene to certify training, and review and approve the PCB removal plan, including determination of the need for personnel protective equipment (PPE) in performing PCB removal work. Provide CIH Qualifications to Contracting Officer.

1.5.6 Regulation Documents

Maintain at the job site one readily available copy each of 29 CFR 1910.1000, 40 CFR 761, and all contractor prepared plans required under "Submittals" paragraphs.

1.5.7 Protection Plan

Prepare and submit a protection plan, prepared by the CIH, covering protection of workers and the environment from PCB hazards. Specific protection requirements shall be determined by the CIH and, as a minimum, as specified herein.

1.6 REGULATORY REQUIREMENTS

1.6.1 Permits and Licenses

Obtain required federal, state, and local permits for excavation, handling, and storage of contaminated material. Permits shall be obtained at no additional cost to the Government.

1.6.2 Air Emissions

Onsite air emissions shall be monitored and controlled in accordance with Sections 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS, 01 36 20 PERIMETER AIR MONITORING and 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES.

PART 2 PRODUCTS

2.1 STAGING AREA MATERIAL

Imported materials shall be obtained from offsite sources approved by the Contracting Officer, and be in accordance with the requirements of Section 01 35 45 CHEMICAL DATA QUALITY CONTROL and the Drawings.

2.1.1 Sand

Sand shall be composed of tough, durable particles, adequately free from thin, flat and elongated pieces, and shall be free from debris or other deleterious substances, foreign objects such as frozen material, wood, coal, hay, burlap, paper, plastics, tree roots, pieces of concrete or pavement or contaminants (chemical and/or biological). Sand shall meet the gradation requirements of AASHTO Standard Specifications for No. 8 Fine Aggregates.

SIEVE	PERCENT PASSING
1/2 inch	100
3/8 inch	85-100
#4	10-30
#8	0-10
#12	0-5

Imported sand shall be tested in accordance with Section 01 35 45 CHEMICAL DATA QUALITY CONTROL.

2.1.2 Non-Woven Geotextile

Provide and install non-woven geotextile in accordance with Section 31 05 19 GEOSYNTHETICS.

2.1.3 Geomembrane Liner

Provide and install geomembrane liner in accordance with Section 31 05 19 GEOSYNTHETICS.

2.1.4 Stone Aggregate

Stone aggregate shall be composed of tough, durable particles, adequately free from thin, flat and elongated pieces, and shall be free from debris or other deleterious substances, foreign objects such as frozen material, coal, wood, hay, burlap, paper, plastics, tree roots, pieces of concrete or pavement or contaminants (chemical and/or biological). Stone aggregate

shall meet the gradation requirements of AASHTO Standard Specifications for Size No. 57 Coarse Aggregates.

SIEVE	PERCENT PASSING
1 1/2 inch	100
1 inch	95-100
1/2 inch	25-80
#4	0-10
#8	0-5

2.1.5 Geocomposite

Provide and install geocomposite in accordance with Section 31 05 19 GEOSYNTHETICS.

2.1.6 Construction Entrance Stone

Provide and install clean stone at all construction entrances as described in the Drawings.

2.2 SPILL RESPONSE MATERIALS

Provide appropriate 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 contaminated 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 PROTECTION OF WORKERS AND THE ENVIRONMENT

Ensure that work operations or processes involving PCB-contaminated materials are conducted in accordance with 40 CFR 761, 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES, and the applicable requirements of this section, including but not limited to:

a. Obtaining advance approval of PCB storage sites.

b. Notifying Contracting Officer prior to commencing the operation.

c. Reporting leaks and spills to the Contracting Officer.

d. Cleaning up spills.

e. Maintaining an access log of employees working in a PCB control area and providing a copy to the Contracting Officer upon completion of the operation.

f. Inspecting PCB and PCB-contaminated items and waste containers for leaks and forwarding copies of inspection reports to the Contracting Officer.

g. Maintaining a spill kit.

h. Maintaining inspection, inventory, and spill records.

Protect workers and the environment from PCB hazards in accordance with the PCB protection plan and, as a minimum, as specified herein.

3.1.1 Worker Safety

Provide portable decontamination and shower rooms. Workers shall wear and use PPE, as recommended by the industrial hygienist, upon entering a PCB control area. If PPE is not required by the CIH, specify in the PCB removal work plan. Keep work footwear inside work area until completion of the job. Have available one set of PPE required for use by Contracting Officer for inspection of work. Do not carry out PCB handling operations in confined spaces. Do not delay aid to a seriously injured worker for reasons of decontamination.

3.1.2 PCB Control Area

Establish a PCB control area to prevent unauthorized entry of personnel. Rope off area and provide 29 CFR 1910.145 signs, and as required by section 01 58 00 PROJECT IDENTIFICATION, at approaches and around perimeter. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Allow only personnel briefed on the elements and trained as specified herein into the area. Do not permit food, drink, or smoking materials in the control area. Smoking is not permitted within 50 feet of the PCB control area. Provide "No Smoking" signs as directed by the Contracting Officer.

3.1.3 Air Quality

Include provisions to ensure that airborne PCB concentrations below the PEL of air defined by CIH are not exceeded outside of the PCB control area or by workers inside the PCB control area. Provide air monitoring, personnel monitoring, and sampling to ensure workers safety as determined by the CIH and as specified in section 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES. As a minimum, sample the air daily at the following locations: at locations being disturbed, within the breathing zone of workers, and at the downwind border of the control area. When airborne concentrations exceed PEL at the breathing zone of workers, provide respirators and additional worker protection as dictated in the Site Health and Safety Plan and in Section 01 36 20 PERIMETER AIR MONITORING. If airborne concentration exceeds PEL at boundary of control area, immediately stop work and notify the Contracting Officer.

3.1.4 Special Hazards

a. Do not expose PCBs to open flames or other high temperature sources since toxic decomposition by-products may be produced.

b. Do not heat PCBs to temperatures of 135 degrees F or higher without Contracting Officer's concurrence.

3.2 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.), notify the Contracting Officer immediately. If the spill exceeds the reporting threshold, follow the pre-established procedures as described in the RCRA Contingency Plan for immediate reporting and containment. 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. As directed by the Contracting Officer, additional sampling and testing shall be performed to verify spills have been cleaned up. Spill cleanup and testing shall be done at no additional cost to the Government.

3.3 EXCAVATION PROTECTION

Provide shoring trench boxes where indicated in the Drawings and Section 31 50 00 EXCAVATION SUPPORT AND PROTECTION. In addition to Section 25 A and B of EM 385-1-1, include provisions in the excavation plan that will accomplish the following:

a. Prevent undermining of pavements, foundations and slabs

b. Prevent slippage or movement in banks or slopes adjacent to the excavation.

3.3.1 Drainage and Dewatering

Provide for the collection and disposal of surface and subsurface water encountered during construction.

3.3.1.1 Drainage

So that construction operations progress successfully, drain construction site during periods of construction to keep soil materials sufficiently dry. The Contractor shall establish/construct storm drainage features at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and/or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils, prevent erosion and undermining of foundations. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site, the area immediately surrounding the site, and the area affecting operations at the site shall be continually and effectively drained.

3.3.1.2 Dewatering

Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in-situ material. While the excavation is open, the water level shall be maintained continuously, at least 1 foot below the working level.

Surface water shall be diverted to prevent entry into the excavation. Dewatering shall be limited to that necessary to assure adequate access, a safe excavation, prevent the spread of contamination, and to ensure that compaction requirements can be met. No dewatering shall be performed without prior approval of the Contracting Officer.

3.3.2 Machinery and Equipment

Movement of construction machinery and equipment over pipes during construction shall be at the Contractor's risk. Repair, or remove and provide new pipe for existing or newly installed pipe that has been displaced or damaged.

3.4 SURVEYS

Perform all surveys as described in Section 01 92 00 SURVEYING

3.5 EXISTING STRUCTURES AND UTILITIES

Location of the existing utilities indicated is approximate. The Contractor shall physically verify the location and elevation of the existing utilities indicated prior to starting construction.

No excavation shall be performed until site utilities have been field located. Take the necessary precautions to ensure no damage occurs to existing structures and utilities. Damage to existing structures and utilities resulting from the Contractor's operations shall be repaired at no additional cost to the Government. Utilities encountered that were not previously shown or otherwise located shall not be disturbed without approval from the Contracting Officer.

3.6 DUST CONTROL

Maintain strict dust control at all times to prevent dust particles from becoming airborne. Apply water to exposed material (e.g., stockpiles) to control dust. Avoid erosion of exposed material when applying dust suppressants or water. Dust control measures are to be performed as described in Sections 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES and 01 36 20 PERIMETER AIR MONITORING.

3.7 SURFACE PREPARATION

3.7.1 Clearing and Grubbing

Unless indicated otherwise, remove trees, stumps, logs, shrubs, brush and vegetation and other items that would interfere with construction operations within the clearing limits shown on the Drawings. Refer to requirements of Section 31 11 00 CLEARING AND GRUBBING.

3.8 CONTAMINATED MATERIAL REMOVAL

3.8.1 Temporary Stream Diversion

Prior to excavation activities the water in the stream shall be diverted in accordance with the Drawings and Section 31 23 18 TEMPORARY STREAM BYPASS PUMPING SYSTEM.

3.8.2 Excavation

Excavate to contours, elevation, and dimensions indicated in the Drawings. Keep excavations free from water. Verify the limits of clean soils by testing and sampling as described in the Drawings and Sections 01 35 45 CHEMICAL DATA QUALITY CONTROL and 01 92 00 SURVEYING.

Excavation shall be performed in a manner that will limit spills and the potential for contaminated material to be mixed with uncontaminated material. An excavation log describing visible signs of contamination encountered shall be maintained for each area of excavation. Excavation logs shall be prepared in accordance with ASTM D5434.

3.8.3 Subgrade Approval and Preparation

Notify Contracting Officer when excavations have reached required subgrade.

If Contracting Officer determines that contaminated soil is present at the required subgrade, continue excavation and replace with compacted fill material as directed.

Subgrades shall be firm, dense, and thoroughly compacted and consolidated; free from mud, muck, and other soft or unsuitable materials; and remain firm and intact under all construction operations.

If the subgrade becomes softened or mucky due to failure to dewater properly, or other cause within the Contractor's control, the subgrade shall be excavated to firm material, trimmed, and backfilled with imported borrow soils.

3.8.4 Wash Down of Solid Material

Remove potentially-contaminated materials from large aggregate (e.g. nominal diameter greater than 1 foot) encountered above or below the ground surface within the excavation limits. Brush to remove soil materials and clean to limit defined herein for PCB-surface-contaminated solids by double rinsing, and place in the adjacent rubble pile. Collect and dispose of washdown water as contaminated water. Sample each type of solid material using destructive samples at locations as directed by the Contracting Officer. Analyze samples for PCBs in accordance with EPA 530/F-93/004 and Method 8080. Collect and test field blanks and replicates in accordance with EPA protocol. Repeat cleaning process and testing until PCBs are below the limits specified herein.

3.8.4.1 Wipe Samples

A 10 cm by 10 cm template gauze pad or glass wool of known size which has been saturated in the laboratory with hexane and stored in sealed glass vials. Wipe aggregate immediately after exposing medium to air. Place sample in precleaned glass bottle, cap, label, and place in ice chest until analyzed according to 40 CFR 761.

3.8.5 Post-Excavation Analytical Confirmatory Sampling

Analytical Samples are required as indicated on the Drawings.

Collect Post-Excavation Analytical Confirmatory Samples at locations indicated in the Drawings, Section 01 92 00 SURVEYING, and herein.

Provide quality control in accordance with EPA guidelines, Section 01 35 45 CHEMICAL DATA QUALITY CONTROL.

3.8.6 Additional Excavations

Perform Post-Excavation Analytical Confirmatory Sampling at locations described in the Drawings. No restoration or backfill shall be performed until analytical results have been reviewed and approved by Contracting Officer. If analytical results are greater than or equal to 1 ppm, an additional 6 inches of material below design elevation must be removed. Additional Post-Excavation Analytical Confirmatory Samples shall be collected and the approval process repeated.

3.9 EQUIPMENT DECONTAMINATION

Provide all supervision, labor, materials, tools, equipment accessories and appurtenances necessary to decontaminate all of the Contractor's equipment that has come into contact with contaminated materials.

Decontaminate equipment in accordance with applicable state and federal regulations before being used with non-contaminated materials or demobilizing from the Site and shall be performed in areas designated by the Contractor and approved by the Contracting Officer.

The equipment decontamination procedure shall, at a minimum, include the following:

a. Remove remaining contaminated materials from equipment surfaces using shovels, brooms and other hand tools as necessary.

b. Wash equipment surfaces using pressure washers and related supplies (e.g., equipment for scrubbing, plastic sheeting), where appropriate, to remove any additional sediment that may remain

c. Collect and transport all decontamination liquids and solids to the equipment and material staging area for proper unloading and disposal.

The contamination standard for equipment that will no longer be used on the project is the removal of visible material and power washing of surfaces.

Surfactant shall not be used to decontaminate equipment.

All decontamination fluids must be managed as wastewater.

3.10 CONTAMINATED MATERIAL STORAGE

Material shall be placed in staging areas immediately after excavation to facilitate material processing. The following paragraphs describe acceptable methods of material storage. Storage units shall be in good condition and constructed of materials that are compatible with the material or liquid to be stored. If multiple storage units are required, each unit shall be clearly labeled with an identification number and a written log shall be kept to track the source of contaminated material in each temporary storage unit.

3.10.1 Staging Areas

Staging area(s) shall be constructed to isolate stored contaminated

material from the environment. Place material removed from the excavation in a temporary containment area near the excavation area. Divert water from the containment area. Cover excavated contaminated soil at all times when not being worked. Maintain liner material and replace when worn or ripped. As an option, soil may be stockpiled in trucks suitable for carrying PCB-contaminated soils as specified herein. No staging areas shall infringe on areas delineated as wetlands.

Staging Area(s) shall be constructed as described in the Drawings and shall include:

a. A base liner system including (from bottom to top): Geocomposite liner, 40 mil HDPE geomembrane liner, 12-ounce non-woven geotextile, sand, and stone aggregate. All geosynthetic seams shall be positioned with the overlap recommended by the manufacturer, but not less than 6 inches.

    1. Geocomposite liner shall be provided and installed in accordance with the manufacturer's recommendations.

    2. HDPE Geomembrane liner shall be seamed in accordance with the geomembrane manufacturer's recommendations. In sumps, corners and odd-shaped geometric locations, the number of field seams shall be minimized. Seaming shall extend to the outside edge of panels. The seam area shall be free of moisture, dust, dirt, and foreign material at the time of seaming. Fish mouths in seams shall be repaired.

    3. Placement of material over the geotextile and geomembrane liner shall be performed in a manner to prevent damage to the geotextile and geomembrane liner.

    4. Base liner system shall be removed following completion of material handling.

b. Non-permeable Geomembrane cover shall be free of holes or other damage to prevent precipitation from entering the stockpile. The cover material shall be extended over the berms and anchored or ballasted to prevent it from being removed or damaged by wind.

c. Berms surrounding the stockpile, a minimum of 18 inches in height. Vehicle access points shall also be bermed.

d. The liner system shall be sloped to allow collection of leachate. Storage and removal of liquid which collects in the stockpile, in accordance with paragraph Liquid Management.

3.10.2 Roll-Off Units

Roll-off units used to temporarily store contaminated material shall be water tight. A cover shall be placed over the units to prevent precipitation from contacting the stored material. Liquid which collects inside the units shall be removed and stored in accordance with paragraph Liquid Management.

3.10.3 Liquid Management

Furnish labor, materials, and equipment necessary for collecting, treating, and discharging of liquid generated during construction activities at the site. Conduct excavations and material handling operations at the site in a

manner that minimizes the amount of liquid generated. Liquid collected from support areas (including stockpiles) shall be transferred to the on-site water treatment facility, constructed in accordance with the Drawings. All contact water (i.e., water that has come in contact with disturbed soil, including stormwater in staging areas or in excavations and/or groundwater accumulated in excavations) must be collected and treated as described in the Drawings and herein prior to discharge.

3.10.3.1 Treatment System Requirements

The Contractor shall be responsible for designing, providing, installing, operating, maintaining, and removing treatment facilities associated with the collection and storage of contaminated water.

The Contractor shall be responsible for all required permits to discharge treated waters within the treatment limits required in paragraph Sampling Liquid. The treatment system shall include the plan and processes shown in the Drawings and shall:

a. Be capable of removing contaminants to below the limit defined in paragraph Sampling Liquid.

b. Include effluent holding tanks designed to allow on-site testing of water quality prior to discharge.

c. Include recycle capability for retreatment of effluent not meeting the discharge requirements of this specification, as determined by on-site testing.

3.10.3.2 Treatment System Operations

Monitor, test, and adjust the treatment system in accordance with Excavation and Onsite Material Handling Plan or as otherwise modified by special regulatory requirements. If there is a conflict between requirements, the more stringent requirement shall prevail.

3.10.3.3 Discharge of Treated Water

Do not discharge any water to the publicly owned treatment works (POTW) until test results collected as defined in Subpart 3.12.3 Sampling Liquid are approved by the Borough of South Plainfield, Middlesex County Utilities Authority (MCUA), and the Contracting Officer. Discharge of the treated water shall be approved by all authorities having jurisdiction. Discharge of water to surface water is strictly prohibited.

3.10.3.4 Cleanup and Removal of Treatment System

Upon completion of work, close and remove from the site the water treatment system. Restore the site to its original condition. Decontaminate equipment in accordance with the Contractor's Excavation and Onsite Material Handling Plan. Containerize, sample, test, and dispose of carbon, residues, cleaning aids, and decontamination solid waste as specified for the contaminated solids. Decontamination liquids shall be containerized and disposed of at an approved disposal facility licensed to accept such liquid wastes.

3.11 CONTAMINATED MATERIAL DEWATERING

Sediments and soil processing activities shall be performed within the

staging area. Sediment and soils excavated with in Bound Brook and below the water table shall be allowed to gravity dewater for a minimum of 24 hours prior to blending or drying with excavated upland soils within the same waste disposal classification. If gravity dewatering and blending or drying sediments with excavated upland soils is not sufficient to meet requirements, a blending/drying agent shall be added. Thoroughly mix blending/drying agent into excavated material to achieve homogeneous mixture throughout. The ratio and actual amounts of blending/drying agent shall be determined by the Contractor based on field conditions and treatability tests performed by the Contractor. Waste materials shall pass Paint Filter testing procedures (EPA SW-846 Method 9095) prior to transport or otherwise meet the acceptance criteria of the selected disposal facility. Only the minimum amount of blending agent necessary to achieve requirements shall be used. Amounts of blending/drying agent used shall be accurately measured and documented by the Contractor.

3.12 SAMPLING

3.12.1 Post-Excavation Analytical Confirmatory Sampling

Confirmation samples shall be analyzed for PCBs. The analytical results obtained by the Contractor should be sufficient to document that the limits of excavation have been achieved the Drawings. The confirmation sample will be collected as a 5-point composite of grab samples collected from 0 to 6 inches below excavation surface. Additional Sampling, if required, is described in Subpart 3.8.6 Additional Excavations.

3.12.2 Waste Characterization Sampling for Stockpiled Material

Waste characterization samples from stockpiled material shall be collected and analyzed to satisfy the requirements of the selected disposal facility or facilities (i.e., frequency, analytes) and Section 01 35 45 CHEMICAL DATA QUALITY CONTROL.

The Contractor may propose and submit to the Contracting Officer an in-situ waste characterization strategy to potentially allow for direct loading of excavated material.

3.12.3 Sampling Liquid

Liquid with contaminant levels that exceed action levels shall be treated onsite. Treatment shall be in accordance with paragraph Liquid Management. Liquid treated at the onsite temporary treatment facility shall be sampled as required by authority having jurisdiction and 01 35 45 CHEMICAL DATA QUALITY CONTROL.

3.13 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.), notify the Contracting Officer immediately. If the spill exceeds the reporting threshold, follow the pre-established procedures as described in the RCRA Contingency Plan for immediate reporting and containment. 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. As directed by the Contracting Officer, additional sampling and testing shall be performed to verify spills have been cleaned up. Spill cleanup and testing shall be done at no additional cost to the Government.

3.14 BACKFILLING

3.14.1 Confirmatory Test Results

Excavations shall be backfilled immediately after all contaminated materials have been removed and post-excavation surveys and completed as described in Section 01 92 00 SURVEYING and/or Post-Excavation Analytical Confirmatory Sample results have been approved by Contracting Officer. Imported backfill must meet the requirements as described in Section 01 35 45 CHEMICAL DATA QUALITY CONTROL. Backfill shall be placed and compacted to the lines and grades shown on the Drawings and in accordance with Section 31 23 00.00 20, BACKFILL AND COMPACTION.

3.15 DISPOSAL REQUIREMENTS

Offsite disposal of contaminated material shall be in accordance with Section 02 81 00 TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIALS.

3.16 REMEDIAL ACTION REPORT

The Remedial Action Report shall be labeled with the contract number, project name, location, date, name of general Contractor, and the Corps of Engineers District contracting for the work. Remedial Action Report shall include the following information as a minimum:

a. A cover letter signed by a responsible company official certifying that all services involved have been performed in accordance with the terms and conditions of the contract documents and regulatory requirements.

b. A narrative report including, but not limited to, the following:

   1. Site conditions, ground water elevation, and cleanup criteria;

   2. Excavation logs

   3. Field screening readings

   4. Quantity of materials removed from each area of contamination

   5. Quantity of water/product removed during dewatering

   6. Sample reports containing sample identification for sampling locations (indicate reference benchmark used), date, time, method of preservation, sampling methods, contamination level, name of individual sampler, identification of laboratory and quality control procedures

   7. Sample chain-of-custody forms

   8. Source of backfill

c. Copies of all chemical and physical test results.

d. Copies of all manifests and land disposal restriction notifications.

e. Copies of all certifications of final disposal signed by the responsible disposal facility official.

f. Waste profile sheets.

g. Scale drawings showing limits of each excavation, limits of contamination, known underground utilities within 50 feet of excavation, sample locations, and sample identification numbers. On-site stockpile, storage, treatment, loading, and disposal areas shall also be shown on the drawings.

h. Progress Photographs. Color photographs shall be used to document progress of the work as described in Section 01 30 00 ADMINISTRATIVE REQUIREMENTS. A minimum of four views of the site showing the location of the area of contamination, entrance/exit road, and any other notable site conditions shall be taken before work begins. After work has been started, activities at each work location shall be photographically recorded weekly. Photographs shall include:

1. Soil removal and sampling.

2. Dewatering operations.

3. Unanticipated events such as spills and the discovery of additional contaminated material.

4. Contaminated material/water storage, handling, treatment, and transport.

5. Site or task-specific employee respiratory and personal protection.

6. Fill placement and grading.

7. Post-construction photographs. After completion of work at each site, take a minimum of four views of each excavation site

A digital version of all photos shown in the report shall be included with the Remedial Action Report. Photographs shall be included in a photograph log that includes the following information for each photograph:

a. Project name

b. Direction of view

c. Location

d. Date/Time

e. Photograph Name, as described in Section 01 30 00 ADMINISTRATIVE REQUIREMENTS

f. Description

-- End of Section --

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SECTION 02 81 00

TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIALS

PART 1 GENERAL

This section pertains only to excavated material inside the OU4: Phase 1 Boundary as described in the Drawings. Waste classifications categories are described in Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

1.1 REFERENCES

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

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

IATA DGR	(2013) Dangerous Goods Regulations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP 415-1-266	(2000) Resident Engineer Management Guide (REMG) for Hazardous, Toxic, and Radioactive Waste (HTRW) Projects

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

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in

	Commerce, and Use Prohibitions
40 CFR 761.75	Chemical Waste Landfills
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 174	Carriage by Rail
49 CFR 176	Carriage by Vessel
49 CFR 177	Carriage by Public Highway
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings
49 CFR 179	Specifications for Tank Cars

1.2 DEFINITIONS

1.2.1 Hazardous Material

A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated pursuant to the Hazardous Materials Transportation Act, 49 U.S.C. Appendix Section 1801 et seq. The term includes materials designated as hazardous materials under the provisions of 49 CFR 172, Sections .101 and .102 and materials which meet the defining criteria for hazard classes and divisions in 49 CFR 173. EPA designated hazardous wastes are also hazardous materials.

1.2.2 Hazardous Waste

A waste which meets criteria established in RCRA or specified by the EPA in 40 CFR 261 or which has been designated as hazardous by a RCRA authorized state program.

1.3 DESCRIPTION OF WORK

The work includes transportation and disposal of PCB-contaminated soils, PCB-contaminated Bound Brook sediments and materials. Perform work in accordance with 40 CFR 761, 29 CFR 1910.120, and the requirements specified herein.

Contractor shall be advised that contaminated material from each of the waste classifications as described in Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL, and defined herein, shall be segregated for transportation and disposal.

1.4 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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Waste Transportation and Disposal Plan; G

Onsite Waste Management; G

Notices of Non-Compliance and Notices of Violation

SD-06 Test Reports

Recordkeeping; G

Spill Response; G

Exception Report; G

SD-07 Certificates

Certification; G

Transportation and Disposal Coordinator; G

Training; G

EPA Offsite Policy

Certificates of Disposal

Shipping Documents

Vehicle Decontamination Verification

1.5 QUALITY ASSURANCE

1.5.1 Transportation and Disposal Coordinator

Designate, by position and title, one person to act as the Transportation and Disposal Coordinator (TDC) for this contract. The TDC shall serve as the single point of contact for all environmental regulatory matters and shall have overall responsibility for total environmental compliance at the site including, but not limited to, accurate identification and classification of contaminated material; determination of proper shipping names; identification of marking, labeling, packaging and placarding requirements; completion of waste profiles, hazardous waste manifests, PCB manifests, bill of ladings, exception and discrepancy reports; and all other environmental documentation. The TDC shall have, at a minimum, one year of specialized experience in the management and transportation of hazardous waste and have been Department of Transportation certified under 49 CFR 172, Subpart H.

1.5.2 Training

The Contractor's hazardous materials employees shall be trained, tested, and certified to safely and effectively carry out their assigned duties in accordance with Section 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES and Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS. The Contractor's employees transporting hazardous materials or preparing hazardous materials for transportation, including samples, shall be trained, tested, and certified in accordance with 49 CFR 172, Subpart H, including security awareness and any applicable security plans. Where shipment of hazardous materials by air may be occurring, such as for sample shipments, the Contractor's hazardous material employees shall also be trained on IATA DGR. Contractor employees making determinations that shipments do not constitute DOT regulated hazardous materials shall also be trained, tested, and certified in accordance with 49 CFR 172, Subpart H.

1.5.3 Certification

The Contractor and/or Subontractors transporting hazardous materials shall possess a current certificate of registration issued by the Research and Special Programs Administration (RSPA), U.S. Department of Transportation, when required by 49 CFR 107, Subpart G. Submit copies of the certificates or written statements certifying exemption from these requirements.

1.5.4 Laws and Regulations Requirements

Work shall meet or exceed the minimum requirements established by Federal, state, and local laws and regulations which are applicable. These requirements are amended frequently and compliance with amendments is required as they become effective. In the event that compliance exceeds the scope of work or conflicts with specific requirements of the contract, notify the Contracting Officer immediately.

PART 2 PRODUCTS

2.1 MATERIALS

Provide all the materials required for the packaging, labeling, marking, placarding and transportation of contaminated material in conformance with Department of Transportation standards and IATA DGR and EP 415-1-266. Details in this specification shall not be construed as establishing the limits of the Contractor's responsibility.

2.1.1 Containers

All containers used for staging and transporting waste material shall be inspected upon arrival to ensure they are in good condition (i.e., clean, no damage). Containers used for offsite waste transport shall be watertight, sift-proof and lined as appropriate to meet the requirements of authorities having jurisdiction; equipped with functioning tailgate locks and non-mesh (solid), waterproof tarpaulins; suitable for truck service; and meet local, state, and federal regulations.

2.1.2 Markings

Provide markings for material/waste package, freight container, and transport vehicle consistent with the requirements of 49 CFR 172, Subpart D and 40 CFR 761, Section.45 (for PCBs). Markings shall be capable of

withstanding, without deterioration or substantial color change, a 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation.

2.1.3 Labeling

Provide primary and subsidiary labels for materials/wastes consistent with the requirements in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 6. Labels shall meet design specifications required by 49 CFR 172, Subpart E including size, shape, color, printing, and symbol requirements. Labels shall be durable and weather resistant and capable of withstanding, without deterioration or substantial color change, a 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation.

2.1.4 Placards

For each offsite shipment of material/waste, provide primary and subsidiary placards consistent with the requirements of 49 CFR 172, Subpart F. Placards shall be provided for each side and each end of bulk packaging, freight containers, transport vehicles, and rail cars requiring such placarding. Placards may be plastic, metal, or other material capable of withstanding, without deterioration, a 30 day exposure to open weather conditions and shall meet design requirements specified in 49 CFR 172, Subpart F.

2.1.5 Spill Response Materials

Provide spill response materials including, but not limited to, containers, adsorbent, shovels, and personal protective equipment. Spill response materials shall be available at all times in which contaminated materials are being handled or transported. Spill response materials shall be compatible with the type of material being handled.

2.2 EQUIPMENT AND TOOLS

Provide miscellaneous equipment and tools necessary to handle contaminated materials and hazardous wastes in a safe and environmentally sound manner.

PART 3 EXECUTION

3.1 WASTE TRANSPORTATION AND DISPOSAL PLAN

Prepare a plan detailing the manner in which wastes will be loaded and transported offsite and describing the types and volumes of wastes anticipated to be managed as well as the management practices to be utilized. The plan shall include at minimum:

a. Names and qualifications of each Contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and a 24-hour point of contact. Furnish two copies of EPA, State, local or any applicable PCB waste documentation;

b. Names and qualifications (experience and training) of personnel who will be working on-site with PCB wastes;

c. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment;

d. Spill prevention, containment, and cleanup contingency measures to be implemented;

e. Location of state certified weigh station;

f. Identify the methods to ensure wastes meet shipment requirements;

g. Identify method to be used to ensure accurate weights of shipments;

h. Identify waste minimization methods;

i. Propose facilities and haul routes to be utilized for treatment, storage, and/or disposal;

j. Identify areas onsite where wastes are to be loaded; and

k. Identify whether transfer facilities are to be utilized, and if so, how the wastes will be tracked to ultimate disposal.

l. Identify disposal facilities.

m. Identify waste characterization sampling methods to satisfy requirement described in Section 01 35 45 CHEMICAL DATA QUALITY CONTROL

Submit the plan prior to start of work. For treatment, storage, and/or disposal facilities proposed for off-site disposal of material; provide letter(s) of acceptance from the facility covering the materials being disposed and a copy of the facilities' state and local Solid Waste Management Permit. Ensure that work operations or processes involving PCB-contaminated materials are conducted in accordance with 40 CFR 761. Written documentation of waste transported offsite shall be submitted on a monthly basis.

3.2 ONSITE WASTE MANAGEMENT

These paragraphs apply to Government owned waste only. Contractors are prohibited by 10 U.S.C. 2692 from storing Contractor owned waste onsite for any length of time. The Contractor is responsible for ensuring compliance with all Federal, state, and local hazardous waste laws and regulations and shall verify those requirements when preparing reports, waste shipment records, hazardous waste manifests, or other documents. Identify hazardous wastes using criteria set forth in 40 CFR 261 or all applicable state and local laws, regulations, and ordinances. When accumulating contaminated material onsite, comply with generator requirements in 40 CFR 262 and any applicable state or local law or regulations. Onsite accumulation times shall be restricted to applicable time frames referenced in 40 CFR 262, Section.34 and any applicable state or local law or regulation. Accumulation start dates shall commence when waste is first generated (i.e. containerized or otherwise collected for discard). Only use containers in good condition and compatible with the waste to be stored. Ensure containers are closed except when adding or removing waste, and immediately mark all hazardous waste containers with the words "hazardous waste" and other information required by 40 CFR 262, Section.32 and any applicable state or local law or regulation as soon as the waste is containerized. An additional marking shall be placed on containers of "unknowns" designating the date sampled, and the suspected hazard. Inspect containers for signs of deterioration and for responding to any spills or leaks. Inspect all hazardous waste areas weekly and provide written documentation of the inspection. Include date and time of inspection, name of individual

conducting the inspection, problems noted, and corrective actions taken on the inspection logs.

3.2.1 Hazardous Waste Classification

Identify, in consultation with the Contracting Officer, all waste codes applicable to each hazardous waste stream based on requirements in 40 CFR 261 or any applicable state or local law or regulation. Also identify all applicable treatment standards in 40 CFR 268 and state land disposal restrictions and make a determination as to whether or not the waste meets or exceeds the standards. Waste profiles, analyses, classification and treatment standards information shall be submitted to Contracting Officer for review and approval.

3.3 OFFSITE WASTE MANAGEMENT

Furnish labor, materials, and equipment necessary to store, transport, and dispose of contaminated material in accordance with Federal, State, and local requirements. Prepare and maintain waste shipment records and manifests required by the Resource Conservation and Recovery Act (RCRA), U.S. Federal Department of Transportation (DOT), and State transportation department.

Use RCRA Subtitle C permitted facilities which meet the requirements of 40 CFR 264 or facilities operating under interim status which meet the requirements of 40 CFR 265. Offsite treatment, storage, and/or disposal facilities with significant RCRA violations or compliance problems (such as facilities known to be releasing hazardous constituents into ground water, surface water, soil, or air) shall not be used. Submit Notices of Non-Compliance and Notices of Violation by a Federal, state, or local regulatory agency issued to the Contractor in relation to any work performed under this contract. Immediately provide copies of such notices to the Contracting Officer. Also furnish all relevant documents regarding the incident and any information requested by the Contracting Officer, and coordinate its response to the notice with the Contracting Officer or the designated representative prior to submission to the notifying authority. Also furnish a copy to the Contracting Officer of all documents submitted to the regulatory authority, including the final reply to the notice, and all other materials, until the matter is resolved.

3.3.1 Treatment, Storage, and/or Disposal Facility and Transporter

Provide the Contracting Officer with EPA ID numbers, names, locations, and telephone numbers of TSD facilities and transporters. This information shall be contained in the Waste Transportation and Disposal Plan and shall be approved by the Contracting Officer prior to off-site disposal.

3.3.2 Status of the Facility

Facilities receiving hazardous waste shall be permitted in accordance with 40 CFR 270 or operating under interim status in accordance with 40 CFR 265 requirements, or permitted by a state authorized by the Environmental Protection Agency to administer the RCRA permit program. Additionally, prior to using a TSD Facility, contact the EPA Regional Offsite Coordinator specified in 40 CFR 300, Section .440, to determine the facility's status, and document all information necessary to satisfy the requirements of the EPA Offsite policy and submit this information to the Contracting Officer.

3.3.3 Shipping Documents

The Contracting Officer will be responsible for designating Authority of Signature for all disposal manifests.

Prior to shipment of any material offsite and a minimum of 14 days prior to anticipated pickup, provide for review written certification to the Contracting Officer that all materials have been properly packaged, labeled, and marked in accordance with Department of Transportation and EPA requirements.

Prior to transporting the PCB-contaminated and/or hazardous waste, sign and date the manifest acknowledging acceptance of the material from the transporter. Return a signed copy to the Contracting Officer before the shipment leaves the job site. Ensure that the manifest accompanies the waste at all times. Submit transporter certification of notification to EPA of their PCB waste activities and EPA identification numbers. Within 35 days from shipment date, the transporter shall provide a copy of the manifest signed and dated by the disposal facility.

The Contractor's TDC shall also provide written certification regarding waste minimization efforts documenting that efforts have been taken to reduce the volume and toxicity of waste to the degree economically practicable and that the method of treatment, storage, or disposal selected minimizes threats to human health and the environment.

3.3.4 Transportation

Transport material in vehicles designed to carry contaminated material in accordance with 49 CFR 171, 49 CFR 172, 49 CFR 173, 49 CFR 174, 49 CFR 176, 49 CFR 177, 49 CFR 178, 49 CFR 179, Federal and State requirements. Transport PCB-contaminated solid material, articles, or equipment in DOT Specification 5, 5B, or 17C containers with removable heads. Store PCB-contaminated liquid in DOT Specification 17E containers. In addition to those requirements:

a. Inspect and document vehicles and containers for proper operation and covering. Repair or replace damaged containers.

b. Inspect vehicles and containers for proper markings, manifest documents, and other requirements for waste shipment.

c. Perform and document Vehicle Decontamination Verification procedures prior to leaving the worksite and again before leaving the disposal site.

3.3.5 Weight Certification

Weigh vehicles transporting PCB-contaminated materials at a State-certified weigh scale within 15 miles of the project site.

3.3.6 Payment Upon Furnishing Certificate of Disposal of PCBs

Payment will not be made until the certificate of disposal has been furnished to the Contracting Officer.

3.3.7 Disposal

Dispose of PCB-contaminated soils in accordance with 40 CFR 761 at a TSCA-

regulated landfill meeting the requirements of 40 CFR 761.75. TSCA disposal waste streams are described in the Drawings and Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL. The disposer shall forward a copy of the manifest to the Contracting Officer within 30 days of receipt of PCBs.

3.3.8 Certificates of Disposal

Submit certificate of disposal to the Government within 30 calendar days of the date that the disposal of the PCB waste identified on the manifest was completed. Include:

a. The identity of the disposal facility, by name, address, and EPA identification number.

b. The identity of the PCB waste affected by the Certificate of Disposal including reference to the manifest number for the shipment

c. A statement certifying the fact of disposal of the identified PCB waste, including the date(s) of disposal, and identifying the disposal process used.

d. A certification as defined in 40 CFR 761, Section 3.

3.4 CLEANUP

Maintain surfaces of the PCB control area free of accumulations of material. Restrict the spread of dust and debris; keep waste from being distributed over work area. Do not remove the PCB control area and warning signs prior to the Contracting Officer's approval. Reclean areas showing residual PCBs.

3.4.1 Solvent Cleaning

Clean contaminated tools, containers, etc., after use by rinsing three times with an appropriate solvent or by wiping down three times with a solvent wetted rag. Suggested solvents are stoddard solvent or hexane.

3.5 OBTAINING EPA ID NUMBERS

Complete EPA Form 8700-12, Notification of Hazardous Waste Activity, and submit to the Contracting Officer for review and approval. Allow a minimum of 30 days for processing the application and assigning the EPA ID number. Shipment shall be made not earlier than one week after receipt of the EPA ID number.

3.6 WASTE MINIMIZATION

Minimize the generation of hazardous waste to the maximum extent practicable and take all necessary precautions to avoid mixing clean and contaminated wastes.

3.7 RECORDKEEPING

Maintain adequate records to support information provided to the Contracting Officer regarding exception reports, annual reports, and biennial reports; and maintain bill of ladings for a minimum of 375 days from the date of shipment or any longer period required by any applicable law or regulation or any other provision of this contract. Submit

information necessary to file state annual or EPA biennial reports for all hazardous waste transported, treated, stored, or disposed of under this contract. Do not forward these data directly to the regulatory agency but to the Contracting Officer at the specified time. The submittal shall contain all the information necessary for filing of the formal reports in the form and format required by the governing Federal or state regulatory agency. A cover letter shall accompany the data to include the contract number, Contractor name, and project location. In the events that a manifest copy documenting receipt of hazardous waste at the treatment storage and disposal facility is not received within 35 days of shipment initiation, or that a manifest copy documenting receipt of PCB waste at the designated facility is not received within 35 days of shipment initiation, prepare and submit an Exception Report to the Contracting Officer within 37 days of shipment initiation.

3.8 PCB SPILL PREVENTION

Use appropriate vehicles and operating practices to prevent spillage or leakage of contaminated materials from occurring during operations. Inspect vehicles leaving the contaminated soil removal site to ensure that no contaminated soil adheres to the wheels or undercarriage. Immediately report any spills to the Contracting Officer and provide cleanup in accordance with 40 CFR 761, Subpart G.

3.9 SPILL RESPONSE

In the event of a spill or release of contaminated materials, pollutant,, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), notify the Contracting Officer immediately. Any direction from the Contracting Officer concerning a spill or release shall not be considered a change under the contract. If the spill exceeds a reporting threshold, follow the pre-established procedures for immediate reporting to the Contracting Officer. Comply with all applicable requirements of Federal, state, or local laws or regulations regarding any spill incident.

3.10 EMERGENCY CONTACTS

The Contractor is responsible for complying with the emergency contact provisions in 49 CFR 172, Section .604. Whenever the Contractor ships hazardous materials, provide a 24 hr emergency response contact and phone number of a person knowledgeable about the hazardous materials being shipped and who has comprehensive emergency response and incident mitigation information for that material, or has immediate access to a person who possesses such knowledge and information. The phone shall be monitored on a 24 hour basis at all times when the hazardous materials are in transportation, including during storage incidental to transportation. Ensure that information regarding this emergency contact and phone number are placed on all hazardous material shipping documents. Designate an emergency coordinator and post the following information at areas in which hazardous wastes are managed:

a. The name of the emergency coordinator.

b. Phone number through which the emergency coordinator can be contacted on a 24 hour basis.

c. The telephone number of the local fire department.

d. The location of fire extinguishers and spill control materials.

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Attachment A SAMPLE OFF-SITE POLICY CERTIFICATION MEMO	
Project/Contract #:	
Waste Stream:	
Primary TSD Facility, EPA ID #	
Alter. TSD Facility, EPA ID # and	
EPA Region	Contact
I	(617) 918-1752
II	(212) 637-4130
III	(214) 814-5267
IV	(404) 562-8591
V	(312) 353-8207
VI	(214) 665-2282
VII	(913) 551-7154
VIII	(303) 312-6419
IX	(415) 972-3304
X	(206) 553-2859
EPA representative contacted:	
EPA representative phone number:	
Date contacted:	
Comment:	
The above EPA representative was contacted on _____. As of that date the above sites were considered acceptable in accordance with the Off-Site Policy in 40 CFR 300.440.	
Date:	Signature:
Phone number:	

-- End of Section --

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SECTION 31 05 19

GEOSYNTHETICS

PART 1 GENERAL

The term 'geosynthetics' is used in this section to describe planar products manufactured from polymeric material used with soil, rock, earth, or other geotechnical engineering related material (ASTM D4439), including geotextiles, geomembranes, and geocomposite materials.

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D4439	(2017) Standard Terminology for Geosynthetics
ASTM D1004	(2013) Initial Tear Resistance of Plastic Film and Sheeting
ASTM D6693	(2015) Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Polypropylene Geomembranes
ASTM D3776/D3776M	(2009a; R 2017) Standard Test Methods for Mass Per Unit Area (Weight) of Fabric
ASTM D4354	(2012) Sampling of Geosynthetics for Testing
ASTM D4355/D4355M	(2014) Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus
ASTM D4491/D4491M	(2015) Standard Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D4533/D4533M	(2015) Standard Test Method for Trapezoid Tearing Strength of Geotextiles
ASTM D5199-12	Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
ASTM D4632/D4632M	(2015a) Grab Breaking Load and Elongation of Geotextiles
ASTM D4751	(2016) Standard Test Method for Determining Apparent Opening Size of a Geotextile

ASTM D4759	(2011) Determining the Specification Conformance of Geosynthetics
ASTM D4833/D4833M	(2007; E 2013; R 2013) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D4873/D4873M	(2016) Identification, Storage, and Handling of Geosynthetic Rolls and Samples
ASTM D5261	(2010) Measuring Mass Per Unit Area of Geotextiles
ASTM D6241	(2014) Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

HDPE Geomembrane Liner; G

SD-03 Product Data

Manufacturing Quality Control Sampling and Testing; G

Geocomposite

SD-04 Samples

Quality Assurance Samples and Tests; G

SD-07 Certificates

Non-Woven Geotextile; G

PART 2 PRODUCTS

2.1 DELIVERY, STORAGE, AND HANDLING

Deliver, store, and handle geosynthetics in accordance with ASTM D4873/D4873M.

2.1.1 Delivery

Notify the Contracting Officer a minimum of 24 hours prior to delivery and unloading of geosynthetics rolls packaged in an opaque, waterproof, protective plastic wrapping. The plastic wrapping shall not be removed until deployment. If quality assurance samples are collected, immediately rewrap rolls with the plastic wrapping. Geosynthetics or plastic wrapping damaged during storage or handling shall be repaired or replaced, as

directed. Label each roll with the manufacturer's name, geosynthetics type, roll number, roll dimensions (length, width, gross weight), and date manufactured.

2.1.2 Storage

Protect rolls of geosynthetics from construction equipment, chemicals, sparks and flames, temperatures in excess of 160 degrees F, or any other environmental condition that may damage the physical properties of the geosynthetics. To protect geosynthetics from becoming saturated, either elevate rolls off the ground or place them on a sacrificial sheet of plastic in an area where water will not accumulate.

2.1.3 Handling

Handle and unload geosynthetic rolls with load carrying straps, a fork lift with a stinger bar, or an axial bar assembly. Rolls shall not be dragged along the ground, lifted by one end, or dropped to the ground.

2.2 RAW MATERIALS

A minimum of 7 days prior to scheduled use, submit manufacturer's certificate of compliance stating that the geosynthetics meets the requirements of this section. For needle punched geosynthetics, the manufacturer shall also certify that the geosynthetics have been continuously inspected using permanent on-line full-width metal detectors and does not contain any needles which could damage other geosynthetic layers. The certificate of compliance shall be attested to by a person having legal authority to bind the geosynthetics manufacturer.

2.2.1 Non-Woven Geotextile

Provide non-woven geotextile that is a nonwoven pervious sheet of polymeric material consisting of long-chain synthetic polymers composed of at least 95 percent by weight polyolefins, polyesters, or polyamides. The use of woven slit film geotextiles (i.e. geotextiles made from yarns of a flat, tape-like character) will not be allowed. Add stabilizers and/or inhibitors to the base polymer, as needed, to make the filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure. Regrind material, which consists of edge trimmings and other scraps that have never reached the consumer, may be used to produce the geotextile. Post-consumer recycled material may also be used. Geotextile shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including the edges. Geotextiles shall meet the requirements specified in Table 1. Where applicable, property values shown on Table 1represent minimum average roll values (MARV) in the weakest principal direction. Values for Apparent Opening Size (AOS) represent maximum average roll values.

TABLE 1
MINIMUM PHYSICAL REQUIREMENTS FOR 12 oz NON-WOVEN GEOTEXTILE

PROPERTY	UNITS	ACCEPTABLE VALUES	TEST METHOD
MASS PER UNIT AREA	OZ/SY	12	ASTM D5261

TABLE 1 MINIMUM PHYSICAL REQUIREMENTS FOR 12 oz NON-WOVEN GEOTEXTILE			
TENSILE GRAB STRENGTH	LBS	300	ASTM D4632/D4632M
GRAB ELONGATION	PERCENT	50	ASTM D4632/D4632M
PUNCTURE STRENGTH	LBS	180	ASTM D6241
TRAPEZOID TEAR STRENGTH	LBS	115	ASTM D4533/D4533M
APPARENT OPENING SIZE	IN	0.024	ASTM D4751
PERMITTIVITY	SEC^{-1}	0.02	ASTM D4491/D4491M
ULTRAVIOLET DEGRADATION	PERCENT	70 AT 500 HRS	ASTM D4355/D4355M

2.2.2 Geotextile for Silt Fence

Sewn seams shall have a strength equal to or greater than the geotextile itself. Install fabric to withstand maximum velocity flows as recommended by the manufacturer and as specified in Table 2

TABLE 2 MINIMUM PHYSICAL REQUIREMENTS FOR GEOTEXTILE FOR SILT FENCE			
PHYSICAL PROPERTY	UNITS	REQUIRED VALUE	TEST METHOD
WEIGHT	OZ/SQ YD	4	ASTM D3776/D3776M
APPARENT OPENING SIZE	MM	40-70	U.S. Standard Sieve
GRAB TENSILE STRENGTH	LB	160	ASTM D4632/D4632M
ULTRAVIOLET RADIATION RESISTANCE	PERCENT	70	ASTM D4355/D4355M

2.2.3 HDPE Geomembrane Liner

Geomembrane liner shall be smooth and manufactured as wide as possible to minimize factory and field seams. Geomembrane shall be chemically resistant and uniform in color and thickness. Geomembrane shall be free of cuts, abrasions, holes, blisters, contaminants and other imperfections. Geomembrane liner shall meet the requirements specified in Table 3.

TABLE 3 MINIMUM PHYSICAL REQUIREMENTS FOR 40 MIL HDPE GEOMEMBRANE LINER			
PROPERTY	UNITS	ACCEPTABLE VALUES	TEST METHOD
THICKNESS	MILLIMETER	40	ASTM D5199-12
TENSILE PROPERTIES		MINIMUM AVERAGE	ASTM D6693
BREAK STRESS	LBS/IN	162	ASTM D6693
BREAK ELONGATION	PERCENT	700	ASTM D6693
TEAR RESISTANCE	LB	28	ASTM D1004
PUNCTURE RESISTANCE	LB	80	ASTM D4833/D4833M

2.2.4 Geocomposite

Geocomposite shall have a bi-planar geonet core with a minimum thickness of 250 mil and bounded by a 10 oz/sy non-woven needle punched polypropylene geosynthetics (both sides). Geocomposite liner shall meet the requirements specified in Table 4.

TABLE 4 MINIMUM PHYSICAL REQUIREMENTS FOR GEOCOMPOSITE			
PROPERTY	UNIT	ACCEPTABLE VALUE	TEST METHOD
GEOCOMPOSITE			
TRANSMISSIVITY(2)	GAL/MIN/FT {M^2/SEC}	1.4 {3×10^{-4}}	ASTM D4716
PLY ADHESION	LB/IN	1.0	ASTM D7005
GEONET CORE(1,3)			
GEONET CORE THICKNESS	MIL	250	ASTM D5199
TRANSMISSIVITY(2)	GAL/MIN/FT {M^2/SEC}	14.5 {3×10^{-3}}	ASTM D4716
DENSITY	G/CM^2	0.94	ASTM D1505
TENSILE STRENGTH	LB/IN	55	ASTM D7179
CARBON BLACK CONTENT	PERCENT	2.0	ASTM D4218
GEOTEXTILE			
MASS PER UNIT AREA	OZ/YD^2	10	ASTM D5261
GRAB TENSILE STRENGTH	LB	260	ASTM D4632

TABLE 4
MINIMUM PHYSICAL REQUIREMENTS FOR GEOCOMPOSITE

PROPERTY	UNIT	ACCEPTABLE VALUE	TEST METHOD
GRAB ELONGATION	PERCENT	50	ASTM D4632
CBR PUNCTURE STRENGTH	LB	725	ASTM D6241
TRAPEZOIDAL TEAR STRENGTH	LB	100	ASTM D4533
AOS	US SIEVE[1] {MM}	100 {0.15}	ASTM D4751
PERMISSIVITY	SEC^{-1}	1.0	ASTM D4491
WATER FLOW RATE	GPM/FT^2	75	ASTM D4491
UV RESISTANCE	PERCENT RETAINED	70 (AFTER 500 HRS)	ASTM D4355

NOTES:

[1] All geosynthetic properties are minimum average roll values except AOS which is a maximum average roll value and UV resistance is typical value. Geonet core thickness is nominal value.

[2] Gradient of 0.1, normal load of 10,000 psf, water at 70 degrees Fahrenheit between steel plates for 15 minutes.

[3] Component properties prior to lamination.

2.3 MANUFACTURING QUALITY CONTROL SAMPLING AND TESTING

The Manufacturer is responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. A minimum of 7 days prior to scheduled use, submit manufacturer's quality control manual. Documentation describing the quality control program shall be made available upon request. Perform manufacturing quality control sampling and testing in accordance with the manufacturer's approved quality control manual. As a minimum, geosynthetics shall be randomly sampled for testing in accordance with ASTM D4354, Procedure A. Acceptance of geosynthetics shall be in accordance with ASTM D4759. Tests not meeting the specified requirements will result in the rejection of applicable rolls.

PART 3 EXECUTION

Install geosynthetics as detailed in the Drawings, manufacturer specifications, and described herein.

3.1 QUALITY ASSURANCE SAMPLES AND TESTS

3.1.1 Quality Assurance Samples

Provide assistance to the Contracting Officer in the collection of quality assurance samples for quality assurance testing; assign 7 days in the schedule to allow for testing. Collect samples upon delivery to the site at the request of the Contracting Officer. Identify samples with a waterproof marker by manufacturer's name, product identification, lot number, roll number, and machine direction. The date and a unique sample number shall also be noted on the sample. Discard the outer layer of the geosynthetic roll prior to sampling a roll. Samples shall then be collected by cutting the full-width of the geosynthetic sheet a minimum of 3 feet long in the machine direction. Rolls which are sampled shall be

immediately resealed in their protective covering.

3.1.2 Quality Assurance Tests

Provide quality assurance samples to an Independent Laboratory. Samples will be tested to verify that geosynthetics meet the requirements specified in Tables 1 through 4. Test method ASTM D4355/D4355M shall not be performed on the collected samples. Geosynthetic product acceptance shall be based on ASTM D4759. Tests not meeting the specified requirements will result in the rejection of applicable rolls.

3.2 INSTALLATION

3.2.1 Subgrade Preparation

The surface underlying the geosynthetics shall be smooth and free of of any deleterious materials, ruts, or protrusions which could damage the geosynthetics. Subgrade materials and compaction requirements shall be in accordance with Section 31 23 00.00 20 BACKFILL AND COMPACTION.

3.2.2 Placement

All geosynthetics shall be placed, seamed and tested in accordance with the manufacturer's recommendations and specifications. Notify the Contracting Officer a minimum of 24 hours prior to installation of any geosynthetics. Geosynthetic rolls which are damaged or contain imperfections shall be repaired or replaced as directed. The geosynthetic shall be laid flat and smooth so that it is in direct contact with the subgrade soils or underlying layers (e.g., geomembrane). Precautions shall be taken to prevent damage to underlying layers during placement of the overlying geosynthetics. Surfaces to be covered with geosynthetics shall be examined before and directly following deployment to ensure that no potentially harmful foreign objects are present either above or below the geosynthetics. During placement of geosynthetics, all dirt, dust, sand, and mud shall be kept off to prevent clogging or hamper subsequent seaming. If excessive containment materials are present on the geosynthetic, it shall be cleaned or replaced as requested by the Contracting Officer. Proper cutting tools shall be used to cut and size the geosynthetic materials. The geosynthetic shall also be free of tensile stresses, folds, and wrinkles. On slopes steeper than 10 horizontal on 1 vertical, lay the geosynthetic with the machine direction of the fabric parallel to the slope direction. No horizontal seams shall be allowed on slopes.

3.3 SEAMS

3.3.1 Overlap Seams

Continuously overlap geotextile panels a minimum of 12 inches at all longitudinal and transverse joints. Seams for geomembrane and geocomposite shall be completed in accordance with the manufacturer's recommendations and specifications.

3.4 PROTECTION

Protect the geosynthetics during installation from clogging, tears, and other damage. Damaged geosynthetics shall be repaired or replaced as directed. Use adequate ballast (e.g. sand bags) to prevent uplift by wind. The geosynthetics shall not be left uncovered for more than 14 days after installation.

3.5 REPAIRS

Repair torn or damaged geosynthetics. Clogged areas of geosynthetics shall be removed. Perform repairs by placing a patch of the same type of geosynthetic over the damaged area. The patch shall extend a minimum of 12 inches beyond the edge of the damaged area. Patches shall be continuously fastened using approved methods. The machine direction of the patch shall be aligned with the machine direction of the geosynthetic being repaired. Remove and replace geosynthetic rolls which cannot be repaired. Repairs shall be performed at no additional cost to the Contracting Officer.

3.6 PENETRATIONS

Construct engineered penetrations of the geosynthetics in accordance with manufacturer's recommendations.

3.7 COVERING

Do not cover geosynthetics prior to inspection and approval by the Contracting Officer. Place cover soil in a manner that prevents soil from entering the geosynthetic overlap zone, prevents tensile stress from being mobilized in the geosynthetics, and prevents wrinkles from folding over onto themselves. On side slopes, soil backfill shall be placed from the bottom of the slope upward. Cover soil shall not be dropped onto the geosynthetics from a height greater than 3 feet. No equipment shall be operated directly on top of the geosynthetics . Use equipment with ground pressures less than 7 psi to place the first lift over the geosynthetics. A minimum of 12 inches of soil shall be maintained between full-scale construction equipment and the geosynthetics. Cover soil material type, compaction, and testing requirements are described in Section 31 23 00.00 20 BACKFILL AND COMPACTION. Equipment placing cover soil shall not stop abruptly, make sharp turns, spin their wheels, or travel at speeds exceeding 5 mph.

-- End of Section --

SECTION 31 11 00

CLEARING AND GRUBBING

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 within the text by the basic designation only.

ARCADIS U.S., INC (ARCADIS)

DAR 2018	(2018) Design Analysis Report - Cornell-Dubilier Electronics Superfund Site Operable Unit 4: Phase 1 - Capacitor Debris Area

U.S. DEPARTMENT OF DEFENSE (DOD)

DODI 4150.07	DOD Pest Management Program

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Herbicide Application Plan

SD-03 Product Data

Herbicide; G

SD-04 Samples

Tree Wound Paint

1.3 QUALITY CONTROL

1.3.1 Regulatory Requirements

Comply with DODI 4150.07 for requirements on Contractor's licensing, certification, and record keeping. Maintain daily records using the Pest Management Maintenance Record, DD Form 1532-1, or a computer generated equivalent. These forms may be obtained from the main web site: http://www.dtic.mil/whs/directives/forms/eforms/dd1532-1.pdf

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the site, and handle in a manner which will maintain

the materials in their original manufactured or fabricated condition until ready for use.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Tree Wound Paint

Submit samples in cans with manufacturer's label of bituminous based paint of standard manufacture specially formulated for tree wounds.

2.1.2 Herbicide

Provide glyphosate-based herbicide (i.e., Rodeo) currently registered by the EPA or approved for wetland use by the appropriate agency of the host county and approved by the Contracting Officer. Select a herbicide that is suitable for the climatic conditions at the project site. Submit manufacturer's label and SDS for herbicides proposed for use.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Herbicide Application Plan

Prior to commencing application of herbicide, submit a herbicide application plan with proposed sequence of treatment work including dates and times of application. Include the herbicide trade name, EPA registration number, chemical composition, formulation, application rate of active ingredients, method of application, area or volume treated, and amount applied. Include a copy of the pesticide applicator certificates.

The focus of the herbicide application with be the monotypic stands of Phragmites australis. All stands and isolated individuals of Phragmites will be treated within the Wetland Herbicide Treatment Areas, as indicated in the Drawings. This is inclusive of all areas that will not be excavated, and which could act as a future seed source.

Herbicide application will occur the summer or early fall prior site restoration activities and when the majority of plants are in full bloom. Herbicide application will not occur after the first frost.

3.1.2 Protection

3.1.2.1 Roads and Walks

Keep roads and walks free of dirt and debris at all times.

3.1.2.2 Trees, Shrubs, and Existing Facilities

Protect trees and vegetation to be left standing from damage incident to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require.

3.1.2.3 Utility Lines

Protect existing utility lines that are indicated to remain from damage. Notify the Contracting Officer immediately of damage to or an encounter

with an unknown existing utility line. The Contractor is responsible for the repair of damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations. When utility lines which are to be removed are encountered within the area of operations, notify the Contracting Officer in ample time to minimize interruption of the service. Refer to Section 01 30 00 ADMINISTRATIVE REQUIREMENTS and Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS for additional utility protection.

3.1.2.4 Threatened and Endangered Species

A formal evaluation of potential effect on federal and state listed threatened and endangered species was completed (DAR 2018). A formal determination of "no-effect" was made based upon the following assumptions that will be incorporated into project implementation:

1. No trees will be removed during the interval of April 1 through September 30 to avoid any impacts to listed bat species.

2. A pre-construction nesting survey for raptors and other migratory birds will be completed prior to initiating construction activities. If bald eagle nesting occurs proximate to the project area, then federal guidance outlined in the National Bald Eagle Management Guidelines (USFWS 2007) will be followed.

3. Biological oversight will be provided by qualified ecologist before and during implementation of the perimeter silt fence. The silt fence will function as a physical deterrent to any turtle from entering the active construction site. A qualified ecologist will survey the area for silt fencing prior to construction implementation, and then all areas within the protected boundaries. If a turtle is observed during initial surveys, then all construction will be temporarily ceased until which time the turtle can be relocated by a qualified ecologist safely. If a turtle is observed during remedial construction activities, then all construction will be ceased until which time a qualified ecologist can address and safely remove the individual from the project area. Only qualified ecologists will handle and/or move any identified turtle observed within the Site.

Deviation or omission of any of the above listed species would require coordination and approval from the Contracting Officer and state regulatory agencies.

3.2 Application

3.2.1 Herbicide Application

Adhere to safety precautions as recommended by the manufacturer concerning handling and application of the herbicide.

3.2.1.1 Clean Up, Disposal, And Protection

Once application has been completed, proceed with clean up and protection of the site without delay. Clean the site of all material associated with the treatment measures, according to label instructions, and as indicated. Remove and dispose of excess and waste material off Government property.

3.2.1.1.1 Disposal of Herbicide

Dispose of residual herbicides and containers off Government property, and in accordance with the approved disposal plan, label instructions and EPA requirements.

3.3 CLEARING

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing.

3.3.1 Tree Removal

Where indicated or directed, trees and stumps that are designated as trees shall be removed from areas designated for clearing and grubbing. This work shall include the felling of such trees and the removal of their stumps and roots as specified in paragraph GRUBBING. Trees shall be disposed of as specified in paragraph DISPOSAL OF MATERIALS.

Wetland Herbicide Treatment Areas treated with herbicide will be mowed within 1 month of herbicide application.

3.3.2 Grubbing

Grubbing will require the cutting of trees, stumps, brush, and all other vegetation in areas to be cleared flush with original ground surface.

Additional grubbing will consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas. Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, will be removed to a depth of not less than 12 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings, and areas to be paved. Fill depressions made by grubbing with suitable material and compact to make the surface conform with the original adjacent surface of the ground.

3.4 DISPOSAL OF MATERIALS

Tree material (originally above ground level and higher) resulting from clearing and grubbing will be disposed of as Non-TSCA, Non-RCRA Material. Remaining material (tree material below original ground surface) will be disposed within the waste classification of surrounding soil.

-- End of Section --

SECTION 31 23 00.00 20

BACKFILL AND COMPACTION

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 the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D1140	(2014) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D1556/D1556M	(2015; E 2016) Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
ASTM D2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4318	(2010; E 2014) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D6938	(2015) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D698	(2012; E 2014; E 2015) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

1.2 DEFINITIONS

1.2.1 Earth

All materials, such as sand, gravel, sediment, clay, loam, ashes, cinders, pavements, muck, roots, pieces of timber, soft or disintegrated rock, not requiring blasting, barring, or wedging from their original beds, and specifically excluding all ledge or bedrock and individual boulders, masonry, or debris larger than 0.5 cy in volume.

1.2.2 Degree of Compaction

Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D698, for general soil types, abbreviated as percent laboratory maximum density.

1.2.3 Hard Materials

Weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" but which usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.2.4 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume.

1.2.5 Bedrock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume.

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Submit 30days prior to starting work.

SD-06 Test Reports

Borrow Site Testing; G

Fill and backfill test

Density tests

Copies of all laboratory and field test reports within 24 hours of the completion of the test.

1.4 DELIVERY, STORAGE, AND HANDLING

Perform in a manner to prevent contamination or segregation of materials.

1.5 REQUIREMENTS FOR OFF SITE SOIL

Soils brought in from off site for use as backfill shall be tested as described in Section 01 35 45 CHEMICAL DATA QUALITY CONTROL. Do not bring material onsite until borrow site testing tests results have been received and approved by the Contracting Officer.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

2.1.1 Satisfactory Materials

Provide and install backfill material as described in the Drawings and to meet the requirements of Section 01 35 45 CHEMICAL DATA QUALITY CONTROL.

2.1.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials as described in the Drawings. Unsatisfactory materials also include man-made fills, trash, refuse, or backfills from previous construction. Unsatisfactory material also includes material classified as satisfactory which contains root and other organic matter, frozen material, and stones larger than 12 inches. The Contracting Officer shall be notified of any contaminated materials.

2.1.3 Imported Subgrade Backfill

Provide and install Imported Subgrade Material as described in the Drawings and to meet the requirements of Section 01 35 45 CHEMICAL DATA QUALITY CONTROL.

2.1.4 Topsoil

Provide as specified in the Drawings and Section 32 92 19 SEEDING.

2.1.5 Imported Sediment Backfill

Provide a well-graded, clean, stone material with the following size characteristics from an approved source as specified in the Drawings. Material shall be adequately free from thin, flat and elongated pieces, and shall be free from debris and foreign objects such as frozen material, coal, wood, hay, burlap, paper, plastics, tree roots, pieces of concrete or pavement or contaminants (chemical and/or biological).

Sieve Size	**Percent Passing by Weight**
6 inch	100%
2 inch	10% - 50%
1/4 inch	10% - 25%
No. 200	0% - 10%

PART 3 EXECUTION

3.1 FILLING AND BACKFILLING

Perform all necessary surveys and sampling as described in the Drawings and in Sections 01 92 00 SURVEYING and 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS prior to placing backfill. Fill and backfill to contours, elevations, and dimensions indicated in the Drawings. Compact each lift before placing overlaying lift.

All excavation areas shall be backfilled as specified in the Drawings or as directed by the Contracting Officer.

Backfilling shall be done with specified materials. Backfill material shall be observed prior to placement, and all roots, vegetation, organic matter, or other foreign debris shall be removed. Stones shall not be allowed to form clusters with voids.

No backfill material shall be placed on frozen ground and the material itself shall not be frozen or contain frozen soil fragments when placed. No calcium chloride or other chemicals shall be added to prevent freezing.

Fill materials shall be placed in such a manner that will facilitate drainage at all times.

The Contractor shall anticipate and schedule site work to accommodate laboratory/field testing of backfill materials and review of test results.

3.1.1 Imported Borrow Soils and Sand Placement

Place in 12 inch maximum loose lifts measured prior to compaction. Compact areas not accessible to rollers or compactors with mechanical hand tampers. Aerate material excessively moistened by rain to a satisfactory moisture content. Finish to a smooth surface by blading, rolling with a smooth roller, or both. Otherwise, adjust moisture content to allow adequate compaction in accordance with the material's moisture-density relationship by ASTM D698.

3.2 COMPACTION

3.2.1 Imported Subgrade Backfill

Fill materials shall be compacted to a minimum of 90 percent of maximum dry density, as determined ASTM D698. The fill shall be compacted with a range of 1 percent below to 3 percent above the optimum moisture content as determined by ASTM D698. Fill shall be moistened or aerated as necessary to obtain the required compaction.

3.3 FINISH OPERATIONS

3.3.1 Grading

Finish grades as indicated within 0.1 ft of design elevation and as described in Section 01 92 00 SURVEYING. Grade areas to drain water away from structures. Maintain areas free of trash and debris. For existing grades that will remain but which were disturbed by Contractor's operations, grade as directed.

3.3.2 Topsoil and Seed

Provide as specified in Sections 32 92 19 SEEDING, 01 92 00 SURVEYING, and the Drawings.

3.3.3 Protection of Surfaces

Protect newly backfilled, graded, and topsoiled areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

3.4 FIELD QUALITY CONTROL

3.4.1 Testing

Perform one of each of the following tests for each material used. Provide additional tests for each source change.

3.4.1.1 Fill and Backfill Material Testing

Test fill and backfill material in accordance with ASTM C136/C136M for conformance to ASTM D2487 gradation limits; ASTM D1140 for material finer than the No. 200 sieve; ASTM D4318 for liquid limit and for plastic limit; ASTM D698 or for moisture density relations, as applicable.

3.4.1.2 Density Tests

Test the in-place density and moisture content of the imported subgrade backfill materials in accordance with ASTM D1556/D1556M or ASTM D6938. The testing shall be conducted at a frequency not less than one test per 500 cubic yards placed, or otherwise required by the Contracting Officer. All test locations shall be recorded.

If any in-place density test does not meet compaction requirements, the Contractor shall perform additional compaction as necessary to obtain passing results. If necessary, and at no additional cost, the Contractor shall remove fill materials within unacceptable areas, and shall replace and re-compact the material until the required compaction is achieved.

Fill material shall not be placed over a lift which has not been tested and accepted by the Contracting Officer.

-- End of Section --

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TEMPORARY STREAM BYPASS PUMPING SYSTEM

PART 1 GENERAL

1.1 SCOPE OF WORK

a. Contractor shall provide temporary bypass pumping system(s) for stream diversion, including all appurtenant components (e.g., upstream and downstream cofferdams, pumps, piping, sumps, discharge scour protection, dewatering), designed to maintain relatively dry working conditions within areas of sediment excavation, backfill, and restoration while maintaining uninterrupted streamflow around active work areas.

b. Contractor shall provide all materials, labor, and equipment needed to design, install, operate, maintain, monitor, and remove the temporary bypass pumping system(s).

c. Contractor shall be responsible for the safety of all personnel and equipment required to install, operate, maintain, monitor, remove, and work within areas protected by the bypass pumping system

d. Contractor shall provide adequate bypass capacity to allow completion of the work within the approved project schedule. General flow data for Bound Brook is provided in Appendix A; Supplementary Information of this Section for informational purposes only. This data should be considered approximate; and use of this data shall be at the Contractor's sole risk.

e. Contractor shall provide additional stand-by pump(s) as necessary to avoid delays in work associated with pump down-time and maintenance and shall provide all required power necessary to maintain pump operation.

f. Contractor shall be responsible for the protection of the work space and additional work during overtopping events and shall reestablish the work space following overtopping events at no additional cost to the project and with minimal impact to schedule.

1.2 HYDRAULIC INFORMATION

Stream flow data has been provided in Appendix A: Supplemental Information.

1.3 QUALITY ASSURANCE

Temporary bypass pumping equipment and materials shall:

a. Be provided by companies that specialize in the manufacture and sale of such products.

b. Meet the requirements of all codes and regulatory agencies having jurisdiction.

c. Comply with requirements of authorities having jurisdiction.

1.4 REFERENCES

NEW JERSEY STATE SOIL CONSERVATION COMMITTEE (NJSSCC)

NJSSCC 12-1	(2014)Standard for Conduit Outlet Protection
NJSSCC 14-1	(2014) Standard for Dewatering
NJSSCC 32-1	(2014) Standard Floating Turbidity Barrier

1.5 SUBMITTALS

SD-01 Preconstruction Submittals

Temporary Bypass Plan; G

Notification of Intended Temporary Bypass Pumping Start; G

Cofferdam Stability Calculations; G

Flood Contingency Plan; G

Water Quality Monitoring Plan; G

SD-03 Product Data

Cofferdams

Pumps

Piping

Outlet Protection

Floating Turbidity Barrier

SD-10 Operation and Maintenance Data

Manufacturer's Data And Instructions; G

PART 2 PRODUCTS

2.1 COFFERDAMS

a. Provide upstream and downstream temporary cofferdam barriers that can

be installed in flowing water conditions.

b. Cofferdams shall be able to be placed on uneven subgrades and on exposed bedrock and cobble size rock, while providing a watertight barrier or shall include description of additional measures needed to create a watertight barrier.

c. Cofferdams shall be resistant to movement and damage during normal use and during overtopping flows.

d. Cofferdams shall be constructed of materials that can withstand anticipated environmental factors such as UV degradation, and disturbance by unauthorized individuals or wildlife. Include any anchorage requirements.

2.2 PUMPS

a. Pumps shall be sized and selected based on the Contractor's planned approach for sediment removal and restoration activities.

b. Provide pump(s) capable of maintaining the removal areas in a dewatered condition as determined by the Contractor based on the planned approach for sediment removal and restoration activities. A minimum pump capacity of 5,000 gallon per minute is assumed as the basis for the bid and information provided in Appendix A: Supplementary Information. Contractor shall identify the maximum pumping capacity that will be provided and the basis for determining the capacity in the Dewatering Plan.

c. Provide redundancy as necessary to maintain minimum pump requirements in the event of pump failure.

d. Provide sound-dampening enclosures, if necessary, as described in 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS and to comply with local noise ordinances.

e. Pumps used for river bypass pumping shall have variable capacity capable of automatically accommodating increasing and decreasing streamflows, from the minimum anticipated streamflow up to the maximum required bypass capacity.

f. Provide backup power source compatible with both the design and backup pump systems.

g. Each bypass pump shall be equipped with an independent suction line. Suction lines shall be constructed of SDR-17 HDPE pipe pre-fabricated as shown in the Drawings.

2.3 PIPING

a. Provide durable, watertight piping capable of conveying proposed maximum pumping capacities at maximum anticipated pumping pressures.too

b. All joints and connections shall be watertight and pressure-rated for the proposed application.

2.4 OUTLET PROTECTION

a. Provide outlet protection for all discharges from bypass pumping and

work-area dewatering operations. Outlet protection shall protect the area immediately downstream of the outlet from localized erosion.

b. Outlet protection shall be designed, installed, and maintained in accordance with the NJSSCC 12-1 :Standard for Conduit Outlet Protection.

2.5 SUMPS

a. Provide sumps at all pump intakes to minimize the potential intake of sediments and debris.

b. Sump construction shall be in accordance with the NJSSCC 14-1: Standard for Dewatering.

2.6 FLOATING TURBIDITY BARRIER

a. Provide a floating turbidity barrier with attached absorbent boom downstream of active work areas as an additional measure of protection against downstream migration of construction-related sediments as described in the Drawings. Downstream containment measures will installed prior to any disturbance of soil and/or sediment or bypass activities.

b. Sediment dropped out of suspension behind the barrier shall be removed from the channel on an as-needed basis to prevent obstruction of flow and to prevent release during removal of the barrier.

c. Barrier shall meet the requirements of the NJSSCC 32-1: Standard for Floating Turbidity Barrier.

PART 3 EXECUTION

3.1 TEMPORARY BYPASS PLAN

Submit Temporary Bypass Plan no less than 21 calendar days prior to commencing Work, submit plan to Contracting Officer for approval. The Temporary Bypass Plan shall include drawings and complete construction information showing methods and equipment the Contractor proposes to utilize for temporary bypass of Bound Brook during each stage of construction. The submittal shall include the following information:

a. Drawings and/or mark-ups showing proposed system layout for each proposed setup/stage of construction, including location of work zones, pumps, temporary cofferdams, dewatering systems, sumps, suction and discharge piping and locations, outlet protection, power source(s), and staging areas.

b. Stream flow monitoring for anticipation of overtopping events.

c. Work plan for securing work areas affected by overtopping events.

d. Manufacturer's Data And Instructions on each type and size of pump proposed and its capacity including pump curves.

e. Details and material product information for temporary sumps, piping, outlet protection, downstream floating turbidity barrier, and temporary upstream and downstream cofferdam materials and configurations. Provide manufacturer name along with the product name and specific model name or number. Provide manufacturer installation, maintenance, inspection,

and repair guidelines, where available, as well as material properties cut sheets and dimensions.

f. Cofferdam Stability Calculations: Provide a cross-sectional figure of the proposed cofferdam system(s), including anchoring details (if applicable) and stability calculations or manufacturer's stability information.

g. Electrical plan for temporary power service including Manufacturer's Data And Instructions for generators and other associated equipment. Electrical plan shall describe provisions for providing standby power in the event of power source failure during temporary pumping.

h. Technical data on temporary piping, pipe joints, valves, supports, controls, secondary containment for fuel tanks and other information pertinent to temporary pumping system.

i. Hydraulic calculations, including piping head losses, substantiating the adequacy of the proposed bypass pumping system and selected equipment.

j. Schedule for installation, operation and maintenance, and removal of temporary bypass systems.

k. Name and contact number(s) of the designated personnel who will be responsible for temporary pumping operations.

3.2 NOTIFICATION OF INTENDED TEMPORARY BYPASS PUMPING START

Contractor shall notify the Contracting Officer at least 3 working days prior to the start of any temporary bypass pumping activities. Contractor shall carefully coordinate construction activities requiring temporary pumping with local weather forecasts to reduce the probability of surface flooding and overtopping. Contractor is responsible for scheduling the bypass pumping activities and making all required notifications, including regulatory notifications, if applicable.

3.3 WATER QUALITY MONITORING PLAN (SHORELINE AND SEDIMENT)

Contractor shall provide personnel, materials, supplies, and equipment to monitor the flows and depths upstream and downstream of the bypass system to ensure that the system is providing appropriate capacity to bypass incoming streamflow and maintain downstream flow.

Contractor shall provide personnel, materials, supplies, and equipment to monitor and control downstream turbidity, as required by Contractor's Water Quality Monitoring Plan. Contractor shall adjust temporary controls or bypass pumping operations as necessary to conform with the specified turbidity monitoring requirements.

3.4 SEQUENCING

Work requiring stream bypass pumping shall be performed in the sequence detailed in the Drawings to prevent potential for downstream re-contamination.

a. Provide required submittals for Contracting Officer's review and resolve any comments to the satisfaction of the Contracting Officer prior to initiating any temporary bypass activities.

b. Notify Contracting Officer of proposed start of temporary bypass activities, as described in Notification of Intended Temporary Bypass Pumping Start, prior to any in-stream work.

c. Install downstream turbidity controls and any downstream and upstream monitoring equipment, if applicable, prior to installation of bypass system.

d. Install and operate bypass system and all appurtenant components in accordance with Contractor's Temporary Bypass Plan.

e. Remove bypass system only after work area has been fully restored and stabilized.

f. Remove downstream turbidity controls and any associated monitoring equipment. If sediments have accumulated behind the turbidity controls that could be mobilized downstream when the controls are removed, leave controls in place and wait to remove until the in-stream work area containing those controls has been bypassed and dewatered. In such a case, additional downstream turbidity controls will need to be established.

3.5 FLOOD CONTINGENCY PLAN

a. The overflow elevation of the temporary cofferdam(s) shall be at least one foot below the lowest adjacent top of bank, unless otherwise directed by the Contracting Officer.

b. The Contractor shall fully stabilize active work areas prior to off-work hours and forecasted wet-weather and potential overtopping events to prevent the erosion and downstream transport of sediments and soils from active work areas.

c. Temporary bypass systems shall be constructed in such a way as to avoid the erosion and downstream transport of existing soils and sediments during normal operation and overtopping events.

d. Recovery from flood/overtopping events (e.g., dewatering, repairs, lost time) shall be at the Contractor's expense unless otherwise authorized in writing by the Contracting Officer.

3.6 SUPPLEMENTARY INFORMATION

Additional water flow modeling data is provided in Appendix A: Supplementary Information.

-- End of Section --

SECTION 31 50 00

EXCAVATION SUPPORT AND PROTECTION

PART 1 GENERAL

1.1 SCOPE OF WORK

Furnish, install, monitor, and maintain excavation support and protection systems capable of supporting excavation sidewalls, and resisting soil and hydrostatic pressures and superimposed and construction loads, including:

a. Furnishing excavation shoring/support systems consisting of, but not limited to soldier piles embedded into bedrock; timber lagging; and trench boxes.

b. Removing and decontaminating temporary excavation shoring system components excluding piles embedded into bedrock.

c. Cutting off piles embedded into bedrock 4 feet below final ground surface elevation or as described in the Drawings.

d. Restoration to final ground surface elevation as described in the Drawings.

1.2 REFERENCES

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

American Society for Testing and Materials (ASTM)

A572M	Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
ASTM A992/A992M	(2015) Standard Specification for Structural Steel Shapes

New Jersey Department of Transportation (NJDOT) Standard Specifications for Road and Bridge Construction

903.06.01	Self-Consolidating Concrete for Drilled Shafts
903.09	Controlled Low Strength Material

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Excavation Support Installation Plan; G

SD-02 Shop Drawings

Trench Box Shop Drawings; G

SD-03 Product Data

Soldier Pile Manufacturer Data; G

Solider Pile Mill Test Documentation; G

SD-07 Certificates

Pile Installer Qualifications; G

Welder Qualifications; G

SD-11 Closeout Submittals

Pile Installation Records; G

1.4 EXISTING CONDITIONS

a. Existing surface and subsurface conditions, based on data obtained for the site, logs for soils borings and other exploratory operations are included in the Contract Documents. The Contractor shall review these documents and become familiar with the soil and groundwater conditions. Topographic and subsurface conditions may vary from those shown or described in the Design Documents. It shall be the Contractor's responsibility to verify the accuracy of all existing conditions shown or described in the Design Documents. The Contractor shall immediately notify the Contracting Officer in writing of variations to the existing conditions indicated in the Design Documents

b. The approximate locations of known underground and aboveground utility lines and structures are shown on the Drawings. The Contractor shall immediately notify the Contracting Officer if other utility lines or structures not shown on the Drawings are encountered during execution of the work. Contractor shall locate all utilities according to 01 92 00 SURVEYING.

1.5 QUALITY ASSURANCE

1.5.1 Pile Installer Qualifications

Installer shall be regularly engaged in the drilling and erection of steel soldier piling. Drilling operators and foreman shall have a minimum of three years' experience installing steel soldier piling into rock. Submit installer's company name and representative project experience

1.5.2 Welder Qualifications

In accordance with the American Welding Society (AWS), and qualified within the past year. Submit certifications of welders.

1.5.3 Excavation Support Installation Plan

The plan shall include a description of proposed methods and sequencing for

installing shoring systems to the limits shown on the Drawings. The plan should be specific to each excavation area where temporary excavation support is required or where proposed by the Contractor. It shall also include details of protection methods around existing active utility lines that are located adjacent to excavation areas.

1. Proposed procedures for storing, handling, preparing, installing, and removing piles in accordance with this Section.

2. Proposed procedures for accommodating or removing obstructions encountered during installation operations

3. Other proposed procedures (e.g., lagging installation, welding procedures) as applicable.

4. Specifications and makes/models of proposed equipment for pile installation Work

5. Planned sequence of pile installation operations, including coordination with excavation and piping installation Work.

6. Quality control procedures to ensure piles are installed within the tolerances specified in this Section

1.5.4 Trench Box Shop Drawings

Shop Drawings that show the trench box system layout and details. Shop Drawings shall be signed and stamped by a licensed Professional Engineer in New Jersey and include the following:

1. Trench box layout for each excavation area, including dimensions, locations of all components, panel dimensions, and sizes of posts and bracing members if used.

2. Design calculations and assumptions for lateral pressures, including magnitude and location of construction surcharges relative to shoring system

3. Manufacturer's product data, specifications, installation instructions, structural properties (moment of inertia, moment capacity), dimensions, and connection details for system components.

1.5.5 Soldier Pile Manufacturer Data

Submit Soldier Pile Manufacturer Data indicating the structural properties of the piling section(s) to be used, including moment of inertia (I), section modulus (S), thickness, and width/depth dimensions.

1.5.6 Solider Pile Mill Test Documentation

Submit Soldier Pile Mill Test Documentation covering chemical and physical properties of piling to be used on Project.

1.6 COORDINATION

Notify Contracting Officer at least 5 days prior to beginning excavation support and protection installation operations at any location. Notification shall not relieve the Contractor of its responsibilities for performing the work in accordance with the Drawings.

1.7 DELIVERY, STORAGE AND HANDLING

a. Deliver materials to the Site in such quantities and at such times to ensure continuity of pile installation operations.

b. Store piles in orderly groups above ground on level blocks or racks to minimize potential for permanent deflection, distortion, or damage. The material will be protected against bending under its own weight or under superimposed loads

c. Handle piling with care using only handling holes or lifting devices to prevent permanent deflection, distortion, or damage.

1.8 PROJECT CONDITIONS

Employ a qualified land surveyor and establish exact elevations, northing and easting coordinates at fixed points as shown in the Drawings to act as control points as described in Section 01 92 00 SURVEYING. Clearly identify benchmarks and record existing elevations.

a. Establish benchmarks on existing site features (e.g., manholes, buildings) located within 15 feet of excavation support and protection systems.

b. During installation of excavation support and protection systems, regularly resurvey benchmarks, and maintain an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Contracting Officer if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

c. Prior to advancing soldier pile in certain areas, the remnants, or intact elements of below ground structures may require demolition and removal to facilitate installation. Following discussions with the Owner and Engineer regarding the presence of such features, the Remediation Contractor shall conduct these activities to facilitate soldier pile installation and achieve the removal limits specified in the Drawings.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Provide materials that are either new or in serviceable (like-new) condition. Unless otherwise shown or indicated, all materials shall conform to pertinent AISC, ANSI, ASTM or other industry standards

2.1.1 Steel Soldier Piles

Install W-shaped beams conforming to ASTM A992/A992M. Provide pile sections of the minimum lengths and specifications shown or indicated on the Drawings.

2.1.2 Steel Trench Box Components

Install to conform to ASTM A572M (Grade 50).

2.1.3 Controlled Low Strength Material (CLSM)

CLSM shall consist of cement, water and at the Contractor's option, fly ash, aggregate or chemical admixtures in any proportions such that the final product meets the strength and flow consistency requirements of NJDOT Section 903.09.

2.1.4 Concrete for Rock Socket

Concrete for Rock Socket shall meet the strength and flow consistency requirements of NJDOT Section 903.06.01.

2.1.5 Timber Lagging

Timber Lagging shall conform to structural grade lumber having a total bending strength not less than 1,500 psi. Nominal thickness of not less than 4 inches.

PART 3 EXECUTION

3.1 PREPARATION

a. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, dewatering, and other hazards that could develop during excavation support and protection system operations.

b. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

c. Provide adequate clearance of support and protection systems within work areas to allow for proper installation/construction of required site features.

d. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or leaks, to ensure that excavation remains stable and free of standing water.

e. Damages to adjacent facilities caused by installing excavation support and protection systems shall be promptly repaired at the Contractor's expense.

f. Determine soldier piling layout and grade by survey.

g. Establish necessary lengths as presented in the Drawings.

h. Locate and protect all underground utilities, piping, structures, etc.

3.2 INSTALLATION OF STEEL SOLDIER PILE

a. The Contractor shall identify the presence of underground utilities or other obstructions. All underground utilities located within the pathway of the proposed steel soldier pile shall be reported to the Contracting Officer prior to be being removed, relocated, protected, or abandoned to facilitate installation of the steel soldier pile as approved by the Contracting Officer.

b. Soldier piles shall be drilled into place. Large diameter augers shall be used for drilling in overburden materials while double walled core barrels or full-faced rotary tools shall be used for drilling into rock.

c. Temporary casings shall be used to stabilize the drilled shaft excavations and then removed after or during placement of rock-socket concrete and/or drilled shaft CLSM around soldier piles.

d. The Contractor shall remove any material that stops drilling prior to continuation of drilling, or develop an alternative methodology, reviewed by the Contracting Officer, for completing soldier pile system installation

e. Plumb steel soldier piling within four percent of pile length

f. Soldier piling shall be constructed so as to keep the core holes free from earth or surface water runoff (into the core holes).

g. Soldier piling shall be constructed to meet all safety requirements.

h. Set Up Soldier Piles

1. Drill piles with equipment suitable for the conditions encountered. Suitable procedures must be employed to prevent damage to pile tops and tips

2. Monitor, prevent, and correct any tendency of soldier piles to bend, twist or rotate.

3. Piles damaged or drilled outside the above tolerances shall be replaced. Any soldier pile damaged during installation shall be immediately pulled and replaced.

4. Splicing is not permitted

3.3 MONITORING

a. Visually monitor excavation support systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or leaks to ensure that excavation remains stable.

b. Immediately address and notify the Engineer of any movement, cracking, or settlement of the ground surface surrounding the excavation, or of any visual damage to or movement of adjacent roads, utility poles, or other facilities.

c. Promptly correct bulges, breakage, or leaks to ensure that the excavation remains stable, and repair any damage to adjacent facilities, structures, and surfaces.

d. All borings shall be secured and covered at all times when no drilling activities are being performed such that surface water or other debris do not enter the boring.

3.4 RECORDS

Provide accurate records of each soldier pile installed. Submit documentation of support as Pile Installation Records, including the

following information:

1. Pile identification number.

2. Date and time of drilling.

3. Elevation at top of pile.

4. Length of soldier pile in the ground when drilling is complete.

5. Length of rock socket.

6. Rate of drilling in feet/minute.

7. Detailed remarks concerning alignment, obstructions, etc.

b. Mark identification number clearly visible on each soldier pile with a waterproof marking device, within two feet of the top, before drilling is initiated.

c. Spray paint all soldier piles rejected from the work for any reason, at the time of rejection, with the letter "X" within three feet of both ends.

3.5 REJECTION

If excavation system components are rejected from the work because of deviation from location, plumbness requirement, excessive bending, twisting, failed load test or other reasons, the Contractor shall take suitable corrective action at no additional cost to the Owner and such corrective action shall be reviewed by the Contracting Officer. Suitable action includes extracting, furnishing, and drilling of replacement soldier piles, so that all soldier piles installed meet the requirements of this Section

3.6 EXTRACTION AND REPAIRS

3.6.1 Tests

Remove excavation support and protection systems when approved by the Engineer and construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities; repair the above items as needed.

Backfill any voids resulting from removal of system components with materials approved by the Contracting Officer.

3.7 ADJUSTING AND CLEANING

3.7.1 Trench Box

Inspect system components upon removal, and prior to reuse, for damage that may have occurred during installation, excavation, backfilling, and/or removal. Promptly replace damaged or defective components at the Contractor's expense, and before reusing in other excavations.

3.7.2 Soldier Piles

Following extraction, the Contractor shall clean/decontaminate steel soldier piling and inspect for any damage that may have occurred while drilling and/or extracting the piling. All piling must be approved by the Engineer for reuse prior to redrilling.

-- End of Section --

SECTION 32 92 19

SEEDING

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 within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D4972	(2013) pH of Soils

U.S. DEPARTMENT OF AGRICULTURE (USDA)

AMS Seed Act	(1940; R 1988; R 1998) Federal Seed Act
DOA SSIR 42	(1996) Soil Survey Investigation Report No. 42, Soil Survey Laboratory Methods Manual, Version 3.0

1.2 RELATED REQUIREMENTS

Site restoration will be completed in accordance with the Mitigation Plan (Arcadis 2018) to be approved by NJDEP prior to any restoration construction activities. Restoration construction sequence should be referenced in the Mitigation Plan (Arcadis 2018).

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Topsoil

Seed Establishment Period

Seeding Plan

SD-03 Product Data

Mulch

Lime

Fertilizer

Wood Cellulose Fiber Mulch

SD-07 Certificates

State Landscape Contactor's License

Contractor shall submit the following Product Data 30 days prior of utilization:

1.3.1 Certificates

Contractor shall submit the following Certificates 15 days prior to performing applicable work:

1.3.1.1 State Landscape Contactor's License

Construction company shall hold a landscape contractors license in the state where the work is performed and have a minimum of five years landscape construction experience. Submit copy of license and three references for similar work completed in the last five years

1.3.2 Pre-Installation Meeting

Convene a pre-installation meeting a minimum of one week prior to commencing work of this section. Require attendance of parties directly affecting work of this section. Review conditions of operations, procedures and coordination with related work. Agenda shall include the following:

a. Tour, inspect, and discuss conditions of planting materials.

b. Review planting schedule and maintenance.

c. Review required inspections.

d. Review environmental procedures.

1.4 HANDLING

Do not drop or dump materials from vehicles.

1.5 TIME LIMITATIONS

1.5.1 Seed

Apply seed within twenty four hours after seed bed preparation. Apply seed consistent with seeding dates specified in Paragraph 2.3.3.

PART 2 PRODUCTS

2.1 TOPSOIL

Topsoil shall be a locally-available, fertile, friable soil of loamy character, obtained from well-drained arable land and reasonably free from subsoil, refuse, roots, heavy or stiff clay, large stones, coarse sand, sticks, brush, litter, and other deleterious substances. Vegetative matter other than brush or trees may be incorporated into topsoil. Topsoil must also conform to requirements specified in paragraph entitled "Composition."

2.1.1 Composition

Containing a minimum of 12 percent organic matter as determined by the

topsoil composition tests of the Organic Carbon, 6A, Chemical Analysis Method described in DOA SSIR 42. Maximum particle size, 3/4 inch, with maximum 3 percent retained on 1/4 inch screen. The pH shall be tested in accordance with ASTM D4972. Topsoil shall be free of sticks, stones, roots, and other debris and objectionable materials. Other components shall conform to the following limits:

Silt	10% to 30%
Clay	0% to 10%
Sand	70% to 90%
pH	5.5 to 7

At least two representative samples shall be sent to an approved laboratory for physical, analytical, and soil fertility testing. The results of the soil fertility testing shall provide recommendations for lime and fertilizer application rates.

2.2 SOIL CONDITIONERS

Add conditioners to topsoil as required to bring into compliance with "composition" standard for topsoil as specified herein.

2.2.1 Lime

Lime shall be agricultural grade pulverized limestone having a minimum total neutralizing value of 88% calcium carbonate equivalence. A minimum of 90% shall pass the 0.85 mm sieve, and a minimum of 60% shall pass the 0.15 mm sieve

2.3 SEED

Add conditioners to topsoil as required to bring into compliance with "composition" standard for topsoil as specified herein.

2.3.1 Classification

Provide seed of the latest season's crop delivered in original sealed packages, bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, weedseed content, and inert material. Label in conformance with AMS Seed Act and applicable state seed laws. Wet, moldy, or otherwise damaged seed will be rejected.

2.3.2 Application

Contractor will submit a Seeding Plan for most suitable means to effectively seed restoration area.

Prior to planting and seeding, the ground will be scarified, harrowed, raked and broomed until the surface is smooth or uniformly fine texture. No seeding shall be done during windy weather. Seeding shall be done in two directions at right angles to each other. Sow seed evenly by hand or with an approved mechanical seeding device in the proportions and at the rate per unit area specified. Hydroseeding will be acceptable. The sown seed shall be covered with a straw mulch, if recommended, as specified

herein

2.3.3 Planting Dates

Native seeding should be completed as described in the Drawings. If construction timing does not allow, Contractor will submit a plan for a temporary cover crop until which time it is suitable to apply seed.

2.3.4 Seed Mixture

Seed mixture by weight for the three specified native seed mixes are included below, and are to be seeded at a minimum rate of 25 lbs per acre. Seeding to occur October to May.

2.3.4.1 Seed Classification

Native seed mix 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. Conform labels to the AMS Seed Act and applicable state seed laws. Submit the calendar time for Seed Establishment Period. When there is more than one seed establishment period, the boundaries of the seeded area covered for each period shall be described.

2.3.4.2 Permanent Seed Species and Mixtures

Seed mixture by weight for the three specified native seed mixes are included below, and are to be seeded at a minimum rate of 25 lbs per acre. Seeding to occur October to May.

Proportion permanent seed species and mixtures by weight as follows:

Emergent Wetland Seed Specification		
Proportion of Seed Mix (%)	Scientific Name	Common Name
25%	Carex vulpinoidea	Fox Sedge
20%	Carex lurida	Lurid (Shallow) Sedge
6%	Elymus riparius	Riverbank Wildrye
10%	Carex lupulina	Hop Sedge
5%	Carex scoparia	Blunt Broom Sedge
4%	Verbena hastata	Blue Vervain
5%	Scirpus cyperinus	Woolgrass
5%	Scirpus validus	Softstem bulrush
5%	Juncus effusus	Soft Rush

Emergent Wetland Seed Specification		
2%	Asclepias incarnata	Swamp Milkweed
3%	Sparganium americanum	Eastern bur reed
3%	Sparganium eurycarpum	Giant bur reed
1%	Onoclea sensibilis	Sensitive Fern
1%	Eupatorium maculatum	Joe Pye Weed
1%	Mimulus ringens	Square Stemmed Monkeyflower
1%	Helenium autumnale	Common Sneezeweed
1%	Eupatorium perfoliatum	Eupatorium Boneset
1%	Alisma subcordatum	Mud Plantain (Water Plantain)
1%	Aster umbellatus	Flat Topped White Aster

Forested Wetland Seed Mix Specifications		
Proportion of Seed Mix (%)	Scientific Name	Common Name
25%	Poa palustris	Fowl Bluegrass
19%	Elymus riparius	Riverbank wildrye
17%	Carex lurida	Lurid (Shallow) Sedge
10%	Carex vulpinoidea	Fox Sedge
5%	Cinna arundinacea	Wood Reedgrass
4%	Carex lupulina	Hop Sedge
4%	Carex scoparia	Blunt Broom Sedge
4%	Sparganium eurycarpum	Giant Bur Reed
3%	Scirpus polyphyllus	Many Leaved Bulrush

2.5%	Juncus effusus	Soft Rush
2%	Carex intumescens	Bladder (Star) Sedge
2%	Sparganium americanum	Eastern Bur Reed
1%	Carex crinita	Fringed (Nodding) Sedge
1%	Scirpus cyperinus	Woolgrass
0.5%	Juncus tenuis	Path Rush

Upland Transitional Grassland Seed Mix Specifications		
Proportion of Seed Mix (%)	Scientific Name	Common Name
18%	Elymus virginicus	Virginia wildrye
17%	Schizachyrium scoparium	Little bluestem
15%	Festuca rubra	Creeping red fescue
15%	Andropogon gerardii	Big bluestem
10%	Sorghastrum nutans	Indian grass
6%	Chamaecrista fasciculata	Partridge pea
6%	Panicum virgatum	Switch grass
3%	Desmodium paniculatum	Panicle leaf tick trefoil
3%	Verbena hastata	Blue vervain
2.5%	Asclepias tuberosa	Butterfly milkweed
1%	Rudbeckia hirta	Black eyed susan
1%	Helenium autumnale	Common sneezeweed
1%	Aster pilosus	Heath aster
1.5%	Solidago juncea	Early goldenrod
0.5%	Agrostis perennans	Upland bentgrass

The seed mixes shall be applied uniformly as described in Section 2.3.2, and during appropriate season as specified in Section 2.3.3. If necessary, a temporary, sterile cover crop can be applied and should be submitted for approval 15 days prior to seeding.

2.4 FERTILIZER

Fertilizer shall be a standard-quality, commercial carrier of available plant food elements (a complete, prepared, and packaged material containing an appropriate ratio of nitrogen, phosphoric acid, and soluble potash, as recommended by the soil fertility tests). Fertilizer composition will be determined based upon soil fertility testing.

2.5 MULCH

Mulch shall be free from noxious weeds, mold, and other deleterious materials.

2.5.1 Straw

Stalks from oats, wheat, rye, barley, or rice. Furnish in air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Straw shall contain no fertile seed.

2.5.2 Hay

Air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Hay shall be sterile, containing no fertile seed.

2.5.3 Wood Cellulose Fiber Mulch

Wood cellulose fiber mulch shall be manufactured from unadulterated wood that is not contaminated with paint, chemicals, shingles, plastics, or other foreign materials. Shall not be manufactured from or contain paper. Shall be manufactured so that wood fibers will remain uniformly suspended in water under agitation and will blend with seeds, fertilizer, and other additives to form a homogeneous slurry. Shall contain no growth or germination inhibiting factors. Shall contain a non-permanent green dye to facilitate inspection of the placement of the material. Shall include a tackifying agent to prevent displacement due to water and wind. Shall be capable of forming an absorptive mat that will allow moisture to percolate into the underlying soil.

PART 3 EXECUTION

3.1 INSTALLATION

The area to receive topsoil shall be graded such that the final top soiled surface will match the final grades shown on the Design Drawings, or as otherwise directed by the Engineer (i.e., rough-graded surface prior to topsoil application should be lower than final design grade by an amount equal to the final thickness of topsoil to be placed).

1. All debris and inorganic material shall be removed and the subgrade surface loosened for a depth of 2 inches prior to the placing of the topsoil.

2. The topsoil shall not be placed until the subgrade is in suitable condition and shall be free of excessive moisture and frost

3. Minimum topsoil depth shall be 12 inches unless otherwise shown on the Design Drawings.

A. Apply lime and fertilizer as recommended by the soil fertility

test results and work as deeply as possible into soil.

B. Prior to seed application, the topsoil surface shall be tilled to a depth of at least 2 inches by disking, harrowing, or other acceptable means if surface is uneven, glazed, or crusted.

C. After the topsoil surface has been prepared, the seed mixture shall be uniformly applied to the prepared surface by appropriate means at the rate specified in this specification, or as otherwise recommended by the seed supplier for the seed mix being used.

1. Seeding and mulching shall not be performed during windy weather (i.e., wind speeds that prevent uniform application of seed and mulch).

2. The seed shall be incorporated into the uppermost 1/2 inch of soil by appropriate means.

3. Native seeds shall only be seeded October to May. If necessary, sterile annual species can be seeded separately to provide immediate cover.

D. Straw mulch, if used, shall be spread to form a continuous blanket over the seed bed at an application rate of approximately 2 tons/acre. Excessive amounts or bunching of mulch will not be permitted.

1. Mulch shall be anchored by an acceptable method (e.g,. pinning, crimping, tackifier).

2. Unless otherwise specified, mulch shall be left in place and allowed to disintegrate.

E. Seeded areas shall be watered as often as required to obtain germination and to obtain and maintain a satisfactory growth. Watering shall be performed in such a manner as to prevent washing out of seed.

F. If hydroseeding is the selected method of planting, the following shall also apply:

1. Seeding and mulching shall be a one-step process in which seed, fertilizer, hydraulic mulch, and mulch adhesive (tackifier) are applied simultaneously in a homogeneous water slurry via hydraulic seeder/mulcher.

2. Hydraulic Seeder/Mulcher: Apply seed, fertilizer, hydraulic mulch, and temporary cover adhesive using an acceptable hydraulic seeder/mulcher. The hydraulic seeder/mulcher shall be equipped with mechanical agitation equipment capable of mixing the materials into a homogeneous water slurry and maintaining the slurry in a homogeneous state while it is being applied. The discharge pumps and gun nozzles shall be capable of applying the materials uniformly in a spray pattern that neither concentrates the slurry nor erodes the soil.

3. Volume Certification: Hydraulic seeding/mulching equipment shall have the tank volume certified by a plate affixed by the

manufacturer and confirmed by the Engineer's on-site representative by means of measurements or tests prior to the commencement of work. This plate shall be affixed in plain view on the hydraulic seeder/mulcher and shall not be removed or altered. The plate shall certify tank volume only, and shall not imply equipment conformance to other requirements of this Section.

4. Application of Materials: Measure the quantity of each material to be charged into the hydraulic seeder/mulcher tank either by mass or by a system of mass-calibrated volume measurements acceptable to the Engineer. Add the materials to the tank while it is being loaded with water. Thoroughly mix the materials into a homogeneous slurry and distribute uniformly over the designated surface area via the hydraulic seeder/mulcher. Apply seed, fertilizer, and where applicable, hydraulic mulch adhesive within 90 minutes of being charged into the hydraulic seeder/mulcher tank. During loading of the hydraulic seeder/mulcher tank, add materials in the following sequence: seed, then fertilizer, then, where applicable, hydraulic mulch and adhesive.

5. Hydroseeding should be performed in two directions to avoid shadowing and in such a manner that produces 100 percent ground coverage.

6. Blend into existing adjacent grass areas to bond new growth to existing adjacent areas or to previous applications to form uniform surfaces.

7. Seed mixture shall be applied in accordance with the manufacturer's written instructions and Part 2.3 of this Section.

3.2 MAINTENANCE

1. Contractor is responsible for all necessary watering throughout the first year after planting.

2. Contractor is responsible for achieving a minimum of 70 percent vegetative herbaceous cover within first year after planting.

3. Contractor shall repair any areas of erosion and reseed (and re-fertilize, if necessary) any dead or dying areas of vegetation, as necessary, until complete coverage is achieved.

-- End of Section --

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SECTION 32 93 00

EXTERIOR PLANTS

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 within the text by the basic designation only.

AMERICANHORT (AH)

ANSI/ANLA Z60.1	(2004) American Standard for Nursery Stock

ASTM INTERNATIONAL (ASTM)

ASTM A580/A580M	(2016) Standard Specification for Stainless Steel Wire

1.2 RELATED REQUIREMENTS

Section 32 92 19 SEEDING applies to this section for plant establishment requirements, with additions and modifications herein.

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Maintenance Plan

SD-03 Product Data

Weed Control Fabric

Metal Anchors

Time Restrictions And Planting Conditions

Local/Regional Materials

Nursery Certifications

Fertilizer

Mulch

Staking Material

Ground Stakes

Organic Mulch Materials

SD-07 Certificates

State Landscape Contractor's LicenseSD-11 Closeout Submittals

1.3.1 Preconstruction Submittals

Contractor shall submit the following Product Data 30 days prior of utilization

1.3.1.1 Trees and Shrubs Specifications

Species composition of trees and shrubs and source specifications (based on Contract Drawings) shall be submitted for approval prior to planting. Bidder may propose alternatives based on plant availability. Alternatives will be selected in accordance with NJDEP Policy Directive 2004-02 and submitted to Engineer for approval.

1.3.1.2 Wetland Plants

Species composition of herbaceous wetland plants and source specifications (based on Contract Drawings) shall be submitted for approval prior to planting. Bidder may propose alternatives based on plant availability. Alternatives will be selected in accordance with NJDEP Policy Directive 2004-02 and submitted to Engineer for approval.

1.3.1.3 Herbivory Control Plan

Submit drawing and details illustrating proposed deer and/or goose deterrent for protection of trees, shrubs, and potentially herbaceous wetland plantings as determined necessary by contractor to support the 1-year survival guarantee.

1.3.1.4 Maintenance Plan

Submit proposed plan for any required for vegetative maintenance for a period of one year following planting to ensure survival requirements associated with specified trees, shrubs, and wetland plantings.

1.4 QUALITY ASSURANCE

1.4.1 State Landscape Contractor's License

Construction company shall hold a landscape contractors license in the state where the work is performed and have a minimum of five years landscape construction experience. Submit copy of license and three references for similar work completed in the last 5 years.

1.4.2 Pre-Installation Meeting

Convene a pre-installation meeting a minimum of one week prior to commencing work of this section. Require attendance of parties directly affecting work of this section. Review conditions of operations, procedures and coordination with related work. Agenda shall include the following:

a. Tour, inspect, and discuss conditions of planting materials.

b. Review planting schedule and maintenance.

c. Review required inspections.

d. Review environmental procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

1.5.1.1 Branched Plant Delivery

Deliver with branches tied and exposed branches covered with material which allows air circulation. Prevent damage to branches, trunks, root systems, and root balls and desiccation of leaves.

1.5.1.2 Plant Labels

Deliver plants with durable waterproof labels in weather-resistant ink. Provide labels stating the correct botanical and common plant name and variety as applicable and size as specified in the list of required plants. Attach to plants, bundles, and containers of plants. Groups of plants may be labeled by tagging one plant. Labels shall be legible for a minimum of 60 days after delivery to the planting site.

1.5.2 Storage

1.5.2.1 Plant Storage and Protection

Store and protect plants not planted on the day of arrival at the site as follows:

a. Shade and protect plants in outside storage areas from the wind and direct sunlight until planted.

b. Heel-in bare root plants.

c. Protect balled and burlapped plants from freezing or drying out by covering the balls or roots with moist burlap, sawdust, wood chips, shredded bark, peat moss, or other approved material. Provide covering which allows air circulation.

d. Keep plants in a moist condition until planted by watering with a fine mist spray.

e. Do not store plant material directly on concrete or bituminous surfaces.

1.5.2.2 Weed Control Fabric

Store materials on site in enclosures or under protective covering in dry location. Store under cover out of direct sunlight. Do not store materials directly on ground. Plants can be stored on top control fabric.

1.5.3 Handling

Do not drop or dump plants from vehicles. Avoid damaging plants being moved from nursery or storage area to planting site. Handle all nursery grown plants carefully to avoid damaging or breaking the earth ball or root

structure. Do not handle plants by the trunk or stem. Remove damaged plants from the site.

1.5.4 TIME LIMITATION

Except for container-grown plant material, the time limitation from digging to installing plant material shall be a maximum of 90 days. The time limitation between installing the plant material and placing the mulch shall be a maximum of 24 hours.

1.6 TIME RESTRICTIONS AND PLANTING CONDITIONS

Coordinate installation of planting materials during optimal planting seasons for each type of plant material required.

1.6.1 Planting Dates

Plant all plants from April 1 to June 1, or from October 1 to October 15.

1.7 GUARANTEE

All plants shall be guaranteed for one year beginning on the date of inspection by the Contracting Officer to commence the plant establishment period. The Contractor is required to provide maintenance throughout this one year period to address fluctuating weather and precipitation patterns.

Remove and replace dead planting materials immediately unless required to plant in the succeeding planting season. At end of warranty period, replace planting materials that die or have 25 percent or more of their branches that die during the construction operations or the guarantee period.

1.8 SUSTAINABLE DESIGN REQUIREMENTS

1.8.1 Local/Regional Materials

Use plant materials grown in a similar climatic conditions and within a500 mile radius from the project site; if available from a minimum of three sources.

PART 2 PRODUCTS

2.1 PLANTS

2.1.1 Regulations and Varieties

Furnish nursery stock in accordance with ANSI/ANLA Z60.1, except as otherwise specified or indicated. Each plant or group of planting shall have a "key" number indicated on the Nursery Certifications of the plant schedule. Furnish plants grown under climatic conditions similar to those in the locality of the project. Plants of the same specified size shall be of uniform size and character of growth. All plants shall comply with all Federal and State Laws requiring inspection for plant diseases and infestation.

2.1.2 Shape and Condition

Well-branched, well-formed, sound, vigorous, healthy planting stock free from disease, sunscald, windburn, abrasion, and harmful insects or insect

eggs and having a healthy, normal, and undamaged root system.

2.1.2.1 Deciduous Trees and Shrubs

Symmetrically developed and of uniform habit of growth, with straight boles or stems, and free from objectionable disfigurements.

2.1.2.2 Evergreen Trees and Shrubs

Well developed symmetrical tops with typical spread of branches for each particular species or variety.

2.1.3 Plant Size

Plant sizes should be consistent with specifications provided in the Drawings. Minimum sizes measured after pruning and with branches in normal position, shall conform to measurements indicated, based on the average width or height of the plant for the species as specified in ANSI/ANLA Z60.1. Plants larger in size than specified may be provided with approval of the Contracting Officer. When larger plants are provided, increase the ball of earth or spread of roots in accordance with ANSI/ANLA Z60.1.

2.1.4 Root Ball Size

All box-grown, field potted, field boxed, collected, plantation grown, bare root, balled and burlapped, container grown, processed-balled, and in-ground fabric bag-grown root balls shall conform to ANSI/ANLA Z60.1. All wrappings and ties shall be biodegradable. Root growth in container grown plants shall be sufficient to hold earth intact when removed from containers. Root bound plants will not be accepted.

2.1.4.1 Mycorrhizal fungi inoculum

Before shipment, root systems shall contain mycorrhizal fungi inoculum.

2.2 FERTILIZER

Fertilizer for groundcover, wildflowers and grasses is not permitted. Fertilizer for trees, plants, and shrubs shall be as recommended by plant supplier, except synthetic chemical fertilizers are not permitted. Fertilizers containing petrochemical additives or that have been treated with pesticides or herbicides are not permitted.

2.2.1 Granular Fertilizer

Organic, granular controlled release fertilizer containing the following minimum percentages, by weight, of plant food nutrients:

14 percent available nitrogen
14 percent available phosphorus
14 percent available potassium

2.2.2 Fertilizer Tablets

Organic, plant tablets composed of tightly compressed fertilizer chips forming a tablet that is insoluble in water, is designed to provide a continuous release of nutrients for at least 24 months and contains the

following minimum percentages, by weight, of plant food nutrients:

20 percent available nitrogen
10 percent available phosphorus
5 percent available potassium

2.3 WEED CONTROL FABRIC

2.3.1 Roll Type Polypropylene or Polyester Mats

Fabric shall be woven, needle punched or non-woven and treated for protection against deterioration due to ultraviolet radiation. Fabric shall be minimum 99 percent opaque to prevent photosynthesis and seed germination from occurring, yet allowing air, water and nutrients to pass thru to the roots. Minimum weight shall be 5 ounces per square yard with a minimum thickness of 20 mils with a 20-year (minimum) guarantee.

2.4 MULCH

Free from noxious weeds, mold, pesticides, or other deleterious materials.

2.4.1 Organic Mulch Materials

Biobased content shall be a minimum of 100 percent. Wood cellulose fiber shall be processed to contain no growth or germination-inhibiting factors, dyed with non-toxic, biodegradable dye to an appropriate color to facilitate visual metering of materials application. Paper-based hydraulic mulch shall contain a minimum of 100 percent post-consumer recycled content. Wood-based hydraulic mulch shall contain a minimum of 100 percent recycled material.

2.4.2 Recycled Organic Mulch

Recycled mulch may include compost, tree trimmings, or pine needles with a gradation that passes through a 2-1/2 by 2-1/2-inch screen. It shall be cleaned of all sticks a minimum 1 inch in diameter and plastic materials a minimum 3 inches length. The material shall be treated to retard the growth of mold and fungi.

2.5 STAKING AND GUYING MATERIAL

2.5.1 Staking Material

2.5.1.1 Tree Support Stakes

Rough sawn hard wood free of knots, rot, cross grain, bark, long slivers, or other defects that impair strength. Stakes shall be minimum 2 inches square or 2 1/2 inch diameter by 8 feet long, pointed at one end. .

2.5.1.2 Ground Stakes

100 percent post-consumer recycled content plastic, 2 inches square are by 3 feet long, pointed at one end.

2.5.2 Guying Material

2.5.2.1 Guying Wire

12 gauge annealed galvanized steel, ASTM A580/A580M.

2.5.2.2 Guying Cable

Minimum five-strand, 3/16 inch-diameter galvanized steel cable.

2.5.3 Hose Chafing Guards

New or used 2 ply 3/4 inch diameter reinforced rubber or plastic hose, black or dark green, all of same color.

2.5.4 Turnbuckles

Galvanized or cadmium-plated steel with minimum 3 inch long openings fitted with screw eyes. Eye bolts shall be galvanized or cadmium-plated steel with one inch diameter eyes and screw length 1 1/2 inches, minimum.

2.5.5 Deadmen

4 by 8 inch rectangular or 8-inch diameter by36 inch long, wood material.

2.5.6 Metal Anchors

2.5.6.1 Driven Anchors

Malleable iron, arrow shaped, galvanized, sized as follows:

Tree Caliper	Anchor Size
2 inches and under	3 inches
3 to 6 inches	4 inches
6 to 8 inches	6 inches
8 to 10 inches	8 inches
10 to 12 inches	10 inches

2.5.6.2 Screw Anchors

Steel, screw type with welded-on 3 inch round helical steel plate, minimum 3/8 inch diameter, 15 inches long.

2.6 SOURCE QUALITY CONTROL

The Contracting Officer or Landscape Architect of Record will inspect plant materials at the site and approve them. Tag plant materials for size and quality.

PART 3 EXECUTION

3.1 EXTENT OF WORK

Provide soil preparation, fertilizing, tree, shrub, planting, installation and a mulch topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations. Additional procedures and materials not specified on the Contract Drawings associated

with NJDEP-approved Mitigation Plan will be provided prior to start of work, if applicable.

3.2 PREPARATION

3.2.1 Layout

Stake out approved plant material locations on the project site before digging plant pits or beds. The Contracting Officer reserves the right to adjust plant material locations to meet field conditions.

3.3 PLANT BED PREPARATION

Verify location of underground utilities prior to excavation. Protect existing adjacent turf before excavations are made. Do not disturb topsoil and vegetation in areas outside those indicated on Drawings. Measure depth of plant pits from finished grade. Depth of plant pit excavation shall be as indicated and provide proper relation between top of root ball and finished grade. Install plant material as specified in paragraph entitled "Plant Installation."

3.4 PLANT INSTALLATION

All planting will be performed under oversight from Ecologist or Engineer familiar with approved restoration design. The Contracting Officer reserves the right to adjust plant material locations to meet field conditions.

3.4.1 Individual Plant Pit Excavation

Excavate pits at least twice as large in diameter as the size of ball or container to depth shown.

3.4.2 Handling and Setting

Move plant materials only by supporting the root ball or container. Set plants on hand compacted layer of prepared backfill soil mixture 6 inches thick and hold plumb in the center of the pit until soil has been tamped firmly around root ball. Set plant materials to elevation equal to surrounding finish grade. Replace plant material whose root balls are cracked or damaged either before or during the planting process.

3.4.2.1 Bare-Root Stock

Plant so roots are arranged in a natural position. Place roots in water a minimum of 30 minutes prior to planting. Carefully work prepared soil mixture among roots. Tamp remainder of backfill and water.

3.4.3 Fertilization

3.4.3.1 Fertilizer Tablets

Place fertilizer planting tablets evenly spaced around the plant pits to the manufacturer's recommended depth.

3.4.3.2 Granular Fertilizer

Apply granular fertilizer as a top coat prior to placing mulch layer and water thoroughly.

3.4.4 Watering

Start watering areas planted as required by temperature and wind conditions. Apply water at a rate sufficient to ensure thorough wetting of soil to a depth of 12 inches.

3.4.5 Staking and Guying

3.4.5.1 Staking

Stabilize trees over 48 inches in height using stakes, and trees over 60 inches in height using stakes and guy wires as detailed herein. Stake plants with the number of stakes indicated in the Drawings. Complete with double strand of 12 gage guy wire as detailed. Attach guy wire half the tree height but not more than 5 feet high. Drive stakes to a depth of 2 1/2 to 3 feet into the ground outside the plant pit. Do not injure the root ball. Use hose chafer guards where guy wire comes in contact with tree trunk.

3.4.5.2 Guying

Guy plants as indicated. Attach two strands of guying wire around the tree trunk at an angle of 45 degrees at approximately 1/2 of the trunk height. Protect tree trunks with chafing guards where guying wire contacts the tree trunk. Anchor guys to deadmen wood blocks, wood ground stakes, malleable iron anchors, or steel screw anchors.

3.4.5.3 Chafing Guards

Use hose chafing guards, as specified where guy wire will contact the plant.

3.4.5.4 Deadmen

Place deadmen minimum 18 inches below ground surface. Place equal distance from tree trunk and around the plant pit.

3.4.5.5 Wood Ground Stakes

Drive wood ground stakes into firm ground outside of plant pit with top of stake flush with ground. Place equal distance from tree trunk and around the plant pit.

3.4.5.6 Iron Anchors

Drive malleable iron anchors into firm ground outside of plant pit a minimum 30 inches below finish grade. Place equal distance from tree trunk and around the plant pit.

3.4.5.7 Steel Screw Anchors

Insert steel screw anchors as recommended in manufacturer's data. Place equal distance from tree trunk and around the plant pit.

3.5 RESTORATION AND CLEAN UP

3.5.1 Restoration

Disturbances will be repaired upon completion of the restoration planting.

Restoration of temporary disturbances will include regrading to maintain proper drainage and as-built surface elevations and seeding to promote establishment of native vegetation.

3.5.2 Clean Up

Excess and waste material shall be removed from the installed area and shall be disposed offsite at an approved landfill, recycling center, or composting center. Adjacent paved areas shall be cleared.

3.6 MAINTENANCE

The Contractor is responsible for installing herbivory deterrent fencing or other passive devices suitable for preventing or minimizing herbivory over the restoration area. The one year guarantee includes mortality due to herbivory. A proposed herbivory plan is required (see Submittal subsection above).

The Contractor is responsible for maintaining the planted and restored vegetation through the end of the first growing season. A proposed water schedule, including specification of a potable water source suitable for vegetation maintenance and details regarding any other planned maintenance, is required (see Submittal subsection above).

Following the conclusion of the first growing season, the Contractor is required to prepare a site survey and report documenting achievement of plant survival goals. For trees and shrubs, 100 percent of planted materials must survive to consider the project successfully complete. For wetland plants, 95 percent of planted materials must survive to consider the project successfully complete. The report must include a survey plan identifying the location and makeup of plant clusters.

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Phase 1 - Capacitor Debris Area

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
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Cornell – Dubilier Electronics Superfund Site
Operable Unit 4:

Phase 2 - Water Line Replacement

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SECTION 02 32 00.99

TEST PIT EXCAVATION
05/10

PART 1 GENERAL

1.1 SUMMARY

This section outlines procedures for excavation of 2 test pits for the purpose of obtaining and verifying information on the existing 36-inch water line for use in confirming requirements for the connection of the new water line to the existing pipeline. Additional test pitting will be performed at the connection points for the 8-inch water line.

One test pit shall be located at each tie-in point as shown on the Contract Drawings. For the 36-inch water line, Test Pit #1 will be located near the intersection of Hamilton Boulevard and New Market Avenue on the former CDE facility property. Test Pit #2 will be located between Bound Brook and the former CDE facility property. For the 8-inch water line, test pits will be located in the connection points and other relevant points as necessary. Actual locations will be established in the field prior to the work in conjunction with New Jersey American Water (NJAW), the pipeline owner, and the Contracting Officer.

The Contractor shall provide all necessary labor, associated materials and equipment, and other facilities and incidentals to excavate the test pits. The test pits shall be excavated in general accordance with the requirements of the USACE, State of New Jersey, Middlesex County, NJAW requirements and this Specification.

1.2 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D2488	(2017) Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

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

29 CFR 1926.651	Specific Excavation Requirements
29 CFR 1926.652	Safety and Health Regulations for Construction; Subpart P, Excavations; Requirements for Protective Systems

1.3 SYSTEM DESCRIPTION

Provide a laterally extensive review of pipeline conditions, including but not limited to information on the type of pipe and pipe bedding material; construction details; soil conditions; length of pipeline segments; potential obstructions; and other information necessary for bypass installation and the connection of the new water line to the existing pipeline. The primary objective is to identify the location and depth of the water line and to verify the condition of the pipe. Field measurement of pipe diameter and length of pipe segments will be used in the design of the connections at each end of the pipeline as well as the installation of hot taps, linestops and temporary bypass connections. Work shall be performed to the satisfaction of the Contracting Officer and NJAW. NJAW will have a representative on-site during the performance of the work to make their own observations and data recollection.

1.3.1 Test Pit Excavation

A test pit is any excavation in soil, hardpan, decomposed rock, or other unconsolidated or partially consolidated overburden materials which has an open cross-sectional area large enough to permit efficient excavation and shoring/lining, engineering and geological inspection and photographing of the subsurface soils and manual undisturbed sampling from within the test pit. All test pits shall be excavated, dewatered (if necessary), shored/lined and protected from surface water drainage in accordance with all applicable Federal, State, local, Corps of Engineers, and OSHA safety regulations.

1.3.2 Coordination of Work

Timing and location of work will be coordinated with NJAW and the Contracting Officer.

1.3.3 Timeframe

Unless approved by the Contracting Officer in writing prior to excavation, test pit excavation, once started, shall be completed with all backfill appropriately placed, within an approximate 8 hour period; no test pit trenches shall be left open overnight.

1.4 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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Test Pit Excavation Plan; G

Shoring And Sheeting Plan; G

Lift Plan; G

SD-03 Product Data

Permits, Certifications, and Licenses; G

SD-11 Closeout Submittals

Test Pit Logs

1.5 TEST PIT EXCAVATION AND IDW MANAGEMENT

1.5.1 Test Pit Excavation Plan

Contractor shall prepare and submit a plan describing the excavation methods, equipment, and sampling procedures, 30 calendar days prior to beginning excavation operations. The plan will be approved by NJAW, the Contracting Officer and shall be signed by an engineer. The plan shall include, but not be limited to, discussion of the following:

1. Description of test pit excavation methods. Test pits shall be in the form of "trenches," are defined as narrow excavations (in relation to length), approximately 15 to 20 feet long, 10 to 15 feet wide, and 5 to 15 feet deep (actual depth will vary with location and depth of pipe). The test pit shall be excavated to expose the existing water line to the approximate spring line. In addition, the full depth of the pipe in selected locations shall be excavated by hand to allow the diameter of the pipe to be measured. Disturbances to the pipe bedding will be minimized to reduce the potential to induce settlement or damage the pipe.

2. Description of the excavation equipment. A wheel or track-mounted excavator or backhoe as necessary to dig the test pits given site conditions. The equipment shall come with a minimum 2-foot wide bucket and arm capable of excavation to a depth up to 15 feet below the ground surface (bgs). Hand excavation may be required at or near the pipe to avoid potential damage from the excavator. In the event that track mounted equipment will be used, Contractor shall include provisions for the protection of the asphalt cap on the former CDE facility property as necessary.

4. Description and location of trench box or shoring procedures. Personnel shall enter the excavation to make measurements and observations so protective measures shall be provided. In accordance with EM 385-1-1, the trench will be considered a permitted confined space for health and safety purposes. As appropriate, a shoring and sheeting plan and a lift plan for transfer of trench box from transport truck to trench shall be provided.

5. Description of necessary personal protective equipment and monitoring requirements. See Paragraph 1.6.

6. Description of trench entrance and exit procedures/fall protection.

7. Description of procedures to prevent the spread of contaminants. Describe decontamination procedures for excavation equipment, control of soil during and after excavation, and site cleanup. These procedures shall be based on the timing of other work being conducted at the site at the time of the excavation.

8. Description of dewatering operations. Groundwater is anticipated to be encountered in Test Pit #2 and potentially at other locations.

Coordinate with dewatering operations for Phase 1 remediation work. If groundwater is encountered in the excavation, the Contractor shall install a sump and dewatering pump. All extracted groundwater shall be containerized for on-site characterization and treatment. The excavation needs to be dewatered to 2-ft below the proposed subgrade to assure a stable excavation.

9. Description of equipment and methods used to place excavated material back into the test pit and to restore conditions at the site.

10. List of personnel assignments for this project, and personnel qualifications.

11. Sample of forms used for written test pit logs and method used to geologically classify soil material.

12. Description of site access control procedures.

1.6 HEALTH AND SAFETY

Work shall be performed in accordance with Section 01 35 29.13 and EM 385-1-1. The following safety protocols shall be employed when excavating the test pits:

1. Air Monitoring: Air monitoring shall be conducted in the excavation using a multi-gas meter prior to any personnel entering the trench.

2. Test pit location: The Contractor shall visually inspect the area surrounding the test pits. In no instance shall the test pits be located such that workers could slip or fall into the trench due to sloping terrain. Prior to excavation, the site safety health officer will locate the proposed test pit and assess the terrain and site conditions. As necessary, the site safety health officer will shift test pit locations or stockpile locations into areas with less hazardous terrain. Shifted locations will be approved by the Contracting Officer and NJAW. All excavated materials shall be placed on downslope and in a location where it could not slough in to the trench.

1.7 QUALIFICATIONS

1.7.1 Competent Person(s)

Contractor shall provide a competent person(s) trained in the following areas as defined in 29 CFR 1926.651 and 29 CFR 1926.652 to supervise the test pit excavation activities:

1. Excavation and Trenching

This person shall be capable of identifying actual and predictable hazards in the excavation as well as the surrounding area for work conditions that are hazardous to workers. The competent person shall also be familiar with the different types of soil and other material likely to be encountered during excavation and therefore could identify potential hazard of the trench sidewall collapse. Following excavation and during material screening, the competent person shall periodically monitor side slope conditions for stability (i.e., sloughing of materials, surface cracking).

2. Shoring

This person shall be capable of selecting/designing an appropriate protective system in accordance with 29 CFR 1926.652, Appendices C and D, or with manufacturers' data for shoring and shielding systems. Examples of protective systems include trench shield, trench box, sloping or benching, and shoring. The competent person shall also be familiar with providing support systems such as shoring, bracing or underpinning to ensure stability of adjoining structures (i.e., buildings, walls) endangered by excavation activities. The shoring and/or other protective systems shall be checked/measured each day to detect movement and possible failures.

3. Lift/Rigger

This person shall be experienced in rigging and lifting of heavy equipment. The competent person shall inspect all rigging prior to each lift and remove any damaged rigging hardware.

4. Fall Protection

This person shall be experienced in fall protection and capable of establishing a safe work zone, ingress and egress and rescue plans. Particular consideration shall be given to potential hazards when excavating below 4 feet (or 122 cm).

5. Confined Spaces

This person shall be trained in permit-required confined space entry, including entrapment in trench and air quality. The competent person shall be responsible for evaluating the work site and identifying confined spaces, including permit spaces. A permit specifying what safety measures must be taken and who is allowed to enter the confined space shall be written by the competent person prior to the start of work.

1.7.2 Authority

The competent person(s) shall have the authority to stop work until hazards are eliminated (refer to the APP/SSHP).

1.8 QUALITY ASSURANCE

Comply with all Federal, State and local laws, regulations and ordinances relating to the performance of this work. Procure all required permits, certifications and licenses required by Federal, State, and local law for the execution of this work. Submit copies of all permits, certifications, and licenses prior to starting work. This submittal shall also include a statement of the prior experience, in the type of work described in these specifications, of the person or persons designated to perform the work specified herein.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 TEST PIT EXCAVATION

All work shall be performed in accordance with approved Test Pit Excavation Plan.

3.1.1 Access

Provide access to the locations as necessary for the prosecution of the work. Since no separate payment shall be made for access construction, include all costs associated with this in the cost of excavating.

3.1.2 Field Measurements

The approximate locations of test pits for the 36-inch water line are shown on the Contract Documents. The actual locations for all test pits shall be established in the field by the Contracting Officer and a representative of NJAW. During the excavation, NJAW shall be present to document identified field conditions of the existing water line. The Contracting Officer shall provide assistance to NJAW as requested.

3.1.3 Environmental Protection

At Test Pit #2, the contractor shall install silt fencing, straw bales or other erosion/sediment controls in accordance with the site erosion control permit and as necessary to protect the Brook or wetlands prior to the start of work.

3.1.4 Restoration

After excavation is complete, the surface conditions shall be restored to pre-excavation conditions.

1. Temporary capping shall be placed at Test Pit #1 in accordance with Section 32 12 16.99.

2. Bare soil at Test Pit #2 shall be mulched to control erosion until vegetation is reestablished.

3. Temporary paving or steel plates shall be placed at test pit locations for the 8-inch water line.

3.2 BACKFILLING

Coordinate backfill operations with other ongoing work at the site. If the area will be excavated or other work performed in the area, backfilling may be delayed with the approval of the Contracting Officer.

For the 36-inch water line, clean material, in accordance with Section 31 23 00.99 Trenching and Backfill, shall be used for backfilling of Test Pit #1 and Test Pit #2. Backfill all test pits for the 8-inch water with the excavated material.

If a depression is observed in test pit location, discuss the need for fill with the Contracting Officer prior to filling.

3.3 RECORDS

Submit complete, legible copies of Test pit logs and other records to the Contracting Officer upon completion of the work or at such other time or times as directed. All such records shall be recorded during the actual performance of the work and shall be preserved in good condition and order until they are delivered and accepted. The Contracting Officer has the right to examine and review all such records at any time prior to their delivery and has the right to request changes to the record keeping procedure. The following information shall be included on the logs or in the records for each test pit:

a. Test Pit number or designation and elevation of top of test pit.

b. Excavator's name and field technician.

c. Make, size, and manufacturer's model designation of test-pit excavating equipment.

d. Type of excavation operation by depth.

e. Dates and time by depths when test pit excavation operations were performed.

f. Classification or description by depths of the materials excavated using the Unified Soil Classification System (ASTM D2487), including a description of moisture conditions, consistency and other appropriate descriptive information of ASTM D2488. This classification or description shall be made immediately after the soil is removed.

g. Depth at which groundwater is encountered initially and when stabilized.

h. Depth of bottom of test pit and rock elevation, if encountered.

i. Pipeline dimensions, including diameter, circumference, and length of exposed segment.

j. Pipeline materials and overall condition assessment.

k. Pipe invert elevation at location where entire pipe circumference is exposed, and the estimate depth to top of pipe at that location based on existing grade before test pit excavation.

l. Depth of groundwater, if encountered; volume of water removed through dewatering operations; documentation of procedures used to handle groundwater encountered.

-- End of Section --

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SECTION 02 81 00.99

HANDLING, TRANSPORT AND DISPOSAL OF WASTE MATERIALS
02/10

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The soil and groundwater in the Phase 1 Remediation Area Sta. 14+58 to Sta. 25+06 of the 36-inch water line)and the Clean Corridor Area (Sta. 0+00 to Sta. 81+00 of the 36-inch water line), as indicated on the Contract Drawings, are contaminated with polychlorinated biphenyls (PCBs) and chlorinated volatile organic compounds. Soils and groundwater in the public right-of-way are assumed to be non-hazardous.

B. Prior to construction of the pipeline, contaminated soil in the Remediation Area will be remediated to either top of bedrock or the remedial cut line (whichever is lower) as indicated on the Contract Drawings. However, it is possible that excavation may encounter unremediated soil particularly if excavation extends beyond the envelope identified in the Contract Documents. Soils in the Clean Corridor Area will be remediated as part of the water line replacement work.

C. Furnish all labor, materials, equipment, and incidentals necessary for the handling, storage, and off-site transport and disposal of waste materials generated during construction.

D. Waste materials refer to any and all materials including, but not limited to, excavated soils determined not to be suitable for backfilling, rock, construction debris, and other materials. The Contractor's plans, which shall be based on the requirements of this section, shall provide the detailed methods for managing waste generated during the Project.

E. All waste (including excess soil assumed to be non-hazardous) is to be characterized as defined in 40 CFR 261 prior to off-site disposal of the soil and debris. Sample requirements and methodology for waste characterization shall be in accordance with Section 01 35 45 CHEMICAL DATA QUALITY CONTROL, the Contractor's approved UFP-QAPP, as required by the off-site disposal facilities, and all Federal, State, and local requirements.

F. Ensure all operations for handling, storage, loading and hauling of wastes are in compliance with all Federal, State, and local requirements.

1.2 REFERENCES

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

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

IATA DGR (2013) Dangerous Goods Regulations

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

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 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 272	Approved State Hazardous Waste Management Programs
40 CFR 273	Standards For Universal Waste Management
40 CFR 279	Standards for the Management of Used Oil
40 CFR 280	Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 300.440	Procedures for Planning and Implementing Off-Site Response Actions
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response

	Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings

NEW JERSEY ADMINISTRATIVE CODE (NJAC)

NJAC 7:26	Solid and Hazardous Waste Management Regulations

U.S. Code (USC)

10 USC 2692	Storage, Treatment, and Disposal of Nondefense Toxic and Hazardous Materials
33 USC 2701	Oil Pollution Act

1.3 DEFINITIONS

1.3.1 Hazardous Material

A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated pursuant to the Hazardous Materials Transportation Act, 49 U.S.C. Appendix Section 1801 et seq. The term includes materials designated as hazardous materials under the provisions of 49 CFR 172, Sections .101 and .102 and materials which meet the defining criteria for hazard classes and divisions in 49 CFR 173. EPA designated hazardous wastes are also hazardous materials.

1.3.2 Hazardous Waste

A waste which meets criteria established in RCRA or specified by the EPA in 40 CFR 261 or which has been designated as hazardous by a RCRA authorized state program.

1.3.3 PCBs

As defined in 40 CFR 761. PCBs means any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contain such substance.

1.3.4 PCB Contaminated Soil and Debris

All soils and associated buried debris removed during excavation of the Clean Corridor (Sta. 0+00 to Sta. 0+81 of the 36-inch water line) are assumed to be contaminated with PCBs at concentrations ranging from non detect to 499 mg/kg. All soils excavated in the Remediation Area (Sta. 14+58 to Sta. 25+06 of the 36-inch water line) are potentially contaminated with PCBs at unknown concentrations. Soil and debris excavated in these areas will be handled in accordance with Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS and this Section.

All other soils removed during excavation for the pipelines shall be considered non-hazardous and suitable for reuse as backfill for construction activities if the material meets chemical and physical requirements. Bedrock and debris will be segregated from the soil prior to its reuse.

1.4 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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Waste Management Plan; G

SD-06 Test Reports

Recordkeeping; G

SD-07 Certificates

Transporter Certification

Designated Transportation and Disposal Coordinator; G

Training Certificates

Waste Minimization Certification

Vehicle Decontamination Verification

SD-11 Closeout Submittals

Closeout Submittals

Certificates of Disposal

1.5 QUALITY ASSURANCE

1.5.1 Designated Transportation and Disposal Coordinator

Designate, by position and title, one person to act as the Transportation and Disposal Coordinator (TDC) for this Contract. The TDC shall serve as the single point of contact for all environmental regulatory matters and shall have overall responsibility for total environmental compliance at the site including, but not limited to, accurate identification and classification of hazardous waste and hazardous materials; determination of proper shipping names; identification of marking, labeling, packaging and placarding requirements; completion of waste profiles, hazardous waste manifests, TSCA manifests, bill of ladings, exception and discrepancy reports; and all other environmental documentation. The TDC shall have, at a minimum, one year of specialized experience in the management and transportation of hazardous waste and have been Department of Transportation certified under 49 CFR 172, Subpart H.

1.5.2 Training Certificates

The Contractor's hazardous materials employees shall be trained, tested, and certified to safely and effectively carry out their assigned duties in accordance with Section 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES. The Contractor's employees transporting

hazardous materials or preparing hazardous/TSCA materials for transportation, including samples, shall be trained, tested, and certified in accordance with 49 CFR 172, Subpart H, including security awareness and any applicable security plans. Where shipment of hazardous materials by air may be occurring, such as for sample shipments, the Contractor's hazardous material employees shall also be trained on IATA DGR. Contractor employees making determinations that shipments do not constitute DOT regulated hazardous materials shall also be trained, tested, and certified in accordance with 49 CFR 172, Subpart H.

1.5.3 Transporter Certification

The Contractor and/or subcontractors transporting hazardous materials shall possess a current certificate of registration issued by the Research and Special Programs Administration (RSPA), U.S. Department of Transportation, when required by 49 CFR 107, Subpart G. Submit copies of the certificates or written statements certifying exemption from these requirements.

1.5.4 Waste Management Plan

A. At a minimum, the Waste Management Plan shall include the following:

1. Procedures to be employed to ensure a written waste determination is made for appropriate wastes which are to be generated.

2. Procedures for collecting representative samples and required analysis.

3. List of notifications and permit applications to be made.

4. Methods of hazardous and non-hazardous waste accumulation/storage (i.e., stockpiles, tanks and/or containers).

5. Management procedures for storage, labeling, and packaging of waste.

6. Management procedures for transporting waste including transportation requirements, transport vehicles, potential hazards during hauling operations, and procedures for mitigation of hazards.

7. Management procedures for disposal of waste including requirements by the permitted waste facilities.

8. Management procedures for proper documentation of waste disposal including documentation that disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268).

9. Used oil management procedures in accordance with 40 CFR 279.

10. Pollution prevention and hazardous waste minimization procedures.

11. Procedures to be employed to ensure all required employee training records are maintained.

12. Procedures to verify compliance with CERCLA Off-Site Rule (40 CFR 300.440) reviews and approvals.

13. Provide inventory log for waste stored onsite.

14. Provide the locations where various types of waste will be disposed or recycled. Include letters of acceptance or as applicable, submit one copy of a State and local Solid Waste Management Permit or license showing such agency's approval of the disposal plan before transporting wastes off Government property.

15. Provide documentation that all operators and vehicles used to transport contaminated material meet all federal, state, and local regulations for the transport of waste to the disposal facility.

16. Describe methods, techniques, and phases of dealing with the PCB-contaminated soil, including: a sequence of operations, the method of excavation, hauling, and handling of the contaminated materials, and the proposed equipment. Coordinate work with other activities being conducted at the site. Ensure that work operations or processes involving PCB-contaminated materials are conducted in accordance with 40 CFR 761 and the applicable requirements of this section.

1.5.5 Vehicle Decontamination Verification

Provide documentation verifying that vehicles and containers in contact with contaminated soils were decontaminated prior to leaving the disposal site, were properly operating, and were covered, within 24 hours after removal of waste from the site.

1.5.6 Closeout Submittals

Include in Closeout Submittals prepared under Section 01 78 00, CLOSEOUT SUBMITTALS, the following items: all testing results including readings and locations, a diagram of the limits of the excavated area with sample locations indicated (indicate reference benchmark used), chain of custody forms, certificates of disposal, truck manifests, and description of the work completed.

1.5.7 Laws and Regulations Requirements

Work shall meet or exceed the minimum requirements established by Federal, state, and local laws and regulations which are applicable. These requirements are amended frequently and compliance with amendments is required as they become effective. In the event that compliance exceeds the scope of work or conflicts with specific requirements of the Contract, notify the Contracting Officer immediately.

PART 2 PRODUCTS

2.1 MATERIALS

Provide all the materials required for the packaging, labeling, marking, placarding and transportation of hazardous wastes and hazardous materials in conformance with Department of Transportation and State of New Jersey standards. Details in this specification shall not be construed as establishing the limits of the Contractor's responsibility.

2.1.1 Shipping Containers

1. Shipping containers shall be suitable to receive and contain the waste

until the waste is disposed of at the approved facility.

2. Inspect the condition of all containers upon arrival at the site. Containers that are deteriorating or leaking must not be used.

3. Drums shall be UN/DOT approved and in accordance with NJAC 7:26-7.2(b), 9.3 and 9A. 2.2 LABELING.

4. Containers to be marked and labeled in accordance with federal, state, and locate requirements. Labels to be durable, weather resistant, and capable of withstanding, without deterioration or substantial color change, a 180-day exposure to conditions reasonably expected to be encountered during container storage and transportation.

2.1.2 Placards

Provide primary and subsidiary placards, both quantity and type, as required by federal, state and local requirement for each off-site shipment of material/waste.

2.2 EQUIPMENT AND TOOLS

Provide miscellaneous equipment and tools necessary to handle hazardous, non-hazardous, and TSCA wastes in a safe and environmentally sound manner.

PART 3 EXECUTION

3.1 ON-SITE HAZARDOUS WASTE MANAGEMENT

These paragraphs apply to Government-owned waste originating at the Site only. Contractors are prohibited by 10 USC 2692 from storing Contractor-owned waste onsite for any length of time. The Contractor is responsible for ensuring compliance with all Federal, state, and local hazardous waste laws and regulations and shall verify those requirements when preparing reports, waste shipment records, hazardous waste manifests, or other documents. Identify hazardous wastes using criteria set forth in 40 CFR 261 or all applicable state and local laws, regulations, and ordinances. When accumulating hazardous waste onsite, comply with generator requirements in 40 CFR 262 and any applicable state or local law or regulations. Onsite accumulation times shall be restricted to applicable time frames referenced in 40 CFR 262, or as approved by Contracting Officer. Accumulation start dates shall commence when waste is first generated (i.e., containerized or otherwise collected for discard). Only use containers in good condition and compatible with the waste to be stored. Ensure containers are closed except when adding or removing waste, and immediately mark all hazardous waste containers with the words "hazardous waste" and other information required by 40 CFR 262, Section .32 and any applicable state or local law or regulation as soon as the waste is containerized. An additional marking shall be placed on containers of "unknowns" designating the date sampled, and the suspected hazard. Inspect containers for signs of deterioration and for responding to any spills or leaks. Inspect all hazardous waste areas weekly and provide written documentation of the inspection. Include date and time of inspection, name of individual conducting the inspection, problems noted, and corrective actions taken on the inspection logs.

3.2 CONTROL AND MANAGEMENT OF WASTE

1. Pick up general site refuse and place in covered containers which are regularly emptied. Recycling is encouraged.

2. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the site clean.

3. Provide all field screening and sampling and analytical services necessary to characterize the waste in accordance with the disposal facility requirements, all applicable federal, state, and local requirements, and the approved UFP-QAPP.

4. Cover all transport vehicles containing waste with tarps before leaving the site.

5. Remove all solid waste (including non-hazardous debris) from Government property and dispose off-site at an approved landfill. Solid waste disposal off-site must comply with most stringent local, State, and Federal requirements.

6. Coordinate the schedule for vehicle arrival and material deliveries at the site to meet the approved project schedule.

7. Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated by environmental law.

8. Maintain spill cleanup equipment and materials at the work site and clean up all hazardous and non-hazardous waste spills in accordance with the approved Accident Prevention Plan.

9. Excavated material from trenching in the Clean Corridor and Phase 1 Remediation Area shall be assumed to be PCB-contaminated unless shown otherwise through characterization.

10. The Contractor shall stockpile all excavated soils in a controlled manner in accordance with Paragraph 3.5.4 of Section 31 23 00.99 TRENCHING AND BACKFILL and the Contract Drawings.

11. Excess excavated non-hazardous material from the ROW that cannot be used for backfill, either in the ROW or in the Phase 1 Remediation Area, shall be characterized for off-site disposal.

12. Liquid waste will be generated as part of dewatering activities. Water shall be containerized and characterized for subsequent discharge in conjunction with Phase 1 activities.

3.3 WASTE DISPOSAL

1. No hazardous, toxic, or universal waste, PCB-contaminated soil or debris, or non-hazardous material shall be disposed or abandoned on Government property. Unless otherwise noted in this Contract, the Government is not responsible for disposal of Contractor generated waste material. The disposal of incidental materials used to accomplish the work including, but not limited to aerosol cans, waste paint, cleaning solvents, contaminated brushes, rags, clothing, etc. are the responsibility of the Contractor.

2. The Contractor is not authorized to discharge any materials to sanitary sewer, storm drain, or water way or conduct waste treatment or disposal on Government property without appropriate permits and the written approval of the Contracting Officer.

3. Control of stored waste, packaging, sampling, analysis, and disposal will be determined by the details in the Contract. The requirements for jobs in the following paragraphs will be used as the guidelines for disposal of any hazardous waste generated.

   a. Provide all service necessary for the final treatment/disposal of the hazardous material/waste in accordance with all local, State and Federal laws and regulations, and the terms and conditions of the Contract within 60 days after the materials have been generated. These services will include all necessary personnel, labor, transportation, packaging, and detailed analysis for disposal, including manifesting or completing waste profile sheets, equipment, and the compilation of all documentation.

   b. Contain all waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, 40 CFR 270, 40 CFR 272, 40 CFR 273, 40 CFR 279, 40 CFR 280, and 40 CFR 761.

   c. Obtain representative sample(s) of the material generated for each job done to provide waste stream characterization. The number of samples required shall comply with the requirements of the disposal facility.

   d. Analyze each sample taken and providing analytical results to the Government in accordance with Section 01 35 45 CHEMICAL DATA QUALITY CONTROL and UFP-QAPP.

   e. Determine the DOT proper shipping names for all waste (each container requiring disposal) and demonstrate how this determination is developed and supported by the sampling and analysis requirements contained herein to the Contracting Officer.

3.4 WASTE LOADING AND VEHICLE INSPECTION

1. Provide equipment that is appropriate to accomplish the work and its use is in compliance with Occupational Safety and Health Administration (OSHA) requirements. Take all necessary precautions for the safe operation of the equipment and the protection of the public from injury and damage from the equipment.

2. Inspect vehicles at the site prior to loading to ensure that the vehicles have no fluid leaks, no unusually noisy mufflers or tailpipes, tires that are in good condition, and have operational brakes, horn, steering, operating controls, and safety devices. Vehicle beds used for hauling shall be free from drain holes, cracks, or other conditions that might permit waste material to leak from the vehicle beds.

3. If the vehicle used for hauling has tailgates for dumping, the Contractor shall demonstrate to the Contracting Officer that the tailgates can be sealed watertight during operation. Any vehicle bed not providing an adequate leak-proof seal shall be repaired or replaced as required. Bed liners may be used with approval of Contracting

Officer.

4. Tarpaulin covers shall be placed over all vehicle beds during waste transport to the disposal facility. Covers shall be placed over trucks, trailers or other conveyances used for bulk shipment to avoid spillage of the waste material and entrance of rain or snow during transport. The covers shall completely enclose the bulk shipment with no open areas along the sides or openings on the top. Cover systems shall meet the criteria for a closed transport vehicle as specified in 49 CFR 173.403(c). Failure of the shipping container, liner, seals, hatches, doors, or tarpaulin system to meet the above requirements which causes material to be rejected by disposal facility shall be addressed at the Contractor's expense.

5. The Contractor shall coordinate recording quantities of waste leaving the site with the Contracting Officer.

6. Vehicles/containers, either empty or loaded, shall not remain at the site, unless specific arrangements are made otherwise. Immediately after loading, they shall be sealed, weighed, and transported directly to the disposal facility.

3.5 TRANSPORTATION

1. Meet all existing Federal, State, and local regulations for vehicle operations in transporting the waste on public roads and highways. Haul routes shall be maintained in a clean condition so that no dirt or contamination is tracked onto clean areas or public roads and highways.

2. Responsible for any and all actions necessary to remedy situations involving material spilled in transit on- or off-site or mud and dust tracked off-site. This cleanup shall be accomplished at the Contractor's expense.

3. Transportation routes to and from project areas shall be in accordance with the approved Waste Management Plan. No deviation from transportation routes shall be allowed without prior written approval from the Contracting Officer.

4. Responsible for all repair costs for damages to structures, roads, bridges and any other features affected by the Contractor's off-site transportation and disposal operations.

3.6 OFF-SITE DISPOSAL

1. Dispose of all waste at a Government approved off-site disposal facility and coordinate the proposed modes of transportation and scheduling and notification of all shipments with the disposal facility. Notify the Contracting Officer in writing within 14 calendar days of any problems or issues which occur during transportation to the disposal location. This notification shall include any damage to containers during transportation and any scheduling conflicts with the disposal subcontractor which may adversely impact project schedule or cost.

2. Provide for the weighing of each loaded container by a certified weigh-master at a State-certified scale at the disposal facility. Shipping documentation shall be forwarded to the Contracting Officer immediately after each load container is weighed. Provide the

Contracting Officer with an original copy of the shipping documentation within two days following shipment.

3. The Contractor shall be responsible for all wastes until they are accepted by the disposal facility. It is the Contractor's responsibility to ensure that all waste shipments are in compliance with the disposal facility's requirements at the time of receipt of the shipments at the disposal facility.

4. The Contractor shall maintain communication throughout the transportation process associated with each shipment to ensure adequate notification of scheduled arrival times for containers reaching the site. The Contractor shall be responsible for all delays in turnaround time for transport vehicles.

3.7 WASTE MINIMIZATION CERTIFICATION

Minimize the generation of hazardous waste to the maximum extent practicable and take all necessary precautions to avoid mixing clean and contaminated wastes. Identify and evaluate recycling and reclamation options as alternatives to land disposal. Requirements of 40 CFR 266 shall apply to: hazardous wastes recycled in a manner constituting disposal; hazardous waste burned for energy recovery; lead-acid battery recycling; and hazardous wastes with economically recoverable precious metals. Submit written certification that waste minimization efforts have been undertaken to reduce the volume and toxicity of waste to the degree economically practicable and that the method of treatment, storage, or disposal selected minimizes threats to human health and the environment.

3.8 RECORDKEEPING

Maintain adequate records to support information provided to the Contracting Officer regarding exception reports, monthly reports, annual reports, and biennial reports and maintain bill of ladings for a minimum of 375 days from the date of shipment or any longer period required by any applicable law or regulation or any other provision of this Contract. Submit information necessary to file state annual or EPA biennial reports for all hazardous waste transported, treated, stored, or disposed of under this Contract. The submittal shall contain all the information necessary for filing of the formal reports in the form and format required by the governing Federal or state regulatory agency. A cover letter shall accompany the data to include the Contract number, Contractor name, and project location. In the events that a manifest copy documenting receipt of hazardous waste at the treatment storage and disposal facility is not received within 35 days of shipment initiation, or that a manifest copy documenting receipt of PCB waste at the designated facility is not received within 35 days of shipment initiation, prepare and submit an exception report to the Contracting Officer within 37 days of shipment initiation.

3.9 SPILL RESPONSE

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), or pollutant or contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 USC 2701 et seq.), notify the Contracting Officer immediately. Any direction from the Contracting Officer concerning a spill or release shall not be considered a change under the Contract. If the spill exceeds a reporting threshold, follow the pre-established procedures for immediate reporting to the Contracting Officer. Comply with all applicable requirements of Federal, state, or local laws or regulations

regarding any spill incident.

3.10 EMERGENCY CONTACTS

The Contractor is responsible for complying with the emergency contact provisions in 49 CFR 172, Section 604. Whenever the Contractor ships hazardous materials, provide a 24 hr emergency response contact and phone number of a person knowledgeable about the hazardous materials being shipped and who has comprehensive emergency response and incident mitigation information for that material, or has immediate access to a person who possesses such knowledge and information. The phone shall be monitored on a 24 hour basis at all times when the hazardous materials are in transportation, including during storage incidental to transportation. Ensure that information regarding this emergency contact and phone number are placed on all hazardous material shipping documents. Designate an emergency coordinator and post the following information at areas in which hazardous wastes are managed:

1. The name of the emergency coordinator.
2. Phone number through which the emergency coordinator can be contacted on a 24 hour basis.
3. The telephone number of the local fire department.
4. The location of fire extinguishers and spill control materials.

Attachment A SAMPLE OFF-SITE POLICY CERTIFICATION MEMO	
Project/Contract #:	
Waste Stream:	
Primary TSD Facility, EPA ID # and Location:	
Alter. TSD Facility, EPA ID # and Location:	
EPA Region	Contact
I	(617) 918-1752
II	(212) 637-4130
III	(214) 814-5267
IV	(404) 562-8591
V	(312) 353-8207
VI	(214) 665-2282
VII	(913) 551-7154
VIII	(303) 312-6419
IX	(415) 972-3304

Attachment A SAMPLE OFF-SITE POLICY CERTIFICATION MEMO	
X	(206) 553-2859
EPA representative contacted:	
EPA representative phone number:	
Date contacted:	
Comment:	
The above EPA representative was contacted on _____. As of that date the above sites were considered acceptable in accordance with the Off-Site Policy in 40 CFR 300.440.	
Date:	Signature:
Phone number:	

-- End of Section --

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SECTION 03 30 00.99

CAST-IN-PLACE CONCRETE
05/14

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 within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 306R	(2016) Guide to Cold Weather Concreting
ACI 308.1	(2011) Specification for Curing Concrete
ACI 318	(2014; Errata 1-2 2014; Errata 3-5 2015; Errata 6 2016; Errata 7 2017) Building Code Requirements for Structural Concrete and Commentary

ASTM INTERNATIONAL (ASTM)

ASTM A185/A185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A615/A615M	(2016) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C150/C150M	(2017) Standard Specification for Portland Cement
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C33/C33M	(2016) Standard Specification for Concrete Aggregates
ASTM C94/C94M	(2017) Standard Specification for Ready-Mixed Concrete
ASTM D1751	(2004; E 2013; R 2013) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Cold Weather Concrete Curing Plan

SD-02 Shop Drawings

Formwork

Reinforcing Steel; G

SD-03 Product Data

Portland Cement; G

Concrete Aggregates; G

Reinforcing Bars; G

SD-05 Design Data

Concrete Mix Design; G

SD-06 Test Reports

Mill Test And All Other Test Results; G

Compressive Strength; G

1.3 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer.

1.4 QUALITY ASSURANCE

1.4.1 Design Data

1.4.1.1 Concrete Mix Design

Sixty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, complementary cementitious materials, and admixtures; and applicable reference specifications. Submit mill test and all other test results for cement, complementary cementitious materials, aggregates, and admixtures. Provide documentation of maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Provide mix proportion data using at least three different water-cementitious material ratios for each type of mixture, which produce a range of strength encompassing those required for each type of concrete required. If source material changes, resubmit mix proportion data using revised source material. Provide only materials that have been

proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Contracting Officer. Indicate clearly in the submittal where each mix design is used when more than one mix design is submitted. Resubmit data on concrete components if the qualities or source of components changes. For previously approved concrete mix designs used within the past twelve months, the previous mix design may be re-submitted without further trial batch testing if accompanied by material test data conducted within the last six months. Obtain mix design approval from the contracting officer prior to concrete placement.

1.4.2 Control Submittals

1.4.2.1 Cold Weather Concrete Curing Plan

Submit proposed materials, methods and duration for curing concrete elements in accordance with ACI 308.1.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Portland Cement

Portland cement shall be Type I or Type III and conform to "Specification for Portland Cement" ASTM C150/C150M.

2.1.2 Air-Entraining Agent

Air-entraining agent shall be from approved manufacturer. Shall be added in accordance with manufacturer's directions to the normal Portland cement to entrain 4 1/2 percent air ± 1 percent with all other ingredients and strength as specified. Air-entraining admixtures shall conform to "Specifications for Air- Entraining Admixtures for Concrete" ASTM C260/C260M.

2.1.3 Concrete Aggregates

Concrete aggregates shall conform to "Specifications for Concrete Aggregates" ASTM C33/C33M. Coarse aggregates shall be a maximum of 1½ inches in size in footings and plain concrete. Pea gravel shall be used for sections 3 inches or less in thickness.

2.1.4 Water

Water used in mixing concrete shall be potable water, clean and free from injurious amounts of oils, acids, alkalis, organic materials, or other deleterious substances.

2.1.5 Reinforcing Bars

Reinforcing bars shall be billet steel grade (60,000 psi minimum yield) conforming to the requirements of ASTM A615/A615M, Grade 60. Reinforcing bars shall be new stock, free from rust, scale, or other coatings that tend to destroy or reduce bonding. Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

2.1.6 Welded Wire Mesh

Welded wire mesh shall conform to "Specifications for Welded Steel Wire Fabric for Concrete Reinforcements" ASTM A185/A185M.

2.1.7 Premolded Expansion Joint Material

Premolded expansion join material shall be provided where shown on the Contract Drawings or directed by the Contracting Officer. This non-extruding compressible joint material shall conform to the requirements of "Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction", ASTM D1751.

2.2 CONCRETE MIXES

Ready-mixed concrete shall conform to "Specifications for Ready-Mixed Concrete", ASTM C94/C94M.

2.2.1 Concrete Strength

All concrete mixes shall produce a dense durable concrete. The minimum 28 day compressive strength of the concrete shall be:

a. 3,000 psi - thrust blocking, sidewalks, curbs and pipe encasement.
b. 4,000 psi - manhole bases and road pavement.

2.2.2 Water/Cement Ratio

Shall not exceed a maximum as shown in Table 4.4 of the ACI 318 latest edition, Building Code Requirements For Reinforced Concrete, when strength data from field experience or trial mixtures are not available.

2.2.3 Slump

A workable concrete with minimum slump of 3 inches and a maximum slump of 5 inches shall be produced without exceeding the water/cement ratio.

PART 3 EXECUTION

3.1 FORMWORK

Build all forms mortar tight and of sufficient rigidity to prevent distortion due to the pressure of the concrete and other loads incidental to the construction operations. Construct and maintain forms so as to prevent warping and the opening of joints.

The forms shall be substantial and unyielding. Design the forms so that the finished concrete conforms to the proper dimensions and contours. Design the forms to take into account the effect of the vibration of concrete during placement.

3.2 PLACING REINFORCING STEEL

Place all steel reinforcement accurately in the positions shown on the plans. Secure the steel reinforcements firmly in place during the placing and setting of concrete. When placed in the work, it shall be free from dirt, detrimental rust, loose scale, paint, oil or other foreign material.

When spacing between crossing tie bars is one foot more, tie all bars at all intersections. When spacing is less than one foot in each direction, tie alternate intersections of bars.

Maintain distances from the forms by means of stays, blocks, ties, hangers or other approved supports. Continuous high chairs will not be permitted. Furnish all reinforcement in full lengths as indicated on the plans. Splicing of bars will not be permitted without the approval of the Contracting Officer, except where shown on the plans. Stagger splices as far apart as possible. Unless otherwise shown on the plans, bars shall be lapped 36 diameters to make the splice.

Lap welded wire mesh at least 1½ meshes plus end extension of wires but not less than twelve inches in structural slabs. Lap welded wire mesh at least 1/2 mesh plus end extension of wires but not less than six inches in slabs on the ground.

3.3 CONVEYING AND PLACING CONCRETE

Submit a concrete mix design to the Contracting Officer for approval prior to placing any concrete by pumping.

Convey concrete from the mixer to the forms as rapidly as practical by approved methods which will prevent segregation and loss of ingredients. Clean formwork of dirt and construction debris, drain water, and remove snow and ice. After the forms have been inspected, deposit the concrete in approximately horizontal layers to avoid flowing along the forms. Place all concrete in the dry, free from standing water. Deposit all concrete continuously or in layers of a thickness such that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the sections. Place the concrete to create a monolithic structure the component parts of which are securely bonded together. Compact the concrete during placement by suitable means. Work the concrete around the reinforcement and embedded fixtures and into corners and angles of forms, taking care to avoid overworking which may result in segregation.

Do not drop concrete into forms from a height greater than 5 feet. Use a spout to deposit concrete from a greater height; or, provide openings in the forms to limit the height of drop. Obtain the approval of the Contracting Officer before using any other method of placing concrete from a height greater than 5 feet.

Direct concrete through chutes to prevent it from striking reinforcement or sides of the form above the level of placement. Avoid segregation and coating of the surfaces with paste which may dry before concrete reaches its level.

3.4 THRUST BLOCKING

See the thrust blocking details in Contract Drawings. Notify the Contracting Officer whenever field conditions are noted which are more restrictive than the thrust block design data included on Drawing details.

Construct blocking against the vertical face of undisturbed earth or sheeting left in place. Prevent the concrete from enclosing more than half the circumference of the pipe unless it is a straddle block. Keep the concrete away from joints or bolts in the piping.

If thrust blocks are employed, place thrust blocking for hydrants to allow the hydrant to drain.

3.5 PLACING CONCRETE IN COLD WEATHER

Follow the provisions of ACI 306.1, ACI 306R, and ACI 308.1 when the ambient temperature is less than 40 degrees F at time of placement or expected to be less than 40 degrees F during the curing period.

Control concrete setting time with the use of accelerating admixtures as required to facilitate placing and finishing operations. Do not use calcium chloride in excess of 2 percent by weight in the concrete free of steel reinforcement. Where steel reinforcement is employed and concrete with calcium chloride is permitted, contractor must use galvanized or coated steel satisfactory to the Contracting Officer.

Exposed subgrade, formwork and reinforcing shall be warmer than 33°F prior to placement of concrete.

The temperature of the concrete during placing shall be between 55 degrees F and 75 degrees F. Maintain the temperature of the concrete between 55 degrees F and 75 degrees F for a minimum of 5 days by providing insulating blankets, heated enclosures, or other methods of thermal protection. Provide a means of maintaining atmospheric moisture when dry heat is used. Provide proper curing for a minimum of days or as approved by the Contracting Officer.

In case of low air temperatures (below 40 degrees F), submit a plan to comply with this section. The Contracting Officer may, at their discretion, raise the minimum limiting temperatures for water, aggregates and mixed concrete when temperatures drop below 40 degrees F.

Protect all earth supported concrete from damage due to frost heave.

-- End of Section --

SECTION 31 23 00.99

TRENCHING AND BACKFILL
02/11

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 the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D1140	(2017) Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing
ASTM D1557	(2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D2216	(2010) Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4318	(2010; E 2014) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D6938	(2017) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D698	(2012; E 2014; E 2015) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

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. Submit the following in

accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Shoring and Sheeting Plan; G

Sampling And Analysis Plan; G

SD-05 Design Data

Material Delineation And Handling Plan; G

SD-06 Test Reports

Borrow Site Testing

Density tests

Moisture Content Tests

Fill And Backfill Material Testing; G

Select Material; G

1.3 DELIVERY, STORAGE, AND HANDLING

Perform in a manner to prevent contamination or segregation of materials.

1.4 CRITERIA FOR BIDDING

Base bids on the following criteria:

a. Surface elevations are as indicated.

b. Pipes or other artificial obstructions, except those indicated, will not be encountered.

c. Ground water elevations indicated by the boring log were those existing at the time subsurface investigations were made and do not necessarily represent ground water elevation at the time of construction.

e. Material character is indicated by the boring logs and geotechnical testing.

f. Bedrock at 4 to 20 feet below existing surface elevations.

g. Suitable backfill and bedding material in the quantities required are not available at the project site.

h. Blasting will not be permitted. Remove material in an approved manner.

1.5 REQUIREMENTS FOR OFF-SITE SOIL

Soils brought in from off-site for use as backfill shall be tested according to the requirements in Section 01 35 45 CHEMICAL QUALITY DATA CONTROL. Provide borrow site testing in accordance with Table 1 of Section 01 35 45 CHEMICAL QUALITY DATA CONTROL from a grab sample of material from the area most likely to be contaminated at the borrow site (as indicated by visual or olfactory evidence), with at least three tests from each borrow

site. Do not bring material onsite until test results have been received and approved by the Contracting Officer.

1.6 CLEAN CORRIDOR SAMPLING

Prior to excavation in the Clean Corridor Area as shown on the Contract Drawings, the soil shall be characterized in-situ to determine characteristics to be used in the handling and disposal of material in this area.

1.6.1 Sampling and Analysis Plan

Prepare a sampling and analysis plan for in-situ sampling of the Clean Corridor Area. The analytical results will be used to determine which material is a hazardous or TSCA waste, and which material can be handled as a non-hazardous waste. The plan shall include the following:

1. Sample collection procedures.

2. Proposed sampling locations.

3. Testing laboratory qualifications and analytical procedures to be used.

4. Data analysis procedures for delineating types of waste prior to excavation.

Sampling and analytical procedures shall comply with the requirements of Section 01 34 45 CHEMICAL DATA QUALITY CONTROL and the requirements of the proposed disposal facilities.

1.6.2 Material Delineation and Handling Plan

Develop a program for the separation and segregation of non-hazardous waste from hazardous or TSCA waste during excavation of the Clean Corridor Area. Identify stockpile locations and management procedures to minimize the spread of contaminated soil on the former CDE facility property.

1.7 QUALITY ASSURANCE

1.7.1 Shoring and Sheeting Plan

Submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheeting of excavations. Drawings shall include material sizes and types, arrangement of members, and the sequence and method of installation and removal. Calculations shall include data and references used.

1.7.2 Utilities

Movement of construction machinery and equipment over pipes and utilities during construction shall be at the Contractor's risk. Excavation made with power-driven equipment is not permitted within two feet of known utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Contracting Officer. Report damage to utility lines or subsurface

construction immediately to the Contracting Officer.

1.8 PERMITS, APPROVALS AND FEES

Comply with State and local code requirements when disposing of trees, shrubs and all other materials removed under this Specification Section.

Bear all expenses to obtain a suitable disposal area, haul to the disposal area, pay disposal fees, and dump at the disposal area.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

2.1.1 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials as detailed in Paragraph 1.5. Unsatisfactory materials also include man-made fills, trash, refuse, or backfills from previous construction. Unsatisfactory material includes material classified as satisfactory which contains roots and other organic matter, frozen material, and stones larger than 4 inches. The Contracting Officer shall be notified of any contaminated materials.

2.1.2 Common Fill

Common Fill shall be earthen materials entirely free of vegetation; trash; lumber; contamination; and frozen, soft or organic materials. No stones or rocks larger than 4 inches will be permitted in the Common Fill. Common Fill shall be an unclassified soil material with the characteristics required to compact to the soil density specified for the intended location.

Common fill material may be obtained from the trench excavation within the public right of way provided it has been tested in accordance with the requirements of this Section and approved by the Contracting Officer.

Furnish the necessary approved common fill materials from an off-site source whenever approved material obtained from the trench excavation is insufficient to complete the backfill.

2.1.3 Select Fill

Provide materials classified as GW, GP, SW, or SP by ASTM D2487 where indicated. No stones or or rocks larger than 1 inch will be permitted in Select Fill.

2.1.4 3/4" Granular Fill

Granular Fill shall meet the sieve analysis requirements of AASHTO as follows:

1 inch sieve	passing 100 percent
1/2 inch sieve	passing 0 to 5 percent
No 4 sieve	passing 0 to 1 percent

This material may be wrapped in filter fabric (trench bottom, side, and over top of Granular Fill), as directed by the Contracting Officer, to prevent the migration of finer grained soils into this material or the

migration of this material into the trench bottom or sidewall.

2.1.5 Crushed Stone

1. Crushed stone: In accordance with AASHTO #57 coarse aggregate stone, uniform in texture and quality and free of organic matter, wood, garbage, metal, debris, or lumps of clay.

Crushed Stone Gradation	
SIEVE SIZE	PASSING
1.5 inches	100 percent
1 inch	95 to 100 percent
0.5 inch	25 to 80 percent
#4	0 to 10 percent
#8	0 to 5 percent

2.1.6 Topsoil

Provide as specified in Section 32 92 19.99 SEEDING.

2.2 FILTER FABRIC

Filter fabric shall be non-woven, synthetic fiber material with sieve design to prevent the select material in the pipe bedding and haunching from migrating into the surrounding soils. The material shall meet or exceed the following minimum requirements: thickness of 15 mils, tensile strength of 130 lbs., elongation at break of 64%, and trapezoidal tear strength of 70 lbs.

2.3 BURIED WARNING AND IDENTIFICATION TAPE

Warning tape for installed water lines shall be as described in Specification Section 33 11 00.99 WATER UTILITY DISTRIBUTION PIPING.

All other underground utilities installed shall be in accordance with Federal, State, and Local requirements.

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Shoring and Sheeting

Provide shoring, bracing, cribbing, trench boxes, underpinning and or sheeting as required based on site condition. Support open cut excavation for mains where trenching may cause danger to life, unnecessary damage to street pavement, trees, structures, poles, utilities, or other private or public property. Support the sides of the excavation by adequate and suitable sheeting, shoring, bracing or other approved means in accordance with all applicable local, county, state, and federal, and OSHA rules and regulations during the progress of the work, whenever and wherever it is

necessary. Maintain the trench support materials and equipment in place until backfilling operations have progressed to the point where the supports may be withdrawn without endangering life or property per Article 6 on safety issues.

In addition to Section 25 A and B of EM 385-1-1, include provisions in the shoring and sheeting plan that will accomplish the following:

a. Prevent undermining of pavements, foundations and slabs.

b. Prevent slippage or movement in banks or slopes adjacent to the excavation.

c. Allow for the abandonment of shoring and sheeting materials in place in critical areas as the work is completed. In these areas, backfill the excavation to within 3 feet of the finished grade and remove the remaining exposed portion of the shoring before completing the backfill.

3.1.2 Underground Utilities

Location of the existing utilities indicated is approximate. The Contractor shall physically verify the location and elevation of the existing utilities indicated prior to starting construction. The Contractor shall contact the Borough of South Plainfield Public Works Department, New Jersey One Call, and all other utilities for assistance in locating existing utilities. A private utility locating service shall be used for area on the former CDE facility property or as necessary to obtain all required utility information.

The Contractor shall scan the construction site with electromagnetic and sonic equipment and mark the surface of the ground where existing underground utilities are discovered.

3.1.3 Machinery and Equipment

Movement of construction machinery and equipment over pipes during construction shall be at the Contractor's risk. Repair, or remove and provide new pipe for existing or newly installed pipe that has been displaced or damaged at no expense to the Government.

3.1.4 Vegetation

Protect existing trees, shrubs and bushes located outside the clearing limits from damage for the life of this Contract. Take special care to avoid damage to trees and their root system. In all cases, operate equipment within the limb spread in a manner which will not injure trees, trunks, branches or their roots. Pay particular attention when employing booms, storing materials, and handling excavated materials.

As necessary for access purposes, trees and vegetation located along Spicer Avenue on the former CDE facility property can be temporarily removed and replaced at the end of construction in the area. Relocated plants shall be maintained in a good condition or replaced with a comparably sized, similar specimen during site restoration.

3.2 DEWATERING

3.2.1 General

Should groundwater be encountered, furnish and operate pumping equipment of sufficient capacity to dewater the trench. Dewater the trench so that the laying and joining of the pipe is made in a dry environment so as to prevent water from entering the pipe during construction. Maintain groundwater a minimum of 6 inches below excavations. Remove soil which is disturbed by pressure or flow of groundwater and replace with free draining material.

No additional sum shall be allowed for any reasonably anticipated dewatering operation, overtime, equipment rental or any other expense incurred due to the occurrence of ground water, surface water or water from possible leakage of existing buildings, structures and piping in the vicinity of the Contractor's operations. If Contractor believes unreasonable, unanticipated wet conditions exist, immediately contact Contracting Officer to decide appropriate measures.

3.2.2 Permit

The Contractor shall obtain and pay for any permits required for dewatering and disposal in conjunction with Phase 1 activities..

3.2.3 Management of Dewatering Fluids

All groundwater encountered during construction shall be considered contaminated. Water shall be pumped to storage containers (i.e., frac tanks) placed in a location to be approved by the Contracting Officer. Water shall be managed, treated, and disposed of with other Contact Water generated during the project as described in Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

3.3 CLEARING AND GRUBBING

A. Clear and grub the work site within easement and/or clearing limit lines shown on the Contract Drawings. Remove those items that are designated for removal or obstruct construction. This includes, but is not limited to; trees, downed timber, shrubs, bushes, vines, roots, stumps, undergrowth, rubbish, paving materials, debris, and all other objectionable materials. Site objects outside clearing limits shall not be removed. Only those portions of the construction area which are absolutely necessary and essential for construction shall be cleared. Minimize the length of time of ground disturbance as much as practical, especially within environmentally sensitive areas. Ground shall not be cleared and grubbed until immediately prior to construction.

B. Remove site improvement objects such as signs, lawn ornaments, etc. which interfere with construction. Removed site improvement objects shall be stored in a manner protecting objects for reinstallation after construction is complete. Relocate mailboxes as necessary. Provide temporary traffic control signs when permanent signs are removed for construction. Temporary signs shall be worded to match permanent signs, except as necessary to be compatible with construction operations.

C. Remove pavement, curb and sidewalk in accordance with applicable local standards. Neatly saw cut paved surfaces prior to pavement removal.

Saw cuts may be eliminated where paving abuts curb or roadway expansion joints or construction joints, and pavement can be removed without damaging or disturbing curbs or remaining pavement. Remove sidewalks in full squares only. Saw cut sidewalks if no true joint exists.

D. Notify the Contracting Officer of locations where additional trees and shrubs will interfere with installation of facilities. Do not remove additional trees or shrubs without written permission of Contracting Officer. Conduct operations to minimize disturbance of trees and shrubs. Trim trees and roots in accordance with the best horticultural practices, including sealing cuts to preserve the tree.

E. Burning of logs, stumps, roots, cuttings and other material on the site will not be permitted. All materials obtained as a result of the clearing and grubbing operations shall be disposed of in accordance with the requirements of the applicable governing agencies. Chipping of brush materials will be permitted. However, Contractor shall bear all costs to dispose of the resultant chips at an approved location.

3.4 SURFACE PREPARATION

3.4.1 Stripping

Strip suitable soil from the site where excavation or grading is indicated and stockpile separately from other excavated material. Material unsuitable for use as topsoil shall be stockpiled and used for backfilling. Locate topsoil so that the material can be used readily for the finished grading. Where sufficient existing topsoil conforming to the material requirements is not available on site, provide borrow materials suitable for use as topsoil. Protect topsoil and keep in segregated piles until needed.

3.4.2 Unsuitable Material

Remove vegetation, debris, decayed vegetable matter, sod, mulch, and rubbish underneath paved areas or concrete slabs.

3.5 TRENCHING

General excavation shall consist of the satisfactory removal and disposal of all material taken from within the limits of the Work contracted, meaning the material lying between the original ground line and the finished ground line as shown on the Contract Drawings. Excavation below existing ground line to enable any required construction or removals is included. It is distinctly understood that any reference to earth, rock, silt, debris or other materials on the Drawings or in the Specifications is solely for the Contractors information and shall not be taken as an indication of classified excavation or the quantity of earth, rock, silt, debris or other material encountered.

Excavate to contours, elevation, and dimensions indicated. Reuse excavated materials from within the public right of way that meet the specified requirements for the material type required at the intended location.

Keep excavations free from water. Excavate soil disturbed or weakened by Contractor's operations, soils softened or made unsuitable for subsequent construction due to exposure to weather.

If debris, pieces of capacitors, or other man-made materials are

encountered during trenching operations, work shall cease and the Contracting Officer shall be notified. The Contracting Officer shall determine if this material is from former CDE facility operations and therefore potentially contaminated, and if other steps are to be taken. This applies only to man-made debris buried at depth.

Excavations below indicated depths will not be permitted except to remove unsatisfactory material. Unsatisfactory material encountered below the grades shown shall be removed as directed by the Contracting Officer. Refill with select fill and compact to 95 percent of ASTM D1557 maximum density. Unless specified otherwise, refill excavations cut below indicated depth with select fill and compact to 95 percent of ASTM D1557 maximum density.

Satisfactory material removed below the depths indicated, without specific direction of the Contracting Officer, shall be replaced with satisfactory materials to the indicated excavation grade at no additional cost to the Government. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades indicated shall be done under the direction of the Contracting Officer.

3.5.1 Pipe Trenches

1. Excavate to the dimension indicated in the Contract Drawings. Grade bottom of trenches to provide uniform support for each section of pipe after pipe bedding placement. Tamp to provide a firm pipe bed. Recesses shall be excavated to accommodate bells and joints so that pipe will be uniformly supported for the entire length. Rock, where encountered, shall be excavated to a depth of at least 6 inches below the bottom of the pipe.

2. Widths of trenches shall be held to a minimum to accommodate the pipe and appurtenances. The trench width shall be measured at the top of the pipe barrel and shall conform to the following limits:

   a. Earth

      Minimum - Outside diameter of the pipe barrel plus 8 inches.
      Maximum - Nominal pipe diameter plus 24 inches.

   b. Rock

      Minimum - Outside diameter of the pipe barrel plus 24 inches.
      Maximum - Normal pipe diameter plus 30 inches. (Contractor will only be compensated for the minimum described above.)

3. Excessive Trench Width - Provide additional backfill and bedding material, as specified in this Section and approved by the Contracting Officer, to fill any trench excavation that exceeds the maximum trench width defined in this Section. Dispose of excess excavated materials off-site in accordance with the Contract Specifications. Furnish Contracting Officer with satisfactory evidence that an appropriate disposal site was used.

4. Trench Depth

   a. General: Provide prescribed minimum cover from the top of the pipe barrel to the top of the finished grade of the roadway, unless otherwise authorized by the Contracting Officer, or as shown on

the plans.

b. Earth: Excavate to the depth required, so as to provide a uniform and continuous bearing and support for the pipe barrel on solid and undisturbed ground at every point between joints. It will be permissible to disturb the finished trench bottom over a maximum length of 18 inches near the middle of each length of pipe by the withdrawal of pipe slings or other lifting tackle. Provide bell holes. Prepare the finished trench bottom accurately using hand tools.

c. Rock: Excavate trenches in rock or boulders 6 inches below the pipe barrel for pipe 24 inches or less in diameter and 9 inches below the pipe barrel for pipe greater than 24 inches in diameter. Remove all loose material from the trench bottom. Prepare a pipe bed using bedding material as described in this Section.

d. Unsuitable Bottom: Notify the Contracting Officer whenever unsuitable material is found below subgrade. Remove the material over the area and to the depth determined by the Contracting Officer. Provide compacted bedding material to restore the trench bottom to the required grade in these areas.

5. Open Trench Length - The length or size of excavation shall be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by Contract Documents. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, Contracting Officer may require special construction procedures such as limiting the length of the open trench or prohibiting stacking excavated material in the street. Take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public, shall be well lighted.

3.5.2 Bedrock Excavation

Remove bedrock to elevations indicated in Contract Drawings in a manner that will leave foundation material in an unshattered and solid condition. Roughen level surfaces and cut sloped surfaces into benches for bond with concrete. Protect shale from conditions causing decomposition along joints or cleavage planes and other types of erosion. Removal of bedrock beyond lines and grades indicated will not be grounds for a claim for additional payment unless previously authorized by the Contracting Officer.

Rippable materials (e.g., weathered bedrock) are not considered bedrock under this specification. During trench excavation, when rock or boulders are encountered (defined as more than 1 cubic yard in volume), the material shall be uncovered and the Contracting Officer notified prior to excavation/removal and the Contracting Officer will prepare cross sections of the rock surface. Excavation of the material claimed as rock shall not be performed until the material has been cross sectioned by the Contractor and approved by the Contracting Officer. Common excavation shall consist of all excavation not classified as rock excavation.

3.5.3 Excavated Materials

1. All material excavated within the Remediation Area and former CDE Facility Site as shown on the Contract Drawings shall be handled and

disposed of in accordance with Specification Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

2. Satisfactory excavated material required for fill or backfill shall be placed in the proper section of the permanent work required or shall be separately stockpiled if it cannot be readily placed.

3.5.4 Stockpiling Excavated Material

1. Stockpile excavated material that is suitable for use as fill or backfill in areas designated by Contracting Officer and in accordance with health and safety procedures.

2. Stockpile contaminated soil at approved locations or in containers on-site. Place stockpiles of contaminated soil on liner as shown on Contract Drawings.

3. Stockpile crushed stone removed under existing asphalt cap for later reuse in cap construction. Take steps to minimize the mingling of the underlying fill material with the crushed stone.

4. Cover all stockpiles when not in use. Maintain soil erosion control measures around soil stockpiles.

5. Post signs indicating proposed use of material stockpiled (i.e., reuse, off-site disposal only, etc.). Post signs that are readable from all directions of approach to each stockpile. Signs should be clearly worded and readable by equipment operators from their normal seated positions.

6. Confine stockpiles to within approved work areas.

7. Do not stockpile excavated material adjacent to trenches and other excavations, unless excavation side slopes and excavation support systems are designed, constructed, and maintained for stockpile loads.

8. Do not stockpile excavated materials near or over existing facilities, adjacent property, or completed Work, if weight of stockpiled material could induce excessive settlement.

3.6 SUBGRADE PREPARATION

Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed and replaced with satisfactory materials as directed by the Contracting Officer. The surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 6 inches, pulverized, and compacted to the specified density. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill.

Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary to plus 2 percent of optimum moisture. Minimum

subgrade density shall be as specified herein.

3.7 SUBGRADE FILTER FABRIC

Place synthetic fiber filter fabric as indicated directly on prepared subgrade free of vegetation, stumps, rocks larger than 2 inches diameter and other debris which may puncture or otherwise damage the fabric. Repair damaged fabric by placing an additional layer of fabric to cover the damaged area a minimum of 3 feet overlap in all directions. Overlap fabric at joints a minimum of 3 feet. Obtain approval of filter fabric installation before placing fill or backfill. Place fill or backfill on fabric in the direction of overlaps and compact as specified herein. Follow manufacturer's recommended installation procedures.

3.8 BACKFILLING

3.8.1 Common Fill Placement

Place in 6 inch lifts. Compact areas not accessible to rollers or compactors with mechanical hand tampers. Aerate material excessively moistened by rain to a satisfactory moisture content. Finish to a smooth surface by blading, rolling with a smooth roller, or both.

3.8.2 Select Fill Placement

Provide under paved surface. Place in 6 inch lifts. Do not place over wet or frozen areas. Backfill adjacent to structures shall be placed as structural elements are completed and accepted. Backfill against concrete only when approved. Place and compact material to avoid loading upon or against structure.

3.8.3 Trench Backfilling

Backfilling shall not begin until construction below finish grade has been approved, underground utilities systems have been inspected, tested and approved, forms removed, and the excavation cleaned of trash and debris. Backfill shall be brought to indicated finish grade.

Where pipe is coated or wrapped for protection against corrosion, the backfill material up to an elevation 2 feet above water line shall be free from stones larger than 1 inch in any dimension.

3.8.3.1 Open Terrain

a. Bedding: Backfill from the bottom of trench to the centerline (springline) of the pipe barrel. Prepare pipe bedding immediately before pipe is laid by installing bedding material from bottom of trench to the proposed bottom of pipe elevation. Once pipe is installed place pipe bedding from the bottom of the pipe barrel to the centerline (springline) of the pipe barrel or clean, granular fill. Take care to avoid injuring or moving the pipe. Place the material in uniform 6 to 12 inch loose layers and compact each layer so as to eliminate the possibility of settlement, pipe misalignment, or damage of joints.

b. Initial Backfill: Backfill from the centerline (springline) of the pipe barrel to 12 inches above the pipe with Select Fill or Granular Fill as described in Paragraph 2.1. See Contract Drawings for required initial trench backfill material. Mechanical equipment may be used to place the backfill. Place the material in such a manner that the material

does not free fall, but rather flows onto the previously placed material. Consolidate the backfill in such a manner as will ensure the minimum possible settlement and the least interference with traffic. Do not compact the backfill with mechanical equipment, such as wheeled vehicles, unless sufficient cover is provided over the pipe to prevent damage to the pipe.

c. Remaining Backfill: Backfill from 12 inches above the pipe to required grade for surface restoration with Common Fill or Select Fill, as described in Paragraph 2.1. Mechanical equipment may be used to place the backfill. Place the material in such a manner that the material does not free fall, but rather flows onto the previously placed material. Consolidate the backfill in such a manner as will ensure the minimum possible settlement and the least interference with traffic. Do not compact the backfill with mechanical equipment, such as wheeled vehicles, unless sufficient cover is provided over the pipe to prevent damage to the pipe.

3.8.3.2 Under or Within 18 Inches of Driveways and Roads

a. Bedding: Install bedding as described in previous section for trenches in open terrain.

b. Remaining Backfill: Fill the remainder of the excavation using Select Fill. Place the material in uniform 6 to 12 inch loose layers and compact each layer so as to eliminate the possibility of settlement, pipe misalignment, or damage of joints. Take care to avoid damaging or moving the pipe.

3.9 BURIED WARNING AND IDENTIFICATION TAPE

Install the identification tape with all buried potable water lines in accordance with the manufacturer’s installation instructions and as specified. Install identification tape one foot above the top of the pipe.

Install identification tape for all other utilities in accordance with Federal, State, and Local requirements.

3.10 COMPACTION

Determine in-place density of existing subgrade; if required density exists, no compaction of existing subgrade will be required.

3.10.1 General Site

Compact underneath areas designated for vegetation and areas outside the 5 foot line of the paved area or structure to 95 percent of ASTM D698.

3.10.2 Paved Areas

Compact top 12 inches of subgrades to 95 percent of ASTM D1557. Compact fill and backfill materials to 95 percent of ASTM D1557.

3.11 FINISH OPERATIONS

3.11.1 Grading

Finish grades as indicated within 0.1 feet. Grade areas to drain water away from structures. Maintain areas free of trash and debris. For

existing grades that will remain but which were disturbed by Contractor's operations, grade as directed.

3.11.2 Topsoil and Seed

Provide as specified in Section 32 92 19.99 SEEDING.

3.11.3 Curbs

1. All curbing shall be installed in accordance with the Borough of South Plainfield specifications and to the satisfaction of the Contracting Officer.

2. All base for the installation shall be thoroughly compacted to support curb installation.

3. All replacement curbs shall be of the same type and thickness as the curb and gutter which it abuts. The grade of the restored curb and gutter shall conform with the grade of the existing adjacent curb and gutter, and installed to insure there is no ponding of water.

3.11.4 Driveways

1. All base for the installation shall be thoroughly compacted and leveled to support the new and replacement installations without settlement.

2. All permanent restoration of driveways shall conform to the construction as originally placed and to the original lines and grades, unless directed otherwise by the Contracting Officer.

   a. No patching of concrete driveway areas will be allowed between joints or dummy joints.

   b. All joints shall be saw cut.

   c. In no case shall the thickness of the driveway be less than four inches, with 6x6x6/6 woven wire mesh.

3.11.5 Sidewalks

1. All base for the installation of sidewalks shall be thoroughly compacted and leveled to support the new and replacement installations without settlement.

2. All permanent restoration of sidewalks shall conform to the manner of construction as originally constructed and placed (brick, block or stone)in accordance with the Borough of South Plainfield specifications.

   a. When concrete sidewalks are replaced, the replacements shall match the existing line and grades, and width.

   b. All replacement work shall meet the requirements of new sidewalk construction. No patching will be allowed between joints or dummy joints.

3.11.6 Protection of Surfaces

Protect newly backfilled, graded, and topsoiled areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged

grades, elevations, or slopes.

3.12 DISPOSITION OF SURPLUS MATERIAL

Dispose of excess soil in accordance with Section 02 81 00.99.

3.13 FIELD QUALITY CONTROL

3.13.1 Sampling

Collect the number and size of samples required to perform the following tests.

3.13.2 Testing

Perform one of each of the following tests for each material used. Provide additional tests for each source change.

3.13.2.1 Fill and Backfill Material Testing

Test fill and backfill material in accordance with ASTM C136/C136M for conformance to ASTM D2487 gradation limits; ASTM D1140 for material finer than the No. 200 sieve; ASTM D4318 for liquid limit and for plastic limit; ASTM D1557 for moisture density relations, as applicable.

3.13.2.2 Select Material Testing

Test select material in accordance with ASTM C136/C136M for conformance to ASTM D2487 gradation limits; ASTM D1140 for material finer than the No. 200 sieve; ASTM D1557 for moisture density relations, as applicable.

3.13.2.3 Density Tests

Test density in accordance with ASTM D6938.

Bedding and backfill in trenches: One test per 50 linear feet in each lift.

3.13.2.4 Moisture Content Tests

In the stockpile, excavation or borrow areas, a minimum of two tests per day per type of material or source of materials being placed is required during stable weather conditions. During unstable weather, tests shall be made as dictated by local conditions and approved moisture content shall be tested in accordance with ASTM D2216. Include moisture content test results in daily report.

-- End of Section --

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SECTION 31 25 00.99

CONTROLLED DENSITY FILL
11/17

PART 1 GENERAL

1.1 SCOPE

A. The Work of this Section includes furnishing all plant, labor, equipment and materials, and performing all operations in connection with the supply, mixing, placement and cleanup work as specified herein and as shown on the Contract Drawings.

B. This Section specifies the requirements for controlled density fill used for trenches, support for pipe structures, culverts, utility cuts and other works where cavities exist and where firm support is needed for pavements and structural elements as necessary based on conditions encountered in the field. Controlled density fill shall also be used to fill the abandoned segment of the 36-inch water and other abandoned utility lines, and where any granular compacted fill is needed and is approved by the Contracting Officer.

1.2 RELATED WORK

Section 31 23 00.99, TRENCHING AND BACKFILL.

1.3 REFERENCES

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

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 229R-94	(1994) Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete
ACI 304R	(2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	(2010) Guide to Hot Weather Concreting
ACI 306R	(2016) Guide to Cold Weather Concreting
ACI 309R	(2005) Guide for Consolidation of Concrete
ACI 318	(2014; Errata 1-2 2014; Errata 3-5 2015; Errata 6 2016; Errata 7 2017) Building Code Requirements for Structural Concrete and Commentary
ACI 347	(2004; Errata 2008; Errata 2012) Guide to

	Formwork for Concrete
ACI SP-66	(2004) ACI Detailing Manual

ASTM INTERNATIONAL (ASTM)

ASTM A185/A185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A615/A615M	(2016) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C143/C143M	(2015) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2017) Standard Specification for Portland Cement
ASTM C231/C231M	(2017) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	(2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C33/C33M	(2016) Standard Specification for Concrete Aggregates
ASTM C494/C494M	(2016) Standard Specification for Chemical Admixtures for Concrete
ASTM C94/C94M	(2017) Standard Specification for Ready-Mixed Concrete

1.4 ADDITIONAL GUIDANCE DOCUMENTS

The publications listed below are supplemental guidance documents.

ASTM D4832-95el - Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders

ASTM D5239-92 - Standard Practice for Characterizing Fly Ash for Use in Soil Stabilization

ASTM D5971-96 -Standard Practice for Sampling Freshly Mixed Controlled Low Strength Material

ASTM D6103-07 - Standard Test Method for Flow Consistency of Controlled Low Strength Material

ASTM D6023-96 - Standard Test Method for Unit Weight, Yield, Cement Content and Air Content (Gravimetric) of Controlled Low Strength Material (CLSM)

ASTM D5971-96 - Standard Practice for Sampling Freshly Mixed Controlled Low Strength Material

ASTM D6024-96 - Standard Test Method for Ball Drop on Controlled Low Strength Material (CLSM) to Determine Suitability for Load Application

ASTM C618 - Fly Ash and Raw or Calcined Natural Pozzolan For Use as a Mineral Admixture in Portland Cement Concrete

1.5 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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings; G

Reinforcing Steel; G

Layout Of Reinforcing Steel; G

SD-03 Product Data

Brochures; G

SD-04 Samples

Samples; G

SD-05 Design Data

Design Mixes; G

1.6 PRODUCT HANDLING

Upon delivery at the site, reinforcement (if necessary) shall be classified and stacked, off the ground, in a position convenient for inspection and subsequent handling. Material shall be marked with metal tags bearing the size, length and symbol for ready identification of each independent bar, bundle, or roll. All steel for reinforcement shall be new, free from loose or flaky rust, loose scale, mud, oil, or other materials that would destroy or reduce bond.

1.7 ENVIRONMENTAL CONDITIONS

1.7.1 Protection

Fresh concrete shall be adequately protected from freezing, premature drying, heavy rains, flowing water and mechanical injury. Provisions shall be made for maintaining new concrete in a continuously moist condition for at least seven days after placement.

1.7.2 Cold Weather Requirements

1. When pouring concrete in cold weather, the recommendations of the American Concrete Institute's Publication "Cold Weather Concreting" (ACI 306R) shall be followed insofar as the Contracting Officer may direct. The use of set accelerators will be at his discretion except that no calcium chloride will be allowed for concrete poured on galvanized metal forms. After the first frost of the winter and after the mean daily temperature at the site falls below 40 degrees F for more than one day, concrete shall be protected from freezing for not less than 48 hours after it is placed. In the spring, concrete shall be similarly protected until the mean daily temperature rises above 40 degrees F for more than three consecutive days. When the mean daily temperature falls below 40 degrees F for more than one day, concrete shall thereafter be placed at a temperature of between 50 and 55 degrees F and maintained at that temperature for at least three days. During the next three days, it shall be protected from freezing.

2. The methods of protecting freshly poured concrete will be subject to the approval of the Contracting Officer. In general, external heating will not be required during the first three days is measures are taken to retain the heat of hydration. Such measures shall be commercial batt insulation, insulating board, loose fill insulation, or other material approved by the Contracting Officer. Canvas or plastic film shall be used to protect the insulation from precipitation. After three days, if heating is required to maintain the temperature of the concrete above freezing, it shall be provided as required. Exhaust steam is the best method, if fire safe, and does not dry the surface of the concrete. Airplane heaters, located outside the structure or enclosure and blowing hot air into it are acceptable but not preferred. Open fires and salamanders without proper ventilation will not be allowed due to the fire hazard and strong carbon dioxide atmosphere which is detrimental to freshly poured concrete.

1.7.3 Hot Weather Requirements

During periods of excessively hot weather (90 degrees F, or above) ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels, all in accordance with the provisions of (ACI 305R), "Hot Weather Concreting".

PART 2 PRODUCTS

2.1 GENERAL

All materials shall be carefully selected, of uniform quality, meeting the requirements of the specification and subject to the approval of the Contracting Officer.

2.2 MATERIALS

2.2.1 Material Requirements

Materials shall meet the requirements specified in the following sections of the Standard Specifications:

Portland Cement, Type I, II, or III:	meeting AASHTO M85
Fly Ash:	meeting AASHTO M4.05.02
Fine Aggregate/Sand:	meeting AASHTO M4.02.02
Air Entraining Admixtures:	meeting AASHTO M4.02.05
Water Potable:	meeting AASHTO M4.02.04
Compressive Strength:	28 day = 30 to 80 psi 90 day = 100 psi
Slump:	10 to 12 inches

2.2.2 Mix Proportions

The Contractor and/or the material supplier shall be responsible for producing a flowable mixture using these guidelines and adjusting the mixture design as called for by the circumstances or as directed by the Contracting Officer.

For excavatable mixes, the controlled density fill material should be proportioned to produce a 28-day compressive strength of 75-100 psi (not a specification requirement).

Typical mix design proportions for normal weight controlled density fill are as follows:

1.

Portland Cement	30 to 70 lbs/cy
Fly Ash	250 to 400 lbs/cy
Fine Aggregate/Mineral Filler	2000 to 3000 lbs/cy
Air Content	0 to 70 percent
Water	600 lbs/cy

2.

Portland Cement	30 to 70 lbs/cy
Mineral Filler	2000 to 3000 lbs/cy
Water	800 lbs/cy

3. Weights or volumes of each material should be adjusted to approximate one cubic yard of controlled density fill. For Light Weight Cellular controlled density fill proportions, consult with manufacturer's recommendations.

The percentage of cement may be increased above these limits only when early strength is required and future removal of the product is not

required. The mix proportions shall be adjusted for removability, pumpability, flowability and setting characteristics. Set times are a product of consolidation of the controlled density fill due mainly to dehydration. A decrease in soil permeability, an increase in air content or excessive fine material will cause an increase in the setting time of controlled density fill.

2.2.3 Testing

In the event that testing is required or deemed necessary by the Contracting Officer, follow the recommendations of ACI 229R-94.

2.2.3.1 Modified Slump Test

2.2.3.1.1 Apparatus

Scoop, measuring tape, flat edge, 3 inch by 6 inch cylinder mold open at both ends, and a flat non-absorbent surface.

2.2.3.1.2 Procedure

1) Set mold upright on flat surface.

2) Scoop representative sample of controlled density fill.

3) Fill mold with sample without tamping and then strike off the top with flat edge to form a flat surface.

4) Clear any residue from around the bottom of the mold.

5) Lift the mold straight up for a duration of 3 seconds, allowing sample to spread on the flat surface.

6) Measure the spread's diameter to the nearest 1/2 inch. A spread of 7 to 9 inches is considered flowable.

2.2.3.1.3 Air Content

Use ASTM C231/C231M procedures where applicable. Unit weight method may also be desirable with high air content mixtures.

2.2.3.2 Compressive Strengths

No testing shall be done for compressive strengths in the field.

2.3 CEMENT

Cement shall meet the requirements of ASTM C150/C150M, Type II. Brands of cement shall be subject to the approval of the Contracting Officer.

2.4 AGGREGATE

All aggregates shall conform to the standard specifications for concrete aggregates, ASTM C33/C33M. Aggregates failing to meet these specifications but proved by special test or actual service to produce concrete of the required quality may be used under ACI 318, Section 3.3, where authorized by the Contracting Officer.

2.5 WATER

Water shall be clean, fresh and free from oil, acid, salt, alkali, sewage, organic matter, and other deleterious substances.

2.6 ADMIXTURES

2.6.1 General

Admixtures shall be used as follows: The use of products other than those named herein will be allowed only with the written approval of the Contracting Officer.

2.6.2 Air Entraining Agent

The air entraining admixture shall be a chloride free, purified and modified salt of a sulfonated hydrocarbon resin in liquid form conforming to ASTM C260/C260M. The admixture shall be added as a part of the computed mixing water requirements, and be used strictly in accordance with the manufacturer's directions.

2.6.3 Water Reducing Agents

Except when otherwise ordered by the Contracting Officer or noted elsewhere herein, all normal structural concrete shall have a water reducing agent added. The admixture shall be a salt of lignosulforic acid in liquid form conforming to ASTM C494/C494M, Type A. The air entraining action of the water reducing agent shall be taken into account and the air entraining agent limited accordingly.

2.7 REINFORCING BARS

Reinforcing bars shall be formed of new billet steel conforming to ASTM A615/A615M, Grade 60 except as otherwise noted, and shall be free from flaking rust, scale, grease or coatings of any character which would tend to reduce or destroy bond. Reinforcing bars shall be wire brushed before placing concrete if the Contracting Officer deems it necessary. If welding of reinforcing steel is contemplated, mill chemical analysis and recommended welding procedures shall be submitted for approval to the Contracting Officer. No welding of reinforcing steel will be allowed without the written approval of the Contracting Officer, for each individual application.

2.8 WELDED WIRE FABRIC

Welded wire fabric shall conform to ASTM A185/A185M of the sizes indicated. For slabs, flat sheets only shall be used, and rolls will be unacceptable.

2.9 METAL ACCESSORIES

Metal accessories shall include all spacers, chairs, tees, hangers and other devices required to properly fasten and hold reinforcement in place.

2.10 MEMBRANE CURING COMPOUND

A. Membrane curing compound may be used, with the approval of the Contracting Officer, conforming to ASTM C309, Type 1 or 1D, Class B. Compound shall be applied uniformly by spray, leaving no pinholes or

gaps, at a coverage rate not to exceed 200 square feet per gallon.

B. Approved manufacturers, if used:

1. Horncure 3QD or 30C as manufactured by Construction Materials Division, W.R. Grace & Co.,

2. Or equal as made by Sonneborn or Sika Chemical Corporation,

3. Or approved equal.

2.11 FORMS

Forms may be of wood, metal or other approved materials and shall conform to the shape, lines and dimensions of the parts and members of concrete work as shown on the Contract Drawings. Forms shall be substantial and sufficiently tight to prevent leakage of mortar or liquid. Furnish panels in largest practicable sizes to minimize number of joints.

2.12 FORM COATING

Form coating shall be a non-grain raising and non-staining type that will not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface.

2.13 FORM TIES

A. Provide factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spilling concrete surfaces upon removal.

B. Provide ties so that portion remaining within concrete after removal of exterior parts is at least 1 inch from the outer concrete surface.

C. Provide form ties which will not leave a hole larger than 1 inch diameter in the concrete surface.

2.14 CEMENT GROUT

A. Approved Manufacturers:

1. Embeco Pre-Mixed Grout as made by Master Builders, Inc.,

2. Star Grout as made by U.S. Grout Company,

3. Upcon Construction Grout as made by USM, Upco Chemical Division,

4. Or approved equal.

2.15 EPOXY BONDING COMPOUNDS

A. Approved Manufacturers:

1. Concresive as made by Adhesive Engineering Co.,

2. Sikastix Hi-Mod Epoxy as made by Sika Chemical Corp.,

3. Or approved equal.

2.16 PRODUCT INFORMATION

Shop drawings, brochures, and samples shall be submitted for all items to be furnished. Submittals shall include at least one of the following:

1. Shop drawings of reinforcing steel showing details in accordance with ACI.

2. Design mixes shall be submitted for each different contemplated application. The Contracting Officer reserves the right to vary in the field any previously approved design mix so as to compensate for field variables including but not limited to weather conditions, placing conditions, variations in size, gradation or characteristics of aggregate and end of use of the concrete.

PART 3 EXECUTION

3.1 STEEL REINFORCEMENT

3.1.1 General Requirements

1. All reinforcement or reinforcing materials shall be provided as indicated on the Contract Drawings or required by this specification, together with all the necessary wire ties, chairs, spacers, supports, and other devices necessary to install and secure the reinforcement properly. All reinforcement, when placed, shall be free from flaking rust, scale, oil, grease, clay on other coatings, and foreign substances that would reduce or destroy the bond. All reinforcement in any one section shall be placed, supported and secured before the beginning of concrete operations. Unless directed otherwise by the Contracting Officer, reinforcement shall not be bent after being partially embedded in hardened concrete.

2. If reinforcements is required when filling large void spaces left by bedrock removal, Contractor shall provide Contracting Officer with documentation on the layout of reinforcing steel and ties points to bedrock or other structures that will be used.

3. Unless otherwise indicated on the Contract Drawings, the details of reinforcing steel, including bending, splicing and supporting shall conform to ACI Building Code 318 (ACI 318) and Detailing Manual 315 (ACI SP-66).

3.1.2 Placing Reinforcement

Reinforcement shall be accurately placed in accordance with the Contract Drawings and adequately secured in proper position by concrete or metal chairs or spacers which will insure accuracy of position, both horizontally and vertically and will be sufficiently rigid to prevent displacement of the reinforcement during the placing and working of the concrete. On the ground and where otherwise subject to corrosion, concrete or other suitable non-corrodible material shall be used for supporting reinforcement. Where the concrete surface will be exposed to the weather in the finished structure, all reinforcement supports, within specified concrete cover, shall be galvanized or made of a suitable non-corrodible material. Reinforcement steel shall be securely tied at intersections with annealed iron wire, not less than No. 16 gauge, or clips and shall be supported in a

manner that will keep all metal away from exposed concrete surfaces.

3.1.3 Splices

Unless otherwise shown on the Contract Drawings, all bar splices in the main reinforcements shall conform to ACI Building Code 318 (ACI 318) and Detailing Manual 315 (ACI SP-66, with considerations for bar spacing, top bar requirements and class of splices, etc. The lapped ends of the bars shall be either separated sufficiently to allow the embedment of the entire surface of each bar in concrete, or connected as a single continuous bar to develop the full strength of the bar. Splicing shall not be made at the points of maximum stress, nor shall adjacent bars be spliced at the same points but joints shall be staggered. Welded wire fabric shall be lapped a minimum of one and one half squares.

3.1.4 Relation of Bars to Concrete Surfaces

The minimum cover of concrete for all reinforcement shall conform to the dimensions shown on the Contract Drawings, which indicate the clear distance from the edge of the reinforcement to the concrete surface. Where not otherwise shown, the minimum coverage of the concrete over the steel shall be as follows:

Concrete against ground or ledge, without forms	3 inches
Concrete against ground, with forms	2 inches
Concrete exposed to weather or water or tank interior	2 inches
Concrete in beams and columns not exposed to ground or weather or tank interior	1-1/2 inches
Concrete in slabs and walls not exposed to weather or water	3/4 inches

3.2 CONCRETE

3.2.1 Proportions

The cement factor and water cement ration shall be determined by consideration of the specified strength, the water reducing admixtures, the slump required for proper placement, air-entraining requirements, the available and maximum allowable aggregate size and its specific gravity and the amount of water carried on the aggregates. The slumps and maximum sizes of aggregate for various types of construction, as well as the computation of trial mixes shall be as described in ACI 211.1 "Recommended Practice for Select Proportions for Normal and Heavyweight Concrete". All concrete shall be air entrained.

3.2.2 Responsibility

The Contractor shall be responsible for all concrete design mixes and

tests, for determining the suitability of ingredients and the proportions of specified ingredients for each concrete type, of the specified slump and air-entrainment, that will be fully workable for all placing conditions and that will produce finishes acceptable to the Contracting Officer.

3.2.3 Strength Requirements

During the progress of the work test cylinders will be made by the Contracting Officer and tested at the Government's expense and in any case where the strength of the cylinders fails to meet the criteria of ACI 318 -83, Chapter 4, Section 4.7.2.3, the Contracting Officer shall have the right to order the defective concrete removed and proper concrete put in its place or to take such other action as they deem necessary to remedy the situation.

3.2.4 Concrete Slump

The concrete used shall have a maximum slump of 4 inches unless otherwise directed by the Contracting Officer. Slump shall be determined as per ASTM C143/C143M.

3.2.5 Ready Mixed Concrete

It is intended that the major portion of the concrete required for the work be ready mixed in an off-site plant. Small amounts for miscellaneous purposes may be site mixed. All concrete produced in an off-site plant shall be mixed and delivered in accordance with the requirements of the "Standard Specifications for Ready Mixed Concrete", ASTM C94/C94M and these Specifications.

3.2.6 Mixing and Placing

1. Concrete shall be mixed, transported and placed in accordance with the applicable provisions of the Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete (ACI 304R) of the American Concrete Institute and these specifications.

    a. Concrete shall be handled from the mixer, or truck if ready-mixed concrete is used, to the place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients but in no case shall the time elapsing between the addition of the water to the cement or the cement to the aggregates and the placing of concrete in the forms exceed one and one-half hours. In periods of excessive hot weather as previously defined in Paragraph 1.7.3 this time shall be reduced to one hour.

    b. The concrete shall be deposited in the forms as nearly as practicable in the final position to avoid rehandling and shall be so deposited as to maintain a homogeneous plastic surface approximately horizontal. Water shall be removed from all forms, trenches and excavations and the work shall be kept dry while the concrete is being placed. No water shall be thrown on or allowed to flow over or rise upon the concrete until it has had time to become thoroughly set.

    c. The maximum free fall of any controlled density fill shall be limited to 3 feet. Accumulation of concrete on the forms or reinforcement above level of the pour shall be avoided. Concrete that is partially hardened, or has been contaminated by foreign

material or that has been retempered will not be permitted on this project. A concrete pour, once started, shall be carried on as a continuous operation until the placing of the section is completed.

3.2.7 Compaction

Concrete shall be placed in layers not exceeding 12 inches in depth, and each layer shall be compacted by mechanical internal-vibrating equipment supplemented by hand spading, rodding, and tamping as required. Form vibrators will be considered only when internal vibration is impractical and will be allowed only with the written permission of the Contracting Officer. When allowed, the vibrator shall be placed so that motion is horizontal and vibration in any location shall not be continued to the extent that segregation occurs, but vibrators shall be relocated frequently. Vibrators shall not be used to transport concrete within the forms. Concrete shall be thoroughly worked around reinforcement, embedded fixtures and into the corners of the forms. Compaction shall be in accordance with ACI 309R, "Recommended Practice for Consolidation of Concrete" as modified by this Specification.

3.2.8 Curing

Curing shall be accomplished by the use of waterproof paper, curing compounds, "wet" methods (fog spray, damp sand or burlap) or other methods as determined by the Contracting Officer and dependent upon the end use of the concrete. Provisions shall be made for maintaining new concrete in a continuously moist condition for a minimum of 7 days.

3.2.9 General Requirements for Form Work

Forms shall be provided for all concrete not indicated or specified otherwise. Forms shall be set true to line and grade and allowable tolerances specified, and shall be mortar-tight. The Contractor shall be responsible for the adequacy of forms and form supports. Bolts and rods used for internal ties shall be arranged so that when the forms are removed, all metal will not be less than 1-1/2 inches from any surfaces for concrete which will be exposed to weather or water.

3.2.10 Coating

Before placing the concrete, the contact surfaces of forms shall be coated with a non-staining mineral oil or suitable non-staining form coating compound.

3.2.11 Tolerances and Variations

The Contractor shall set and maintain concrete forms to ensure that, after removal of the forms and prior to patching and finishing, no portion of the concrete work will exceed any of the tolerances specified. Except as otherwise specified hereinafter, tolerances shall conform to ACI 347.

3.2.12 Removal of Forms

Forms shall be removed in such a manner as to insure the complete safety of the structure. In no case shall supporting forms or shoring be removed until the members have acquired sufficient strength to support safely their weight and the load thereon. The removal of forms shall be performed with care to prevent marring or injury to concrete. Any damage to the concrete by premature or careless removal of forms shall be repaired by and at the

expense of the Contractor.

3.2.13 Repair of Surface Defects

Immediately after the forms are removed, all form ties shall be cut off below the surface of concrete, and all defective areas, holes, honeycombs, cavities and irregularities cleaned and patched with a stiff mortar of the same composition as the mortar in the original concrete mix.

3.2.14 Filling Holes

Holes left by withdrawal of rods or by removal of end ties shall be filled solid with mortar. Excess mortar at the surface of the wall shall be struck off flush with a cloth.

3.2.15 Finish of Formed Surfaces

Forms shall be stripped as soon as concrete will safely sustain itself and repairs made to surface as soon as forms are stripped. Unsightly ridges or lips on exposed concrete shall be removed by tolling and rubbing. All surfaces requiring rubbing shall be thoroughly washed with water after the rubbing is completed. Voids, holes, stone pockets and loose stones shall be cleaned out and repaired. Provide ties so that portion remaining within concrete after removal of exterior parts is at least, inch from the outer concrete surface. Provide form ties which will not leak a hole larger than 1 inch in diameter in the concrete surface.

3.2.16 Finishing of Related Unformed Surfaces

Tops of exposed beams, walls, parapets, and tops of similar unformed surfaces shall be struck of smooth and be hand steel troweled by cement masons assisted by a field party to continually verify and check correct lines and elevations, so as to produce a smooth hard level surface.

3.2.17 Defective Concrete

Concrete work, not formed as shown on the Contract Drawings, out of alignment or level, or showing a defective surface, shall be removed and completely replaced if directed by the Contracting Officer. Slight imperfections may be patched, provided the permission of the Contracting Officer is obtained prior to patching.

3.2.18 Inserts and Embedded Items

The Contractor shall notify all trades when construction is ready for the setting of anchor bolts, inserts, sleeves, and other built-in equipment, in order that such material shall be set at the proper time. Before placing concrete, care shall be taken to determine that all items to be embedded in concrete are accurately located, firmly secured in place and protected from damage or displacement until securely held by the concrete. All items shall be thoroughly cleaned, free from rust, scale, grease or other coating. Any wood used for removable keys shall be thoroughly dampened before concrete is poured against the wood. The Contractor shall be responsible for any displacement of the items caused by his workmen. Tank anchor bolts of the size and number required by the steel tank manufacturer will be furnished by others and installed as required under this item.

-- End of Section --

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SECTION 32 12 16.99

ASPHALT CAP PAVEMENT
09/17

PART 1 GENERAL

1.1 SCOPE OF WORK

This specification applies to any replacement work or repairs to the asphalt cap on the former CDE facility property. Contractor shall provide all labor, materials, tools, and equipment to install all temporary and permanent paving as shown, specified, and ordered.

1.2 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C117	(2013) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131/C131M	(2014) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D1559	(1989) Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D2172/D2172M	(2017) Standard Test Methods for Quantitative Extraction of Asphalt Binder from Asphalt Mixtures
ASTM D4867/D4867M	(2009; R 2014) Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D546	(1999; R 2017) Standard Test Method for Sieve Analysis of Mineral Filler for Asphalt Paving Mixtures
ASTM D75/D75M	(2014) Standard Practice for Sampling Aggregates
ASTM D979/D979M	(2015) Sampling Bituminous Paving Mixtures
ASTM D3666	(2016) Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

NEW JERSEY DEPARTMENT OF TRANSPORTATION

NJDOT STANDARD SPECIFICATIONS	(2007) New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Commercial Laboratory Approved By The Contracting Officer

SD-05 Design Data

Bituminous Mix Tests

Asphalt Mix Design; G

SD-06 Test Reports

Specific Gravity Of Mineral Filler

Specific Gravity Of Asphalt

Pavement Courses Testing

Aggregates Tests

1.4 QUALITY ASSURANCE

1.4.1 Required Data

The Mix Design shall show the following:

1. Source and proportions, percent by weight, of each ingredient of the mixture.
2. Correct gradation, the percentages passing each size sieve listed in the specifications for the mixture to be used, for the aggregate and mineral filler from each separate source and from each different size to be used in the mixture and for the composite mixture.
3. Amount of material passing the No. 200 sieve determined by dry sieving.
4. Number of blows of hammer compaction per side of molded specimen.
5. Temperature viscosity relationship of the asphalt cement.
6. Stability, flow, percent voids in mineral aggregate, percent air voids, unit weight.
7. Asphalt absorption by the aggregate.
8. Effective asphalt content as percent by weight of total mix.
9. Temperature of the mixture immediately upon completion of mixing.
10. Asphalt performance grade.
11. Curves for the leveling, binder, and wearing courses.

1.4.2 Charts

Plot and submit, on a grain size chart, the specified aggregate gradation band, the job-mix gradation and the job-mix tolerance band.

1.4.3 Selection of Optimum Asphalt Content

Base selection on percent of total mix and the average of values at the following points on the curves for each mix:

1. Stability: Peak.
2. Unit Weight: Peak.
3. Percent Air Voids: Median.

1.4.4 Asphalt Mix Design

Contractor shall submit asphalt mix design and supporting documentation for approval prior to placement of any capping material

1.5 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the site for damage and store with a minimum of handling. Store aggregates in such a manner as to prevent segregation, contamination, or intermixing of the different aggregate sizes.

1.6 ENVIRONMENTAL CONDITIONS

Place bituminous mixture only during dry weather and on dry surfaces. Place courses only when the surface temperature of the underlying course is greater than 45 degrees F for course thicknesses greater than one inch and 55 degrees F for course thicknesses one inch or less.

1.7 CONSTRUCTION EQUIPMENT

Calibrated equipment, such as scales, batching equipment, spreaders and similar equipment, shall have been recalibrated by a calibration laboratory approved by the Contracting Officer within 12 months of commencing work.

1.7.1 Testing Laboratory

Provide a testing laboratory for control and acceptance testing functions during periods of mix production, sampling and testing, and whenever materials subject to the provisions of these specifications are being supplied or tested. The laboratory shall provide adequate equipment, space, and utilities as required for the performance of the specified tests.

1.7.2 Surge and Storage Bins

Use surge and storage bins for temporary storage of hot bituminous mixtures will not be permitted.

1.7.3 Drum-Dryer Mixer

Do not use drum-dryer mixer if specified requirements of the bituminous mixture or of the completed bituminous pavement course cannot be met. If drum-dryer mixer is prohibited, use either batch or continuous mix plants meeting the specifications and producing a satisfactory mix.

1.7.4 Paving Equipment

1.7.4.1 Spreading Equipment

Self-propelled electronically controlled type, unless other equipment is authorized by the Contracting Officer. Equip spreading equipment of the self-propelled electronically controlled type with hoppers, tamping or vibrating devices, distributing screws, electronically adjustable screeds, and equalizing devices. Equipment shall be capable of spreading hot bituminous mixtures without tearing, shoving, or gouging and to produce a finished surface of specified grade and smoothness. Operate spreaders, when laying mixture, at variable speeds between 5 and 45 feet per minute. Design spreader with a quick and efficient steering device; a forward and reverse traveling speed; and automatic devices to adjust to grade and confine the edges of the mixture to true lines. The use of a spreader that leaves indented areas or other objectionable irregularities in the fresh laid mix during operations is prohibited.

1.7.4.2 Rolling Equipment

Self-propelled pneumatic-tired rollers supplemented by three-wheel and tandem type steel wheel rollers. The number, type and weight of rollers shall be sufficient to compact the mixture to the required density without detrimentally affecting the compacted material. Rollers shall be suitable for rolling hot-mix bituminous pavements and capable of reversing without backlash. Pneumatic-tired rollers shall be capable of being operated both forward and backward without turning on the mat, and without loosening the surface being rolled. Equip rollers with suitable devices and apparatus to keep the rolling surfaces wet and prevent adherence of bituminous mixture. Vibratory rollers especially designed for bituminous concrete compaction may be used provided rollers do not impair stability of pavement structure and underlying layers. Repair depressions in pavement surfaces resulting from use of vibratory rollers. Rollers shall be self-propelled, single or dual vibrating drums, and steel drive wheels, as applicable; equipped with variable amplitude and separate controls for energy and propulsion.

1.7.4.3 Hand Tampers

Minimum weight of 25 pounds with a tamping face of not more than 50 square inches.

1.7.4.4 Mechanical Hand Tampers

Commercial type, operated by pneumatic pressure or by internal combustion.

PART 2 PRODUCTS

2.1 PRODUCTS

2.1.1 Paving Materials (Job-Mix Designs)

1. Crushed stone: In accordance with AASHTO #57 coarse aggregate stone, uniform in texture and quality and free of organic matter, wood, garbage, metal, debris, or lumps of clay.

Crushed Stone Gradation	
SIEVE SIZE	PASSING
1.5 inches	100 percent
1 inch	95 to 100 percent
0.5 inch	25 to 80 percent
#4	0 to 10 percent
#8	0 to 5 percent

2. Surface course (Mix I-4) shall conform to the NJDOT STANDARD SPECIFICATIONS, as amended.

3. Prime coat as per Section 404.13 of NJDOT STANDARD SPECIFICATIONS.

2.2 SOURCE QUALITY CONTROL

2.2.1 Laboratory

Employ a commercial laboratory approved by the Contracting Officer to perform testing. The laboratory used to perform all sampling and testing shall meet the requirements of ASTM D3666 and NJDOT. A certification signed by the manager of the laboratory stating that it meets these requirements or clearly listing all deficiencies shall be submitted to the Contracting Officer prior to the start of construction. The certification shall contain at a minimum:

1. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.
2. A listing of equipment to be used in developing the job mix.
3. A copy of the laboratory's quality control system.
4. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

2.2.2 Tests

Perform testing in accordance with the NJDOT STANDARD SPECIFICATIONS Sections 301, 305, 404, and 903.

PART 3 EXECUTION

3.1 GENERAL

3.1.1 Subgrade

Keep placement surfaces free of water, debris, and foreign material during placement and compaction of fill and backfill materials. Do not place fill when raining. Confirm that subgrade soil layer meets compaction standard prior to placement of asphalt cap.

3.1.2 Crushed Stone

Spread and tamp crushed stone to thickness shown on Contract Drawings.

3.1.3 Base Course

Base Course shall be constructed in accordance with NJDOT STANDARD SPECIFICATIONS Section 301.

3.1.4 Surface Course

Surface Course shall be constructed in accordance with NJDOT STANDARD SPECIFICATIONS Section 404.

3.2 TEMPORARY CAP

Following backfill of the clean corridor, a temporary asphalt cap shall be placed over the clean corridor area to minimize infiltration prior to construction of the permanent asphalt cap. Construction of the temporary cap shall comply with the requirements of this Section except that the cap shall consist of a minimum of 2 inches of Base Course material placed over the crushed stone.

To maintain the integrity of the containment system for the contaminated soil under the asphalt cap, the temporary cap shall be repaired if construction of the water line connection damages the temporary cap. The temporary use of plastic sheeting during construction of the connection system is subject to the approval of the Contracting Officer contingent on the ability of the proposed system to maintain containment.

If any portion of the temporary cap fails prior to construction of the permanent cap, that material shall be removed and a new temporary cap installed.

Prior to installation of the surface course for the final cap, construction in accordance with this Section, the Contractor shall mill the surface course of the surrounding material at least 3 feet in all direction from the edge of the clean corridor and a permanent overlay placed tieing the new cap segment into the existing cap.

3.3 TRANSPORTATION OF BITUMINOUS MIXTURES

Transport bituminous material from the mixing plant to the paving site in trucks having tight, clean, smooth beds that have been coated with a minimum amount of concentrated solution of hydrated lime and water or other approved coating to prevent adhesion of the mixture to the truck. Petroleum products will not be permitted for coating truck. If air temperature is less than 60 degrees F or if haul time is greater than 30 minutes, cover each load with canvas or other approved material of ample size to protect the mixture from the loss of heat. Make deliveries so that the spreading and rolling of all the mixture prepared for one day's run can be completed during daylight, unless adequate approved artificial lighting is provided. Deliver mixture to area to be paved so that the temperature at the time of dumping into the spreader is within the range specified herein. Reject loads that are below minimum temperature, that have crusts of cold unworkable material, or that have been wet excessively by rain. Hauling over freshly laid material is prohibited.

The Contracting Officer shall have access at all times to all areas of the

plant for checking adequacy of equipment, inspecting operation of the plant, verifying weights, proportions, and material properties, checking the temperatures maintained in the preparation of the mixtures, and taking samples.

3.4 SPRAYING OF CONTACT SURFACES

Spray surface of crushed stone with a thin coat of emulsion or other approved bituminous material prior to placing the bituminous mixture.

3.5 PLACEMENT

3.5.1 Machine Spreading

The range of temperatures of the mixtures at the time of spreading shall be between 250 degrees F and 300 degrees F. Bituminous concrete having temperatures less than minimum spreading temperature when dumped into the spreader will be rejected. Adjust spreader and regulate speed so that the surface of the course is smooth and continuous without tears and pulling, and of such depth that, when compacted, the surface conforms with the cross section, grade, and contour indicated. Unless otherwise directed, begin the placing along the centerline of areas to be paved on a crowned section or on the high side of areas with a one-way slope. Place mixture in consecutive adjacent strips having a minimum width of 10 feet, except where the edge lanes require strips less than 10 feet to complete the area. Construct longitudinal joints and edges to true line markings. Establish lines parallel to the centerline of the area to be paved, and place string lines coinciding with the established lines for the spreading machine to follow. Provide the number and location of the lines needed to accomplish proper grade control. When specified grade and smoothness requirements can be met for initial lane construction by use of an approved long ski-type device of not less than 30 feet in length and for subsequent lane construction by use of a short ski or shoe, in-place string lines for grade control may be omitted. Place mixture as nearly continuous as possible and adjust the speed of placing as needed to permit proper rolling.

Minimum Spreading Temperature								
Base Temp in Degrees F*	Wearing, Binder, or Leveling Course Thickness, Inches							
	1/2	3/4	1	1 1/2	2	3	3 1/2	4
20-32**	---	---	---	---	---	---	275**	260**
+32-40**	---	---	---	---	295	280	270	260
+40-50	---	---	---	300	285	275	265	255
+50-60	---	---	300	290	280	270	260	255
+60-70	---	300	290	280	275	265	255	250
+70-80	300	290	280	275	270	265	255	250
+80-90	290	280	275	270	265	260	250	250

Minimum Spreading Temperature								
Base Temp in Degrees F*	Wearing, Binder, or Leveling Course Thickness, Inches							
	1/2	3/4	1	1 1/2	2	3	3 1/2	4
+90	280	275	270	265	265	255	250	250

Table Notes:
* Base on which mix is placed.
** Increase by 15 degrees when placement is on base or subbase containing frozen moisture. Normally, hot mix paving is not allowed on base temperatures below 45 degrees F.

3.5.2 Shoveling, Raking, and Tamping After Machine-Spreading

Shovelers and rakers shall follow the spreading machine. Add or remove hot mixture and rake the mixture as required to obtain a course that when completed will conform to requirements specified herein. Broadcasting or fanning of mixture over areas being compacted is prohibited. When segregation occurs in the mixture during placing, suspend spreading operation until the cause is determined and corrected. Correct irregularities in alignment left by the spreader by trimming directly behind the machine. Immediately after trimming, compact edges of the course by tamping laterally with a metal lute or by other approved methods. Distortion of the course during tamping is prohibited.

3.5.3 Hand-Spreading in Lieu of Machine-Spreading

In areas where the use of machine spreading is impractical, spread mixture by hand. The range of temperatures of the mixtures when dumped onto the area to be paved shall be between 250 and 300 degrees F. Mixtures having temperatures less than minimum spreading temperature when dumped onto the area to be paved will be rejected. Spread hot mixture with rakes in a uniformly loose layer of a thickness that, when compacted, will conform to the required grade, thickness, and smoothness. During hand spreading, place each shovelful of mixture by turning the shovel over in a manner that will prevent segregation. Do not place mixture by throwing or broadcasting from a shovel. Do not dump loads any faster than can be properly handled by the shovelers and rakers.

3.6 COMPACTION OF MIXTURE

Compact mixture by rolling. Begin rolling as soon as placement of mixture will bear rollers. Delays in rolling freshly spread mixture shall not be permitted. Start rolling longitudinally at the extreme sides of the lanes and proceed toward center of pavement, or toward high side of pavement with a one-way slope. Operate rollers so that each trip overlaps the previous adjacent strip by at least one foot. Alternate trips of the roller shall be of slightly different lengths. Conduct tests for conformity with the specified crown, grade and smoothness immediately after initial rolling. Before continuing rolling, correct variations by removing or adding materials as necessary. If required, subject course to diagonal rolling with the steel wheeled roller crossing the lines of the previous rolling while mixture is hot and in a compactable condition. Speed of the rollers shall be slow enough to avoid displacement of hot mixture. Correct displacement of mixture immediately by use of rakes and fresh mixture, or

remove and replace mixture as directed. Continue rolling until roller marks are eliminated and course has a density of at least 90 percent but not more than 100 percent of that attained in a laboratory specimen of the same mixture prepared in accordance with ASTM D1559. During rolling, moisten wheels of the rollers enough to prevent adhesion of mixture to wheels, but excessive water is prohibited. Operation of rollers shall be by competent and experienced operators. Provide sufficient rollers for each spreading machine in operation on the job and to handle plant output. In places not accessible to the rollers, compact mixture thoroughly with hot hand tampers. Skin patching of an area after compaction is prohibited. Remove mixture that becomes mixed with foreign materials or is defective and replace with fresh mixture compacted to the density specified herein. Roller shall pass over unprotected edge of the course only when laying of course is to be discontinued for such length of time as to permit mixture to become cold.

3.7 JOINTS

Joints shall present the same texture and smoothness as other portions of the course, except permissible density at the joint may be up to 2 percent less than the specified course density. Carefully make joints between old and new pavement or within new pavements in a manner to ensure a thorough and continuous bond between old and new sections of the course. Vertical contact surfaces of previously constructed sections that are coated with dust, sand, or other objectionable material shall be painted with a thin uniform coat of emulsion or other approved bituminous material just before placing fresh mixture.

3.7.1 Transverse

Roller shall pass over unprotected end of freshly laid mixture only when laying of course is to be discontinued. Cut back the edge of previously laid course to expose an even, vertical surface for the full thickness of the course. When required, rake fresh mixture against joints, thoroughly tamp with hot tampers, smooth with hot smoothers, and roll.

3.7.2 Longitudinal Joints

Space 6 inches apart. Adjust screed to permit compaction to produce a smooth dense joint. Remove and waste excess material. When edges of longitudinal joints are irregular, honeycombed, or poorly compacted, cut back unsatisfactory sections of joint and expose an even vertical surface for the full thickness of the course. When required, rake fresh mixture against joint, thoroughly tamp with hot tampers, smooth with hot smoothers, and roll while hot.

3.8 FIELD QUALITY CONTROL

3.8.1 Sampling

3.8.1.1 Aggregates At Source

Prior to production and delivery of aggregates, take at least one initial sample in accordance with ASTM D75/D75M at the source. Collect each sample by taking three incremental samples at random from the source material to make a composite sample of not less than 50 pounds. Repeat the sampling when the material source changes or when testing reveals unacceptable deficiencies or variations from the specified grading of materials.

3.8.1.2 Cold Feed Aggregate Sampling

Take two samples daily from the belt conveying materials from the cold feed. Collect materials in three increments at random to make a representative composite sample of not less than 50 pounds. Take samples in accordance with ASTM D75/D75M.

3.8.1.3 Coarse and Fine Aggregates

Take a 50 pound sample from the cold feed at least once daily for sieve analyses and specific gravity tests. Additional samples may be required to perform more frequent tests when analyses show deficiencies, or unacceptable variances or deviations. The method of sampling is as specified herein for aggregates.

3.8.1.4 Mineral Filler

ASTM D546. Take samples large enough to provide ample material for testing. Include the Specific Gravity of Mineral Filler.

3.8.1.5 Pavement and Mixture

Take plant samples for the determination of mix properties and field samples for thickness and density of the completed pavements. Furnish tools, labor and material for samples, and satisfactory replacement of pavement. Take samples and tests at not less than frequency specified hereinafter and at the beginning of plant operations; for each day's work as a minimum; each change in the mix or equipment; and as often as directed. Accomplish sampling in accordance with ASTM D979/D979M. Include the Specific Gravity of Asphalt.

3.8.2 Testing

3.8.2.1 Aggregates Tests

Perform the following Tests:

a. Gradation: ASTM C136/C136M.
b. Mineral Filler Content: ASTM D546.
c. Abrasion: ASTM C131/C131M for wear (Los Angeles test). Perform one test initially prior to incorporation into the work and each time the source is changed.

3.8.2.2 Bituminous Mix Tests

Test one sample for each 500 tons, or fraction thereof, of the uncompacted mix for extraction in accordance with ASTM D2172/D2172M; perform a sieve analysis on each extraction sample in accordance with ASTM C136/C136M and ASTM C117. Test one sample for each 500 tons or fraction thereof for stability and flow in accordance with ASTM D1559. Test one sample for each material blend for Tensile Strength Ratio in accordance with ASTM D4867/D4867M.

3.8.2.3 Pavement Courses Testing

Perform the following tests:

a. Density: Compare density of in-place material against laboratory specimen or certificates on same bituminous concrete mixture. Use

nuclear devices to determine densities. A minimum of one in-place density test shall be performed for every 500 square yards of pavement and a minimum of one in-place density test for each property at which pavement is constructed.

Minimum acceptable density of in-place course material will be 90 percent of the recorded laboratory specimen or certificate density. Maximum acceptable density will be 98 percent.

b. Thickness: Determine thickness of each course from samples taken for the field density test. The maximum allowable deficiency at any point shall not be more than 1/4 inch less than the thickness for the indicated course. Average thickness of course or of combined courses shall be not less than the indicated thickness. Where a deficiency exceeds the specified tolerances, correct each such representative area or areas by removing the deficient pavement and replacing with new pavement.

c. Smoothness: Straightedge test the compacted surface of each course as work progresses. Apply straightedge parallel with and at right angles to the centerline after final rolling. Unevenness of each course shall not vary more than 1/4 inch in 10 feet; variations in the wearing course shall not vary more than 1/8 inch in 10 feet. Correct each portion of the pavement showing irregularities greater than that specified.

d. Finished Grades: Finish grades of each course placed shall not vary from the finish elevations, profiles, and cross sections indicated by more than 1/4 inch. Finished surface of the final wearing course will be tested by running lines of levels at intervals of 10 feet longitudinally and transversely to determine elevations of completed pavement. Within 45 days after completion of final placement, correct deficient paved areas by removing existing work and replacing with new materials that meet the specifications. Skin patching for correcting low areas is prohibited.

e. Finish Surface Texture of Surface Course: Visually check final surface texture for uniformity and reasonable compactness and tightness. Final wearing course with a surface texture having undesirable irregularities such as segregation, cavities, pulls or tears, checking, excessive exposure of coarse aggregates, sand streaks, indentations, ripples, or lack of uniformity shall be repaired as directed by the Contracting Officer.

3.9 PROTECTION

Do not permit vehicular traffic, including heavy equipment, on pavement until surface temperature has cooled to at least 120 degrees F. Measure surface temperature by approved surface thermometers or other satisfactory methods.

3.10 PATCHING

As directed by Contracting Officer, in writing, remove and replace all defective areas. Cut out such areas and fill with fresh bituminous concrete. Compact to the required density.

3.11 CLEANING AND PROTECTION

3.11.1 Cleaning

After completion of paving operations, clean surfaces of excess or spilled bituminous materials and all foreign matter.

3.11.2 Cover Openings

Cover openings of drainage structures in the area of paving until permanent coverings are placed.

3.12 FINISHING

Cover openings of drainage structures in the area of paving until permanent coverings are placed.

The Contractor shall be responsible for repairing all incidental damage and settlement that occurs in roadways as result of construction activities. Material and labor to complete all repair work, in accordance with all local codes and ordinances, shall be at the Contractor's expense. The Government will not provide additional compensation for this work.

-- End of Section --

SECTION 32 12 17.99

PAVEMENT FOR ROADS
08/09

PART 1 GENERAL

Any inconsistencies with Borough of South Plainfield requirements for road construction, the Borough requirements shall apply.

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 156	(2013; R 2017) Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
AASHTO M 320	(2016) Standard Specification for Performance-Graded Asphalt Binder

ASTM INTERNATIONAL (ASTM)

ASTM C131/C131M	(2014) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D2172/D2172M	(2017) Standard Test Methods for Quantitative Extraction of Asphalt Binder from Asphalt Mixtures
ASTM D2950/D2950M	(2014) Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D3666	(2016) Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D4125/D4125M	(2010) Asphalt Content of Bituminous Mixtures by the Nuclear Method
ASTM D546	(1999; R 2017) Standard Test Method for Sieve Analysis of Mineral Filler for Asphalt Paving Mixtures
ASTM D6307	(2016) Standard Test Method for Asphalt Content of Hot Mix Asphalt by Ignition Method

ASTM D75/D75M	(2014) Standard Practice for Sampling Aggregates
ASTM D979/D979M	(2015) Sampling Bituminous Paving Mixtures

NEW JERSEY DEPARTMENT OF TRANSPORTATION

NJDOT STANDARD SPECIFICATIONS	(2007) New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Mix Design; G

Quality Control; G

SD-04 Samples

Asphalt Cement Binder

Aggregates

SD-06 Test Reports

Aggregates; G

QC Monitoring

SD-07 Certificates

Asphalt Cement Binder; G

Testing Laboratory

1.3 QUALITY ASSURANCE

1.3.1 Quality Assurance Plan

Develop and submit an approved Quality Control Plan. Submit aggregate and QC test results. Do not produce hot-mix asphalt for payment until the quality control plan has been approved addressing all elements which affect the quality of the pavement including, but not limited to:

1. Mix Design
2. Aggregate Grading
3. Quality of Materials
4. Stockpile Management
5. Proportioning
6. Mixing and Transportation

7. Mixture Volumetrics
8. Moisture Content of Mixtures
9. Placing and Finishing
10. Joints
11. Compaction
12. Surface Smoothness

1.3.2 Asphalt Job Mix Design

Contractor shall submit asphalt mix design and supporting documentation for approval at least 15 days prior to placement of any capping material. The Mix Design shall show the following:

1. Source and proportions, percent by weight, of each ingredient of the mixture.

2. Correct gradation, the percentages passing each size sieve listed in the specifications for the mixture to be used, for the aggregate and mineral filler from each separate source and from each different size to be used in the mixture and for the composite mixture.

3. Amount of material passing the No. 200 sieve determined by dry sieving.

4. Number of blows of hammer compaction per side of molded specimen.

5. Temperature viscosity relationship of the asphalt cement.

6. Stability, flow, percent voids in mineral aggregate, percent air voids, unit weight.

7. Asphalt absorption by the aggregate.

8. Effective asphalt content as percent by weight of total mix.

9. Temperature of the mixture immediately upon completion of mixing.

10. Asphalt performance grade.

11. Curves for the leveling, binder, and wearing courses.

12. Properties as stated in the Standard Specifications, for at least four different asphalt contents other than optimum, two below optimum, and two above optimum.

1.3.3 Charts

Plot and submit, on a grain size chart, the specified aggregate gradation band, the job-mix gradation and the job-mix tolerance band.

1.3.4 Selection of Optimum Asphalt Content

Base selection on percent of total mix and the average of values at the following points on the curves for each mix:

1. Stability: Peak.
2. Unit Weight: Peak.
3. Percent Air Voids: Median.

1.4 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the site for damage and store with a minimum of handling. Store aggregates in such a manner as to prevent segregation, contamination, or intermixing of the different aggregate sizes.

1.5 ENVIRONMENTAL CONDITIONS

Place bituminous mixture only during dry weather and on dry surfaces. Do not apply asphalt materials or place asphalt mixes when application surface is wet.

Place courses only when the surface temperature of the underlying course is greater than 45 degrees F for course thicknesses greater than one inch and 55 degrees F for course thicknesses of one inch or less. Measure temperature in shaded areas away from heat sources or wet surfaces.

1.6 TESTING LABORATORY

1.6.1 Testing Laboratory

Provide a testing laboratory to perform control and acceptance testing functions during periods of mix production, sampling and testing, and whenever materials subject to the provisions of these specifications are being supplied or tested. The laboratory shall provide adequate equipment, space, and utilities as required for the performance of the specified tests.

1.6.2 Qualifications

The laboratory used to perform all sampling and testing shall meet the requirements of ASTM D3666 and NJDOT STANDARD SPECIFICATIONS. A certification signed by the manager of the laboratory stating that it meets these requirements or clearly listing all deficiencies shall be submitted to the Contracting Officer prior to the start of construction. The certification shall contain as a minimum:

1. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.

2. A listing of equipment to be used in developing the job mix.

3. A copy of the laboratory's quality control system.

4. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

1.6.3 Tests

Perform testing in accordance with the NJDOT STANDARD SPECIFICATIONS Sections 301, 305, 404, and 903.

1.7 TEMPORARY PAVEMENT

Following backfilling but prior to final paving, temporary pavement shall be placed over the entire width of the trench to provide a stable surface for vehicle traffic. Construction of the temporary paving shall comply with the requirements of this Section except that the pavement shall consist of a minimum of 2 to 4 inches of Base Course material placed over the compacted crushed stone layer.

The temporary use of steel plates as an alternative to temporary pavement is subject to the approval of the Contracting Officer contingent on the ability of the proposed system to sustain traffic volumes.

If any portion of the temporary pavement fails prior to construction of the permanent cap, that material shall be removed and a new temporary cap installed.

Prior to installation of the surface course for the final cap, the Contractor shall grind off the surface course of the surrounding material at least 3 feet in all directions and place a permanent overlay tieing into the new cap segment in accordance with this specification.

1.8 FINAL PAVEMENT

In accordance with the requirements of the Borough of South Plainfield, the Contractor shall mill and repave the entire road surface, from edge to edge or curb to curb, for the full length of the trenches excavated in the public right of way. This work shall be performed in accordance with the ordinances of the Borough and the specifications of the Department of Public Works.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Perform the work consisting of pavement courses composed of mineral aggregate and asphalt material heated and mixed in a central mixing plant and placed on a prepared course. HMA designed and constructed in accordance with this section shall conform to the lines, grades, thicknesses, and typical cross sections indicated in the Contract Drawings. Construct each course in accordance with Borough of South Plainfield specifications.

2.2 PRODUCTS

JMF-mix design shall comply with the following standards or the current Borough of South Plainfield design mix requirements if different from the following:

1. Subgrade shall be crushed stone in accordance with Section 31 23 00.99 TRENCHING AND BACKFILL.

2. Surface course (Mix 9.5M 64) shall conform to the NJDOT STANDARD SPECIFICATIONS, as amended.

3. Base course (Mix 19 M 64) shall conform to the NJDOT STANDARD SPECIFICATIONS, as amended.

4. Prime coat and tack Coat in accordance with NJDOT STANDARD SPECIFICATIONS.

2.2.1 Samples

Submit a 5 gallon sample of asphalt cement binder for mix design verification. Asphalt cement binder shall conform to AASHTO M 320

Performance Grade (PG).

Submit sufficient material of aggregates, for each aggregate used, for grain size analysis.

PART 3 EXECUTION

3.1 ASPHALT MIXING PLANT

Plants used for the preparation of hot-mix asphalt shall conform to the requirements of AASHTO M 156 with the following changes:

Provide the Contracting Officer with access at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant; verifying weights, proportions, and material properties; checking the temperatures maintained in the preparation of the mixtures and for taking samples. Provide assistance as requested, for the Government to procure any desired samples.

3.1.1 Surge and storage bins

Use of surge and storage bins for temporary storage of hot bituminous mixtures is not be permitted.

3.1.2 Drum-Dryer Mixer

Do not use drum-dryer mixer if specified requirements of the bituminous mixture or of the completed bituminous pavement course cannot be met. If drum-dryer mixer is prohibited, use either batch or continuous mix plants meeting the specifications and producing a satisfactory mix.

3.2 CONSTRUCTION EQUIPMENT

Calibrated equipment, such as scales, batching equipment, spreaders and similar equipment, shall have been recalibrated by a calibration laboratory approved by the Contracting Officer within 12 months of commencing work.

3.2.1 Hauling Equipment

Provide trucks for hauling hot-mix asphalt having tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other approved material. Petroleum based products shall not be used as a release agent. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers (tarps) shall be securely fastened.

3.2.2 Spreading Equipment

Self-propelled electronically controlled type, unless other equipment is authorized by the Contracting Officer. Equip spreading equipment of the self-propelled electronically controlled type with hoppers, tamping or vibrating devices, distributing screws, electronically adjustable screeds, and equalizing devices. Equipment shall be capable of spreading hot bituminous mixtures without tearing, shoving, or gouging and to produce a finished surface of specified grade and smoothness. Operate spreaders,

when laying mixture, at variable speeds between 5 and 45 feet per minute. Design spreader with a quick and efficient steering device; a forward and reverse traveling speed; and automatic devices to adjust to grade and confine the edges of the mixture to true lines. The use of a spreader that leaves indented areas or other objectionable irregularities in the fresh laid mix during operations is prohibited.

3.2.3 Automatic Grade Controls

Equip the paver with a control system capable of automatically maintaining the specified screed elevation. The control system shall be automatically actuated from either a reference line and/or through a system of mechanical sensors or sensor-directed mechanisms or devices which will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1 percent. A transverse slope controller shall not be used to control grade. Provide controls capable of working in conjunction with any of the following attachments:

1. Ski-type device of not less than 30 feet in length.

2. Taut stringline set to grade.

3. Short ski or shoe for joint matching.

4. Laser control.

3.2.4 Rolling Equipment

Self-propelled pneumatic-tired rollers supplemented by three-wheel and tandem type steel wheel rollers. The number, type and weight of rollers shall be sufficient to compact the mixture to the required density without detrimentally affecting the compacted material. Rollers shall be suitable for rolling hot-mix bituminous pavements and capable of reversing without backlash. Pneumatic-tired rollers shall be capable of being operated both forward and backward without turning on the mat, and without loosening the surface being rolled. Equip rollers with suitable devices and apparatus to keep the rolling surfaces wet and prevent adherence of bituminous mixture. Vibratory rollers especially designed for bituminous concrete compaction may be used provided rollers do not impair stability of pavement structure and underlying layers. Repair depressions in pavement surfaces resulting from use of vibratory rollers. Rollers shall be self-propelled, single or dual vibrating drums, and steel drive wheels, as applicable; equipped with variable amplitude and separate controls for energy and propulsion.

3.2.5 Hand Tampers

Minimum weight of 25 pounds with a tamping face of not more than 50 square inches.

3.2.6 Mechanical Hand Tampers

Commercial type, operated by pneumatic pressure or by internal combustion.

3.3 PREPARATION OF ASPHALT BINDER MATERIAL

Heat the asphalt cement material avoiding local overheating and providing a continuous supply of the asphalt material to the mixer at a uniform

temperature. The temperature of unmodified asphalts shall be no more than 325 degrees F when added to the aggregates.

3.4 PREPARATION OF MINERAL AGGREGATE

Heat and dry the aggregate for the mixture prior to mixing. No damage shall occur to the aggregates due to the maximum temperature and rate of heating used. The temperature of the aggregate and mineral filler shall not exceed 350 degrees F when the asphalt cement is added. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

3.5 PREPARATION OF HOT-MIX ASPHALT MIXTURE

The aggregates and the asphalt cement shall be weighed or metered and introduced into the mixer in the amount specified by the JMF. Mix the combined materials until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but no less than 25 seconds for batch plants.

3.6 PREPARATION OF THE UNDERLYING SURFACE

Immediately before placing the hot mix asphalt (base course), clean the underlying course of dust and debris and apply a prime coat in accordance with NJDOT STANDARD SPECIFICATIONS. Apply uniformly to clean, dry surfaces avoiding overlapping of applications. Do not apply when moisture content of upper 75 millimeters (3 inches) of base exceeds optimum moisture content of base, or if free moisture is present. Application Rate: Minimum 70 (0.68) to maximum 2.28 liters per square meter of surface area (0.15 to 0.50 gallons per square yard). Remove or redistribute excess material. Allow a minimum of 24 hours for curing of primed surface before placing asphalt concrete.

Immediately before placing the surface coat, clean the underlying course of dust and debris and apply a tack coat in accordance with NJDOT STANDARD SPECIFICATIONS. Apply uniformly to clean, dry surfaces avoiding overlapping of applications. Do not apply more tack coat than necessary for the day's paving operation. Touchup missed or lightly coated surfaces and remove excess material. Application Rate: Minimum 0.25 liter to maximum 0.70 liter of asphalt (residual if diluted emulsified asphalt) per square meter (0.05 to 0.15 gallon per square yard) of surface area. If multiple lifts are used in the placement of a layer of pavement, apply tack coat between lifts.

3.7 TESTING LABORATORY

Submit certification of compliance and Plant Scale Calibration Certification. The Government will inspect the laboratory equipment and test procedures prior to the start of hot mix operations for conformance to ASTM D3666. The laboratory shall maintain the Corps certification for the duration of the project. A statement signed by the manager of the laboratory stating that it meets these requirements or clearly listing all deficiencies shall be submitted to the Contracting Officer prior to the start of construction. The statement shall contain as a minimum:

a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.

b. A copy of the laboratory's quality control system.

c. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

3.8 TRANSPORTING AND PLACING

3.8.1 Traffic Control

All work shall be in accordance with the approved Traffic Control plan prepared in accordance with Section 01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS.

3.8.2 Transporting

Transport the hot-mix asphalt from the mixing plant to the site in clean, tight vehicles. Schedule deliveries so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Provide adequate artificial lighting for night placements. Hauling over freshly placed material will not be permitted until the material has been compacted as specified, and allowed to cool to 140 degrees F. To deliver mix to the paver, use a material transfer vehicle operated to produce continuous forward motion of the paver.

If air temperature is less than 60 degrees F or if haul time is greater than 30 minutes, cover each load with canvas or other approved material of ample size to protect the mixture from the loss of heat. Make deliveries so that the spreading and rolling of all the mixture prepared for one day's run can be completed during daylight, unless adequate approved artificial lighting is provided.

Deliver mixture to area to be paved so that the temperature at the time of dumping into the spreader is within the range specified herein. Reject loads that are below minimum temperature, that have crusts of cold unworkable material, or that have been wet excessively by rain. Hauling over freshly laid material is prohibited.

3.8.3 Placing

Place and compact the mix at a temperature suitable for obtaining density, surface smoothness, and other specified requirements. Upon arrival, place the mixture to the full width by an asphalt paver; it shall be struck off in a uniform layer of such depth that, when the work is completed, it will have the required thickness and conform to the grade and contour indicated. Regulate the speed of the paver to eliminate pulling and tearing of the asphalt mat. Unless otherwise permitted, placement of the mixture shall begin along the centerline of a crowned section or on the high side of areas with a one-way slope. Place the mixture in consecutive adjacent strips having a minimum width of 10 feet. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 1 foot; however, the joint in the surface course shall be at the centerline of the pavement. Transverse joints in one course shall be offset by at least 10 feet from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet. On isolated areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and luted by hand tools.

3.9 COMPACTION OF MIXTURE

After placing, the mixture shall be thoroughly and uniformly compacted by rolling. Compact the surface as soon as possible without causing displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once. Furnish sufficient rollers to handle the output of the plant. Continue rolling until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained. To prevent adhesion of the mixture to the roller, keep the wheels properly moistened but excessive water will not be permitted. In areas not accessible to the roller, the mixture shall be thoroughly compacted with hand tampers. Any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or is in any way defective shall be removed full depth, replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching will not be allowed.

3.10 JOINTS

The formation of joints shall be performed ensuring a continuous bond between the courses and to obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

3.10.1 Transverse Joints

Do not pass the roller over the unprotected end of the freshly laid mixture, except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing material at the joint. Remove the cutback material from the project. In both methods, all contact surfaces shall be given a light tack coat of asphalt material before placing any fresh mixture against the joint.

3.10.2 Longitudinal Joints

Longitudinal joints which are irregular, damaged, uncompacted, cold (less than 175 degrees F at the time of placing adjacent lanes), or otherwise defective, shall be cut back a maximum of 3 inches from the top of the course with a cutting wheel to expose a clean, sound vertical surface for the full depth of the course. All cutback material shall be removed from the project. All contact surfaces shall be given a light tack coat of asphalt material prior to placing any fresh mixture against the joint. The Contractor will be allowed to use an alternate method if it can be demonstrated that density, smoothness, and texture can be met.

3.11 FIELD QUALITY CONTROL

3.11.1 Quality Control Testing

Perform all quality control tests applicable to these specifications and as set forth in the Quality Control Program. The testing program shall include, but shall not be limited to, tests for the control of asphalt

content, aggregate gradation, temperatures, aggregate moisture, moisture in the asphalt mixture, laboratory air voids, stability (NA for Superpave), flow (NA for Superpave), in-place density, grade and smoothness. Develop a Quality Control Testing Plan as part of the Quality Control Program.

3.11.2 At Source Sampling

A. Prior to production and delivery of aggregates, take at least one initial sample in accordance with ASTM D75/D75M at the source. Collect each sample by taking three incremental samples at random from the source material to make a composite sample of not less than 50 pounds. Repeat the sampling when the material source changes or when testing reveals unacceptable deficiencies or variations from the specified grading of materials.

B. Take two samples daily from the belt conveying materials from the cold feed. Collect materials in three increments at random to make a representative composite sample of not less than 50 pounds. Take samples in accordance with ASTM D75/D75M.

C. Take a 50 pound sample from the cold feed at least once daily for sieve analyses and specific gravity tests. Additional samples may be required to perform more frequent tests when analyses show deficiencies, or unacceptable variances or deviations. The method of sampling is as specified herein for aggregates.

D. For Mineral Filler use ASTM D546. Take samples large enough to provide ample material for testing. Include the Specific Gravity of Mineral Filler.

E. Take plant samples for the determination of mix properties and field samples for thickness and density of the completed pavements. Furnish tools, labor and material for samples, and satisfactory replacement of pavement. Take samples and tests at not less than frequency specified hereinafter and at the beginning of plant operations; for each day's work as a minimum; each change in the mix or equipment; and as often as directed. Accomplish sampling in accordance with ASTM D979/D979M. Include the Specific Gravity of Asphalt.

3.11.3 Bituminous Mix

A minimum of one test per 500 tons, or fraction thereof, to determine asphalt content will be performed per lot by one of the following methods: the extraction method in accordance with ASTM D2172/D2172M, Method A or B, the ignition method in accordance with ASTM D6307, or the nuclear method in accordance with ASTM D4125/D4125M. Calibrate the ignition oven or the nuclear gauge for the specific mix being used. For the extraction method, determine the weight of ash, as described in ASTM D2172/D2172M, as part of the first extraction test performed at the beginning of plant production; and as part of every tenth extraction test performed thereafter, for the duration of plant production. The last weight of ash value obtained shall be used in the calculation of the asphalt content for the mixture.

3.11.4 Aggregate

Perform the following tests:

A. Gradation: ASTM C136/C136M.

B. Mineral Filler Content: ASTM D546.

C. Abrasion: ASTM C131/C131M for wear (Los Angeles test). Perform one test initially prior to incorporation into the work and each time the source is changed.

3.11.5 Pavement Course Testing

Perform the following tests:

A. Density: Compare density of in-place material against laboratory specimen or certificates on same bituminous concrete mixture. Use nuclear devices to determine densities. A minimum of one in-place density test shall be performed for every 500 square yards of pavement and a minimum of one in-place density test for each property at which pavement is constructed.

Conduct any necessary testing to ensure the specified density is achieved. A nuclear gauge may be used to monitor pavement density in accordance with ASTM D2950/D2950M.

Minimum acceptable density of in-place course material will be 90 percent of the recorded laboratory specimen or certificate density. Maximum acceptable density will be 98 percent.

B. Thickness: Determine thickness of each course from samples taken for the field density test. The maximum allowable deficiency at any point shall not be more than 1/4 inch less than the thickness for the indicated course. Average thickness of course or of combined courses shall be not less than the indicated thickness. Where a deficiency exceeds the specified tolerances, correct each such representative area or areas by removing the deficient pavement and replacing with new pavement.

C. Smoothness: Straightedge test the compacted surface of each course as work progresses. Apply straightedge parallel with and at right angles to the centerline after final rolling. Unevenness of each course shall not vary more than 1/4 inch in 10 feet; variations in the wearing course shall not vary more than 1/8 inch in 10 feet. Correct each portion of the pavement showing irregularities greater than that specified.

D. Finished Grades: Finish grades of each course placed shall not vary from the finish elevations, profiles, and cross sections indicated by more than 1/4 inch. Finished surface of the final wearing course will be tested by running lines of levels at intervals of 10 feet longitudinally and transversely to determine elevations of completed pavement. Within 45 days after completion of final placement, correct deficient paved areas by removing existing work and replacing with new materials that meet the specifications. Skin patching for correcting low areas is prohibited.

E. Finish Surface Texture of Surface Course: Visually check final surface texture for uniformity and reasonable compactness and tightness. Final wearing course with a surface texture having undesirable irregularities such as segregation, cavities, pulls or tears, checking, excessive exposure of coarse aggregates, sand streaks, indentations, ripples, or lack of uniformity shall be repaired as directed by the Contracting Officer.

3.11.6 QC Monitoring

Submit all QC test results to the Contracting Officer on a daily basis as the tests are performed. The Contracting Officer reserves the right to monitor any of the Contractor's quality control testing and to perform duplicate testing as a check to the Contractor's quality control testing.

3.12 SAMPLING

When directed by the Contracting Officer, sample and test any material which appears inconsistent with similar material being produced, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

3.13 PROTECTION

Do not permit vehicular traffic, including heavy equipment, on pavement until surface temperature has cooled to at least 120 degrees F. Measure surface temperature by approved surface thermometers or other satisfactory methods.

3.14 PATCHING

As directed by Contracting Officer, in writing, remove and replace all defective areas. Cut out such areas and fill with fresh bituminous concrete. Compact to the required density.

3.15 CLEANING AND PROTECTION

3.15.1 Cleaning

After completion of paving operations, clean surfaces of excess or spilled bituminous materials and all foreign matter.

3.15.2 Cover Openings

Cover openings of drainage structures in the area of paving until permanent coverings are placed.

3.16 FINISHING

Cover openings of drainage structures and manholes in the area of paving until permanent coverings are placed.

The Contractor shall be responsible for repairing all incidental damage and settlement that occurs in roadways as result of construction activities. Material and labor to complete all repair work, in accordance with all local codes and ordinances, shall be at the Contractor's expense. The Government will not provide additional compensation for this work.

-- End of Section --

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SECTION 32 92 19.99

SEEDING
08/17

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 within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 140	(2016) Standard Specification for Emulsified Asphalt
AASHTO M 208	(2016) Standard Specification for Cationic Emulsified Asphalt

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Mulch

Fertilizer

Topsoil

Seed

SD-06 Test Reports

Topsoil Composition Testing

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery

1.3.1.1 Seed Protection

Protect from drying out and from contamination during delivery, on-site storage, and handling.

1.3.1.2 Fertilizer Delivery

Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer

may be furnished in bulk with certificate indicating the above information.

1.3.2 Storage

1.3.2.1 Seed and Fertilizer Storage

Store in cool, dry locations away from contaminants.

1.3.2.2 Topsoil

Prior to stockpiling topsoil, treat growing vegetation with application of appropriate specified non-selective herbicide. Clear and grub existing vegetation three to four weeks prior to stockpiling topsoil.

1.3.2.3 Handling

Do not drop or dump materials from vehicles.

1.3.2.4 Testing

Topsoil shall comply with the chemical requirements for materials coming from off-site borrow sources as discussed in Section 01 35 45.

1.4 TIME RESTRICTIONS AND PLANTING CONDITIONS

1.4.1 Restrictions

Do not plant when the ground is frozen, snow covered, muddy, or when air temperature exceeds 90 degrees Fahrenheit.

1.5 TIME LIMITATIONS

1.5.1 Seed

Apply seed within twenty four hours after seed bed preparation.

PART 2 PRODUCTS

2.1 TOPSOIL

Topsoil shall not contain more than 40 percent clay in that portion passing a No. 10 sieve. Topsoil shall contain between 5 percent and 20 percent organic matter as determined by loss on ignition of samples oven-dried to constant weight at 212 degrees Fahrenheit.

2.2 FERTILIZER

Fertilizer shall be lawn or turf grade 12-12-12.

2.3 SEED AND SOD

A. Lawn Areas: Seed areas where lawns are or have been regularly maintained, whether residential, commercial or office areas, with the following mixture or a mixture as required by the Soil Conservation District or other governing authority. (Percentages are by weight.)

1. 20 percent Annual Ryegrass (Lolium multiflorum).
2. Remainder to be specified depending on time of year, regulatory

requirements and location.

Where sod is required it shall be green, freshly cut, and of good quality with grass free from all noxious weeds. It shall contain all the dense root system of the grass and shall not be less than 1-1/2 inches thick.

B. All Other Areas: Seed all other areas with the following mixture:

1. 50 percent Perennial Ryegrass (Lolium perenne).
2. Remainder to be specified depending on time of year, regulatory requirements and location.

2.4 MULCH

Mulch shall be straw reasonably free of weed seed and foreign materials which may affect plant growth. Other materials may be used if approved by the Contracting Officer.

2.5 ASPHALT EMULSION

Emulsion shall be non-toxic to plants and shall conform to AASHTO M 140 or AASHTO M 208.

PART 3 EXECUTION

3.1 PREPARATION OF SEED BED

3.1.1 Topsoil Areas

Removed, store, and use suitable topsoil available from the excavated material to backfill the top 4 inches of the excavation. Remove and dispose of all imported granular fill, grass, weeds, roots, sticks, stones, and other debris 1 inch or greater in diameter. Bring the topsoil to the finished grade by raking.

3.1.2 Non-Topsoil Areas

When there is insufficient topsoil available from the site excavated materials, furnish 4 inches of topsoil to be used as a seed bed in lawn areas as described in Part 2.3 or clearly marked as lawn areas on the plans.

The trench backfill may be used as a seed bed, where approved by the Contracting Officer or in areas clearly marked on plans that are not considered lawn areas. After the backfill has been given a reasonable time to settle, grade it off to the finished grade and harrow to a depth of 3 inches. Remove and dispose of all grass, weeds, roots, sticks, stones and other debris 1 inch or greater in diameter. Carefully bring the topsoil to the finished grade by raking.

3.2 FERTILIZING

Apply fertilizer uniformly to all areas to be seeded at the rate of 1 pound per 100 square feet in topsoil and 2 pounds per 100 square feet in non-topsoil. Disk, harrowed, or raked the fertilizer thoroughly into the soil to a depth of not less than 2 inches. Immediately before sowing the seed, rework the surface until it is a fine, pulverized, smooth seed bed varying not more than 1 inch in 10 feet.

3.3 SEEDING

Seed immediately after preparation and fertilization of the seed bed. Mix the seed thoroughly and sow it evenly over the prepared areas at the rate of 3 pounds per 1,000 square feet. Sow the seed dry or hydraulically. After sowing, rake or drag the area to cover the seed to a depth of approximately 1/4 inch. Sod all areas with slopes greater than 10 percent.

3.4 SODDING

Sod all areas as noted in the Contract Drawings. As a minimum, sod shall be fibrous, well rooted approved grass type. The grass shall be cut to a height of less than 3 inches. Edges of sod shall be cleanly cut, either by hand or machine, to a uniform thickness of not less than one and one-half (1-½) inches, to a uniform width of not less than 16 inches, and in strips of not less than 3 feet in length. Sod shall be free from all primary noxious weeds as defined by the New Jersey State Seed Law.

Lay sod with tight staggered joints. On slopes, start placement at the foot of the incline. Use wood pegs driven flush to hold sod in place on slopes 4:1 or greater. Use two wood pegs per strip of sod. Roll the sod lightly after placement. Fill any open joints with topsoil and/or sod.

3.5 MULCHING

Place mulching material evenly over all seeded areas within 48 hours of seeding. Place mulch at the rate of approximately 2 tons per acre, when seeding is performed in recognized growing season and at the approximate rate of 3 tons per acre when seeding is performed in a recognized non-growing season if applicable.

3.6 EMULSION

Keep mulching materials in place with asphalt emulsion applied at a minimum rate of 60 gallons per ton of mulch or by other methods approved by the Contracting Officer. When mulch is displaced, immediately repair any damage to the topsoil and fertilizer, reseed, and re-mulch per the requirements of this Specification Section.

3.7 MAINTENANCE

Carefully maintain, tend, and water all seeded and sodded areas necessary to secure a good turf. Fill, grade, and reseed or re-sod all areas that have settled. Maintain the condition of the sodded areas for a period sufficient for the grass to root into the topsoil. Maintain the condition of the seeded areas in accordance with the requirements of this Specification Section for a period of one year from the date of final completion.

-- End of Section --

SECTION 33 10 02.99

TEMPORARY WATER SUPPLY BYPASS
11/17

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C651	(2014) Standard for Disinfecting Water Mains

1.2 RELATED DOCUMENTS

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

1.3 SUMMARY

A. The Contractor shall design, furnish, install, chlorinate, maintain and remove bypass and temporary service pipe of the size required to adequately service water service connections served by the 36-inch and 8-inch water lines.

1. The existing 36-inch water line is being relocated to eliminate crossing the former CDE property.

2. A portion of the existing 8-inch water line along Spicer Avenue is being relocated to accommodate the new 36-inch water line alignment.

3. The Government makes no guarantees regarding the operability of the existing valves and/or hydrants.

4. Contractor is responsible for field verification of valve and hydrant function prior to development of the Temporary Bypass Plan.

C. The Contractor shall provide temporary services for the water lines/service connections that are:

1. Out of service due to the water line to which it is connected being replaced.

2. Out of service due to the water line to which it is connected being served only by the main being replaced, including dead end pipes and pipes ending at division gates.

3. Out of service due to connection with work under this contract.

1.4 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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Bypass Plan; G

SD-02 Shop Drawings

Shop Drawings Or Brochures, Or Both

SD-07 Certificates

Written Notification To The Borough Of South Plainfield Fire Department

1.5 DESCRIPTION

A. The Contractor shall prepare a Bypass Plan demonstrating compliance with the provisions of this Section and that will allow temporary water service for all water lines impacted during construction. At no time shall water service be shut down for more than an 8 hour period, unless provided written approval by Contracting Officer, NJAW, and the Borough of South Plainfield.

B. The Contractor is responsible for reviewing the Contract Documents and determining the extent of the bypass required, especially where dead ends and division gates may require bypass piping. No payment shall be considered for the extension of the bypass to feed services fed from dead ended pipe or pipe where flow is interrupted by a division gate.

C. All bypasses shall be fed from two (2) sources or as shown on the Contract Drawings. Where two sources are not available, this issue and potential contingencies shall be discussed in the Bypass Plan, subject to the approval of NJAW and the Contracting Officer.

D. In the event a bypass pipe is dead-ended, it shall terminate with a 2-inch valve for flushing and chlorination.

E. No bypass piping shall be activated prior to approval by the Contracting Officer and NJAW. The Contractor shall provide written notification to the Borough of South Plainfield Fire Department that the bypass has been installed and to provide a copy to the Contracting Officer.

F. Contractor shall demonstrate the hydraulic adequacy of the temporary bypass line(s) to accommodate the anticipated demands. Note: same size taps are not permissible by NJAW.

PART 2 PRODUCTS

2.1 BYPASS PIPE

A. Bypass pipe shall be HDPE or PVC pipe.

B. All plastic pipe or hose shall bear the imprint of the National Sanitary Foundation approval for potable water NSF-PW or shall be capable of meeting the standards established by the NSF for this use.

C. The materials selected shall be adequate to operate at the pressure to which they will be subject to and adequate to withstand whatever forces, such as traffic loading, they will encounter.

D. Joints for all pipe shall be watertight.

E. Shop Drawings or brochures, or both, shall be submitted for all items furnished in accordance with the provisions of the General Conditions.

PART 3 EXECUTION

3.1 CONSTRUCTION METHODS

A. In general, bypass piping shall be laid as follows:

1. On the ground surface along the existing water line alignment for the 36-inch water line bypass.

2. On the ground surface along the side of the roadway adjacent to the curb line or edge of pavement line for the 8-inch water line bypass.

B. At locations where the pipe is subject to minimal traffic, such as at driveways, the pipe shall be adequately protected by excavating and setting the pipe below grade or "ramping" it with stone dust or other suitable material.

C. All bypass pipes that cross handicapped ramps or intersections, or extend around the radius of an intersecting street shall be installed below the surface grade.

D. Where necessary to feed large services, the Contractor may be required to excavate the sidewalk, pavement or other areas adjacent to a building to cut into the existing service or fire pipe.

E. In addition, the Contractor shall, where necessary, ramp over all bypass piping to provide for wheelchair access on affected sidewalks. Ramping shall be in accordance with ADA (Americans with Disabilities Act) regulations.

F. For all bypass pipe used to feed temporary hydrants, an intermediate main line valve shall be provided after every third hydrant and shall be required on each street regardless of the number of hydrants.

G. At locations where the pipe is subject to regular and/or heavy traffic, such as where it crosses traveled lanes or truck routes, the pipe must be set below grade and the trench adequately filled to withstand the traffic loads. At such areas all work must be done in accordance with

the applicable sections contained herein relating to trench excavation and paving. These requirements shall include but are not limited to, cutting the pavement neatly to avoid excess damage to existing pavement and restoration of pavement. This applies to, but is not limited to, any crossings of New Market Ave Extension and Spicer Ave.

H. The interior of all bypass pipe, temporary service pipe and service hoses shall be flushed to remove any dirt or other objects and shall be disinfected in accordance with AWWA C651 Section 86 "AWWA Standard for Disinfecting Water Mains".

I. At all locations where hydrants are out of service due to work under this contract, the Contractor shall provide temporary hydrants. A hydrant being used to feed temporary hydrants must be fed by 6-inch bypass pipe including whip connections and must be fitted with a butterfly valve with pentagonal operating nut, which can be turned with a hand wrench. The valve shall be painted blue for easier identification. The valve shall be equipped with a 1/4-turn stop, which will not allow the operating nut to go beyond the closed position. All temporary hydrants shall have one 4 1/2-inch outlet, located with the centerline of the outlet parallel with the curbline, the face of the nozzle perpendicular to the road surface, and between 1 1/2 and 2 1/2 feet above the road surface. A threaded cap with a standard pentagonal nut is to be installed at the end of each 4 1/2-inch hydrant connection. The outlet pipe shall have a 1-inch by 1/2-inch diameter steel rod welded to it, which will allow for a spanner wrench to be fitted to the pipe to prevent the pipe from spinning in the coupling.

J. Bypass lines operated between November 1 and March 1 shall be equipped with insulating jackets and temporary heating to prevent freeze damage.

-- End of Section --

SECTION 33 11 00.99

WATER UTILITY DISTRIBUTION PIPING
05/16

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 within the text by the basic designation only.

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA B300	(2010; Addenda 2011) Hypochlorites
AWWA B301	(2010) Liquid Chlorine
AWWA C104/A21.4	(2016) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C105/A21.5	(2010) Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C110/A21.10	(2012) Ductile-Iron and Gray-Iron Fittings for Water
AWWA C111/A21.11	(2012) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115/A21.15	(2011) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C116/A21.16	(2015) Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray Iron Fittings
AWWA C150/A21.50	(2014) Thickness Design of Ductile-Iron Pipe
AWWA C151/A21.51	(2017) Ductile-Iron Pipe, Centrifugally Cast
AWWA C153/A21.53	(2011) Ductile-Iron Compact Fittings for Water Service
AWWA C207	(2013) Standard for Steel Pipe Flanges for Waterworks Service-Sizes 100 mm through 3600 mm 4 in. through 144 in.
AWWA C217	(2016; Addenda 2017) Microcrystalline Wax and Petrolatum Tape Coating Systems for Steel Water Pipe and Fittings
AWWA C500	(2009) Metal-Seated Gate Valves for Water Supply Service

AWWA C502	(2014) Dry-Barrel Fire Hydrants
AWWA C504	(2015) Standard for Rubber-Seated Butterfly Valves
AWWA C509	(2015) Resilient-Seated Gate Valves for Water Supply Service
AWWA C515	(2015) Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service
AWWA C550	(2017) Protective Interior Coatings for Valves and Hydrants
AWWA C600	(2010) Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C651	(2014) Standard for Disinfecting Water Mains
AWWA C800	(2014) Underground Service Line Valves and Fittings
AWWA C901	(2017) Polyethylene (PE) Pressure Pipe and Tubing, 3/4 In. (19mm) Through 3 In. (76 mm), for Water Service
AWWA M55	(2006) PE Pipe - Design and Installation

ASTM INTERNATIONAL (ASTM)

ASTM A240/A240M	(2016) Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
ASTM A307	(2014) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A380/A380M	(2013) Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
ASTM A743/A743M	(2013a; E 2014) Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application
ASTM B88	(2016) Standard Specification for Seamless Copper Water Tube
ASTM C940	(2016) Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	(2013) Standard for the Installation of Private Fire Service Mains and Their Appurtenances

NSF INTERNATIONAL (NSF)

NSF 372	(2011) Drinking Water System Components - Lead Content
NSF/ANSI 14	(2016a) Plastics Piping System Components and Related Materials
NSF/ANSI 61	(2016) Drinking Water System Components - Health Effects
ANSI B2.1	Pipe Threads

UNDERWRITERS LABORATORIES (UL)

UL 246	(2011; Reprint Feb 2013) Hydrants for Fire-Protection Service

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Pipe, Fittings, Joints and Couplings; G, AE

Valves; G, AE

Valve Boxes; G, AE

Hydrants; G, AE

Pipe Anchorage; G, AE

Marking Posts; G

Tapping Sleeves And Valves; G

Folding Head Linestop; G

SD-06 Test Reports

Bacteriological Samples

Pressure And Leakage Tests; G

SD-07 Certificates

Pipe, Fittings, Joints and Couplings

Valves

Hydrants

Disinfection Procedures

SD-08 Manufacturer's Instructions

Manufacturer's Instructions

SD-11 Closeout Submittals

As Builts Drawings; G

1.3 QUALITY CONTROL

1.3.1 Regulatory Requirements

Comply with NSF/ANSI 61 and NSF 372 for materials for potable water piping, components and specialties for domestic water; comply with lead content requirements for "lead-free" plumbing as defined by the U.S. Safe Drinking Water Act effective January 2014.

Comply with NSF/ANSI 14 for plastic potable water piping and components. Provide plastic pipe and fittings, bearing the seal of the National Sanitation Foundation (NSF) for potable water service from the same manufacturer.

Comply with NFPA 24 for materials, installation, and testing of fire main piping and components.

1.3.2 New Jersey American Water (NJAW) Requirements

New Jersey American Water (NJAW) is the owner of the water distribute systems that will be installed as part of this Contract. NJAW has the right to reject any products or installation methods during this project. The Contractor shall review NJAW's standards and requirements prior to construction and shall have a representative on-site during construction. Contractor shall contact NJAW prior to making any connections into public water supplies.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery and Storage

Inspect materials delivered to site for damage. Unload and store with minimum handling and in accordance with manufacturer's instructions. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves, hydrants, and other accessories free of dirt and debris.

1.4.2 Handling

Handle pipe, fittings, valves, hydrants, and other accessories in accordance with manufacturer's instructions and in a manner to ensure

delivery to the trench in sound undamaged condition. Avoid injury to coatings and linings on pipe and fittings; make repairs if coatings or linings are damaged. Do not place other material, hooks, or pipe inside a pipe or fitting after the coating has been applied. Inspect the pipe for defects before installation. Carry, do not drag pipe to the trench. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. Clean the interior of pipe and accessories of foreign matter before being lowered into the trench and keep them clean during laying operations by plugging. Replace material found to be defective before or after laying with sound material without additional expense to the Government. Store rubber gaskets that are not to be installed immediately, under cover out of direct sunlight.

Handle PE pipe, fittings, and accessories in accordance with AWWA M55.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

2.1.1 36-Inch Water Line

Provide 36-inch diameter ductile iron pipe water line as shown on Contact Drawings. Provide accessories, fittings and valves as specified and where indicated.

2.1.2 8-Inch Water Line and New Fire Hydrant

Provide 8-inch diameter ductile iron pipe water line as shown on the Contract Drawings. Provide accessories, fittings and valves as specified and where indicated. Provide new fire hydrant and accessories as specified and where indicated on the Contract Drawings.

2.2 PIPE, FITTINGS, JOINTS AND COUPLINGS

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on joints. Include information concerning gaskets with submittal for joints and couplings.

2.2.1 Ductile Iron Piping

2.2.1.1 Pipe

2.2.1.1.1 General

a. Research has documented that certain elastomers (such as those used in gasket material) may be subject to permeation by lower-molecular weight organic solvents or petroleum products. Products supplied under this Specification Section assume that petroleum products or organic solvents will not be encountered. If during the course of pipeline installation the Contractor identifies, or suspects the presence of petroleum products or any unknown chemical substance, notify the Contracting Officer immediately. Stop installing piping in the area of suspected contamination until direction is provided by the Contracting Officer.

b. Ductile iron pipe shall conform to the latest specifications as adopted by the American National Standards Institute, Inc., (ANSI) and the American Water Works Association (AWWA). Specifically, ductile iron

pipe shall conform to AWWA C151/A21.51. The pipe or fitting exterior shall be coated with a bituminous coating in accordance with AWWA C151/A21.51.

c. The pipe or fitting interior shall be cement mortar lined and seal coated in compliance with the latest revision of AWWA C104/A21.4.

2.2.1.1.2 Quality

Pipe and fittings shall meet the following minimum quality requirements by conforming to the following:

a. AWWA C105/A21.5 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water Polyethylene Encasement for Ductile-Iron Pipe Systems

b. AWWA C110/A21.10 Ductile Iron and Gray Iron Fittings, 3 NPS through 48 NPS for Water AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

c. AWWA C115/A21.15 Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges

d. AWWA C116/A21.16 Protective Fusion-Bonded Epoxy Coating for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service

e. AWWA C150/A21.50 Thickness Design of Ductile-Iron Pipe

f. AWWA C151/A21.51Ductile-Iron Pipe, Centrifugally Cast, for Water

g. AWWA C153/A21.53 Ductile-Iron Compact Fittings, 3 NPS through 24 NPS and 54 NPS through 64 NPS, for Water Service

2.2.1.1.3 Pipe Class

The pressure class of pipe to be furnished shall be in accordance with the following.

a. 36-inch pipe shall be of pressure class 250 in accordance with AWWA C151/A21.51

b. 8-inch pipe shall be of pressure class 350 in accordance with AWWA C151/A21.51

c. The noted pressure class is adequate to support 3/4 and 1-inch corporation stops. Use a full saddle for larger taps (e.g., air relief valves or larger corporations) due to limited wall thickness.

2.2.1.1.4 Joints

2.2.1.1.4.1 Mechanical and Push-On

Mechanical and push-on joints including accessories shall conform to AWWA C111/A21.11. Anti-Rotation T-Bolts shall be used on mechanical joints shall be of domestic origin, high strength, low alloy steel bolts only, meeting the current provisions of American National Standard AWWA C111/A21.11 for rubber gasket joints for cast iron or ductile iron pipe and fittings. Bolt manufacturer’s certification of compliance must accompany each shipment. T-bolts shall be Xylan, FluoroKote #1, (corrosion

resistant) or an approved equal to handle corrosive conditions on any buried bolts.

2.2.1.1.4.2 Restrained Joint Pipe

Restrained joints for pipes shall be of the boltless push-on type which provides joint restraint independent of the joint seal. Restrained push-on joints allowed for pipe only shall have accessories conforming to AWWA C111/A21.11. Restrained system shall be suitable for the following minimum working pressures equaling that of the pipe.

2.2.1.1.5 Suppliers

Suppliers of Ductile Iron Pipe shall be to the acceptance of NJAW.

2.2.2 Fittings

Standard fittings shall be ductile iron conforming to AWWA C110/A21.10. Compact ductile iron fittings shall meet the requirements of AWWA C153/A21.53.

2.2.2.1 Working Pressures

Fittings shall have minimum working pressures equal to that of the pipe they are installed on unless otherwise noted in AWWA Standard AWWA C110/A21.10 or AWWA C153/A21.53.

2.2.2.2 Coating and Lining

The fittings shall be coated on the outside with a petroleum asphaltic coating in accordance with AWWA C110/A21.10 or fusion coated epoxy in accordance with AWWA C116/A21.16 and lined inside with cement-mortar and seal coated in accordance with AWWA C104/A21.4 or fusion coated epoxy in accordance with AWWA C116/A21.16.

2.2.2.3 Suppliers

Suppliers of Ductile Iron Pipe shall be to the acceptance of NJAW.

2.2.3 Pipe Anchorage

Provide all plugs, caps, tees, and bends (both horizontal and vertical) with concrete thrust blocking and/or restrained joint pipe as represented on the Contract Drawings or otherwise directed.

2.3 VALVES

2.3.1 Gate Valves

2.3.1.1 Small Gate Valves (3 inches to 12 inches)

a. All gate valves, 3 inches through 12 inches NPS, shall be iron body, resilientseated, nut-operated, non-rising stem gate valves suitable for buried service. The valve interior and exterior shall be epoxy coated at the factory by the valve manufacturer in accordance with AWWA C550 (6-8 mil average, 4 mil minimum). The valves shall be designed for a minimum differential pressure of 250 psi and a minimum internal test pressure of 500 psi unless otherwise noted on the plans. Valves shall be designed to operate in the vertical position.

b. Valves shall comply fully with AWWA C509. Valve ends shall be push on joint or MJ (when restrained), or as shown on the plans or approved in writing in accordance with AWWA C111/A21.11. Stems shall be made of a low zinc alloy in accordance with AWWA C509 4.2.2.4.3. Stem seals shall be double O-ring stem seals. Square operating nuts conforming to AWWA C509 shall be used. Valves shall open (left or right) in accordance with the NJAW's standard. All valve materials shall meet the requirements of NSF/ANSI 61.

c. Test valves (Operation Test and Hydrostatic Tests) at the manufacturer’s plant in accordance with AWWA C509. Provide the Contracting Officer with certified copies of all tests prior to shipment. The Contracting Officer reserves the right to observe all tests.

d. Manufacturer shall be to the acceptance of NJAW.

2.3.1.2 Large Gate Valves (Greater than 12 inches)

a. Gate valves larger than 12-inches NPS shall be iron body, double disc (metal to metal seat), parallel seats, bronze mounted, rubber O-ring packing seals, epoxy coated interior and exterior meeting the requirements of AWWA C550, and conforming to AWWA C500. Stems shall be made of a low zinc alloy in accordance with AWWA C500 4.2.2.4.3. All valves shall have openings through the body of the same circular area as that of the pipe to which they are attached. All valves furnished shall open (left or right) in accordance with NJAW’s standard. All valve materials shall meet the requirements of NSF/ANSI 61.

b. Test valves (Operation Test and Hydrostatic Tests) at the manufacturer’s plant in accordance with AWWA C515. Provide the Contracting Officer with certified copies of all tests prior to shipment. The Contracting Officer reserves the right to observe all tests.

c. Valves shall have mechanical joint ends unless otherwise designated on the plans or approved by the Contracting Officer.

d. The valves shall be designed for a minimum differential pressure of 150 psi and a minimum internal test pressure of 300 psi, unless otherwise noted on the plans. Make all valves tight under their working pressures after they have been placed and before the main is placed in operation. Any defective parts shall be replaced at the Contractor's expense.

e. Manufacturer shall be to the acceptance of NJAW.

2.3.2 Butterfly Valves

1. Furnish and install rubber-seated butterfly valves as shown on the Contract Drawings. Butterfly valves shall conform to Class 150B of the AWWA C504 and this specification unless working pressure is greater than 150 psi in which case, the butterfly valve shall conform to Class 250B of the AWWA C504. All valves furnished shall open (left or right) in accordance with the NJAW standard.

2. Valve bodies shall be ductile iron with mechanical joint ends. Mechanical joint ends shall conform to AWWA C111/A21.11. All valve materials shall meet the requirements of NSF/ANSI 61.

3. Valve shafts shall consist of one-piece units extending through the discs of 18-8 stainless steel Type 303 or 304. Shaft diameter shall be in accordance with Table 3 of AWWA C504.

   a. Valve discs shall be Ni-Resist, Type 1, or cast iron with stainless steel edges.

   b. Valve seats shall be hycar or natural rubber mounted in the valve body.

   c. Valve bearings shall be nylon or Teflon.

4. The valve interior and exterior shall be epoxy coated at the factory by the valve manufacturer in accordance with AWWA C550 (6-8 mil average, 4 mil minimum).

5. All elastomers used in the butterfly valves must be suitable for service in the following water conditions:

   a. Chlorine concentration up to 12 mg/L.

   b. Chloramine concentrations up to 6 mg/L.

   c. Ozone concentrations up to 2.0 mg/L

   d. pH range of 4-11.

6. Manual buried operators, if provided, shall be either worm gear or traveling nut type and shall be furnished with 2-inch AWWA nuts and extension shafts. Input required at nuts to produce specified output torque shall be less than 150 ft.-lbs. Operators shall be designed to withstand an input at the nut of 300 ft.-lb. without damage to any operator components.

7. Manufacturer shall be to the acceptance of NJAW.

2.3.3 Combination Air/Vacuum Release Valves

Combination valves shall be double acting to prevent accumulation of air in the pressurized main and to permit air to enter the pipe when pressure drops significantly. Bodies shall be cast iron with stainless steel floats.

2.3.3.1 For 8-Inch Water Line (if necessary)

Provide 1 inch APCO Model No. 143C as manufactured by Valve and Primer Corporation (Schaumburg, IL), 1 inch Valvematic (Elmhurst, IL) Model 201, or an approved equal.

2.3.3.2 For 36-Inch Water Line

Provide 2 inch APCO Model No. 145C as manufactured by Valve and Primer Corporation, Valvematic Model 202C, or an approved equal.

2.3.4 Valve Boxes

All valves (except for on 36-Inch water line) shall be provided with valve boxes of a design approved by the Contracting Officer. Valve boxes shall be of the standard, adjustable, cast iron extension type, multiple piece,

5-1/4-inch shaft, screw type, and of such length as necessary to extend from the valve to finished grade. Cast iron valve boxes shall be hot coated inside and out with an asphaltic compound.

2.3.5 Valve Pits

Construct the valve pits at locations indicated or as required above and in accordance with the details shown. See specification Section 33 39 45.99.99 PRECAST CONCRETE STRUCTURES for requirements on manhole structures.

2.4 FIRE HYDRANTS

2.4.1 Fire Hydrants

Provide one hydrant where indicated. Contractor shall contact NJAW and obtain written fire hydrant mechanical details for the water district prior to ordering any fire hydrants.

2.4.1.1 Dry-Barrel Type Fire Hydrant

Provide Dry-barrel type hydrant, AWWA C502 or UL 246, "Base Valve" design, with 6 inch inlet, 5-1/4 inch valve opening, one 4-1/2 inch pumper connection, and two 2-1/2 inch hose connections. Hydrant shall open left or right as required and be clearly marked on the top of the hydrant with a 1-1/2 inch pentagon top nut and have not less than two O-ring stem seals. Provide hydrant that conforms to the requirements of AWWA C502, traffic-model break-away type fire hydrant. All hydrant materials shall meet the requirements of NSF/ANSI 61. Hydrant interior and exterior shall be epoxy coated at the factory by the hydrant manufacturer in accordance with AWWA C550 (6-8 mil average, 4 mil minimum). Hydrant is to be fully operational under normal conditions.

2.5 SERVICE LINES

2.5.1 Copper Service Line Material

Copper pipe shall be Type L or Type K, as specified, meeting the requirements of ASTM B88. The pipe size (3/4-, 1- 1-1/2-, or 2-inch) and type are to be determined by the Contracting Officer. Type K is normally required in corrosive environments where polyethylene is not allowed.

2.5.2 Polyethylene Service Line Material

Polyethylene service line material shall be Class 160 (minimum), ultra high molecular weight, conforming to AWWA C901. Pipe sizes (3/4-, 1-, 1-1/2- and 2-inch, copper tube size (CTS) or iron pipe size (IPS)) to be determined by the Contracting Officer.

2.5.3 Corporation Stops

Corporation stops shall be of the brass, ball valve type manufactured in accordance with AWWA C800. The inlet connection shall have standard AWWA tapered threads unless otherwise required by the Contracting Officer. The outlet connection shall be copper or brass compression connection end or pack joint for polyethylene pipe, as required. Dielectric unions shall be used to prevent transfer of any electrical stray currents from metallic service lines to metallic water main. The sizes shall range from 1/2- to 2-inch and shall match the size of specified service line material.

2.5.4 Miscellaneous Service Line Fittings

Miscellaneous service line fittings such as couplings, adapters, saddles, bends, plugs, service line electrical insulators, etc. shall conform to AWWA C800.

2.6 ACCESSORIES

2.6.1 Tapping Sleeves and Valves

2.6.1.1 Stainless Steel Tapping Sleeves (4-inch through 12-inch)

The stainless steel band flange shall be manufactured in compliance with AWWA C207, Class D ANSI B.16.1 drilling, recessed for tapping valve MSS-SP60. Mechanical Joint tapping sleeve outlet shall meet or exceed all material specifications listed and be suitable for use with standard mechanical joint by mechanical joint resilient wedge gate valves per AWWA C509 Section 94 and be NSF/ANSI 61 approved.

a. The entire fitting shall be stainless steel type 304 (18-8). The body, lug, and gasket armor plate shall be in compliance with ASTM A240/A240M. The Flange shall be cast stainless steel in compliance with ASTM A743/A743M. The MJ outlet shall be one-piece casting made of stainless steel. The test plug shall be 3/4 inch NPT in compliance with ANSI B2.1 and shall be lubricated or coated to prevent galling. All metal surfaces shall be passivated after fabrication in compliance with ASTM A380/A380M.

b. The gasket shall provide a 360-sealing surface of such size and shape to provide and adequate compressive force against the pipe after assembly, to affect a positive seal under the combinations of joint and gasket tolerances. The materials used shall be vulcanized natural or vulcanized synthetic rubber with antioxidant and antiozonant ingredients to resist set after installation. No reclaimed rubber shall be used. A heavy-gauge-type 304-stainless armor plate shall be vulcanized into the gasket to span the lug area.

c. The lugs shall be heliarc welded (GMAW) to the shell. The lug shall have a pass-through-bolt design to avoid alignment problems and allow tightening from either side of the main. Bolts shall NOT BE integrally welded to the sleeve. Finger Lug designs are not approved; it is the intent of these specifications to allow a tapping sleeve that has a lug design similar to the approved models.

d. Bolts and nuts shall be type 304 (18-8) stainless steel and Teflon coated or as specified in the bolt section below at the discretion of the Contracting Officer. Bent or damaged units will be rejected.

e. Quality control procedures shall be employed to insure that the shell, lug, (4 inch and Larger Nominal Pipe Diameter) armor plate, gasket and related hardware are manufactured to be free of any defects. Each unit, after proper installation, shall have a working-pressure rating up to 250 psi.

f. The sleeve construction shall provide a positive means of preventing gasket cold flow and/or extrusion.

g. Each sleeve shall be stenciled, coded or marked in a satisfactory

manner to identify the size range. The markings shall be permanent type, water resistant, that will not smear or become illegible.

2.6.1.2 Tapping Valves

The horizontal tapping valve shall conform to the applicable requirements of AWWA C509. All tapping valves, 3 inches through 12 inches NPS, shall be ductile iron body, resilient-seated, nut-operated, non-rising stem gate valves suitable for buried service. The valve interior and exterior shall be epoxy coated at the factory by the valve manufacturer in accordance with AWWA C550 (6-8 mil average, 4 mil minimum). The tapping valves shall have flanged inlets with mechanical joint outlets, enclosed bevel gears, bypass valve, rollers, tracks and scrapers. All valves furnished shall open (left or right) in accordance with NJAW's standards.

2.6.2 Linestop

2.6.2.1 Folding Head Linestop

The equipment shall be a folding type. The folding head shall have a sealing element which uses an expandable folding cup to fit large diameter pipe lines which can be out of round. The cup is expanded by water pressure to help form the seal. The equipment must be rated at 150 psi minimum. Folding head linestop shall be manufactured by International Flow Technologies or an approved equal. Linestop fittings shall be from the same manufacturer or as approved by the manufacturer.

2.6.3 Marking Posts

All marking posts shall be Rhino FiberCurveTM with PolyTechCoating or equivalent fiber-composite marking posts. The color shall be standard blue for water and the length shall be a minimum 66 inches. The decals shall be UV stable all weather type with a no dig symbol and white and contrasting white and blue vertical lettering: Butterfly and Gate Valves decals (Rhino GD- 5226C) Blow-Offs decals (Rhino GD-5411C) Pipeline decals (Rhino GD-1333C), or an approved equal.

Marking posts shall be manufactured by one of the following manufacturers:

1. Rhino (Waseca, MN),
2. Carsonite International (Early Branch, SC),
3. Or approved equal.

2.6.4 Insulating Joints

Provide a rubber-gasketed insulating joint or dielectric coupling between pipe of dissimilar metals which will effectively prevent metal-to-metal contact between adjacent sections of piping.

2.6.5 Dielectric Fittings

Install dielectric fittings between threaded ferrous and nonferrous metallic pipe, fittings and valves, except where corporation stops join mains to prevent metal-to-metal contact of dissimilar metallic piping elements and compatible with the indicated working pressure.

2.6.6 Polyethylene Encasement

Polyethylene encasement shall conform to AWWA C105/A21.5. The polyethylene

film supplied shall be translucent and blue in color (or as approved by NJAW) and distinctly marked (at minimum 2 foot intervals) with the following information:

1. Manufacturer's name (or trademark).
2. Year manufactured.
3. Minimum film thickness and material type (LLDPE or HDCLPE).
4. Range of nominal pipe diameter size.
5. AWWA C105/A21.5 (compliance).
6. Warning label "WARNING-CORROSION PROTECTION-REPAIR ANY DAMAGE".
7. Labeled "WATER".

Tape shall be polyethylene compatible adhesive and a minimum of 1.5 inches wide. Shall be Scotchwrap #50, Fulton #355, Polyken #900, or approved equal. Store all polyethylene encasement out of the sunlight. Exposure of wrapped pipe should be kept to a minimum.

2.6.7 Identification Tape

Identification tape shall be manufactured of polyethylene with a minimum thickness of 4-mils and shall have a 1-mil thick metallic foil core. The tape shall be highly resistant to alkalis, acid and other destructive agents found in soil. Tape width shall be a minimum of 3 inches and a maximum of 6 inches and shall have the background color of blue, imprinted with black letters. Imprint shall be "CAUTION CAUTION - WATER LINE BURIED BELOW" and shall repeat itself a minimum of once every 2 feet for entire length of the tape.

2.6.8 Restrained Joint Marking Tape

Joint restraint tape is specifically to warn Water Company workers/contractors that the water main is joint restrained. It is not to be used in place of regular marking tape. Restrained Joint Marking Tape (for use with mains that are joint restrained as directed by NJAW) shall be polyethylene 4-mil thick and 2 1/2-inches wide with blue lettering on white background color and imprinted with the words “RESTRAINED JOINT” every 2 feet. The tape shall have an adhesive backer. The tape shall be highly resistant to alkalis, acid and other destructive agents found in soil.

2.7 CONTROLLED DENSITY FILL (FOR WATER LINE ABANDONMENT)

Submit technical information for equipment and operational procedures including projected slurry injection rate, grout pressure, method of controlling grout pressure, bulkhead and vent design, and number of stages of grout application. At least 15 days prior to commencing controlled density fill abandonment activities, submit plan for abandonment, describing proposed grouting sequence and other information pertinent to completion of Work.

A. Unconfined compressive strength: minimum 75 psi and maximum 150 psi at 56 days as determined based on an average of three tests for same placement. Present at least three acceptable strength tests for proposed mix design in mix design report.

B. Placement characteristics: self-leveling.

C. Shrinkage characteristics: non-shrink.

D. Water bleeding for fill to be placed by grouting method in sewers: not to exceed 2 percent according to ASTM C940.

E. Minimum wet density: 90 pounds per cubic foot.

2.8 DISINFECTION

Furnish liquid chlorine and injection equipment and/or calcium hypochlorite (HTH) as needed to disinfect all pipelines and appurtenances. Liquid chlorine contains 100 percent available chlorine and is packaged in steel containers, usually of 100 lb, 150 lb, or 1 ton net chlorine weight. Liquid chlorine is to be furnished in accordance with AWWA B301.

Calcium hypochlorite is available in granular form or in approximately 5-g tablets, and contains approximately 65 percent available chlorine by weight and is employed in calculations used in this specification.

The material should be stored in a cool, dry, and dark environment to minimize its deterioration. Do not use calcium hypochlorite intend for swimming pool disinfection, as this material (containing trichloroisocyanuric acid) has been sequestered and is extremely difficult to eliminate from the pipe after the desired contact time had been achieved. Calcium hypochlorite must conform to AWWA B300.

PART 3 EXECUTION

3.1 PRECAUTIONS

3.1.1 Connections to Existing Water System

Perform all connections to the existing water system in the presence of the Contracting Officer and NJAW.

3.1.2 Operation of Existing Valves

Do not operate valves within or directly connected to the existing water system unless expressly approved by NJAW to do so.

3.2 INSTALLATION OF PIPELINES

3.2.1 Pipe Laying and Jointing

3.2.1.1 General Requirements

Submit manufacturer's instructions for pipeline installations. These manufacturer's instructions apply to all pipeline installation except as noted herein.

1) Lay and maintain all pipe to the required lines and depths. Install fittings, valves and hydrants in strict accordance with the Contract Specifications at the required locations with joints centered, spigots home, and all valve and hydrant stems plumb. Do not deviate from the required alignment, depth or grade without the written consent of the Contracting Officer.

2) Buried steel lugs, rods, brackets, and flanged joint nuts and bolts are not permitted unless specifically shown on the Contract Drawings or approved in writing by the Contracting Officer. Cover any and all

buried steel lugs, rods, brackets, and flanged joint nuts and bolts with approved coating in accordance with AWWA C217 prior to backfilling. Encase the same in polyethylene if the specifications require polyethylene encasement of the pipe.

3) Lay all pipe to the depth specified. Measure the depth from the final surface grade to the top of the pipe barrel. The minimum pipe cover shall be 48 inches below grade.

4) Do not lay pipe in a wet trench, on subgrade containing frost, or when trench conditions are unsuitable for such work. If all efforts fail to obtain a stable dry trench bottom and the Contracting Officer determines that the trench bottom is unsuitable for such work, the Contracting Officer will order the kind of stabilization to be constructed, in writing. In all cases, water levels must be at least 6 inches below the bottom of the pipe.

5) Thoroughly clean the pipes and fittings before they are installed. Keep these materials clean until the acceptance of the completed work. Lay pipe with the bell ends facing in the direction of laying, unless otherwise shown on the Contract Drawings, or directed by the Contracting Officer. Exercise care to ensure that each length abuts the next in such a manner that no shoulder or unevenness of any kind occurs in the pipe line.

6) Do not wedge or block the pipe during laying unless by written order of the Contracting Officer.

7) Before joints are made, bed each section of pipe the full length of the barrel, at the required grade, and at the invert matching the previously laid pipe. Dig bell holes sufficiently large to permit proper joint making. Do not bring succeeding pipe into position until the preceding length is embedded and secure in place.

8) Take up and relay pipe that is out of alignment or grade, or pipe having disturbed joints after laying. Take up such in-place pipe sections found to be defective and replace them with new pipe. Take up, relaying, and replacement will be at the Contractor's expense.

9) Place enough backfill over the center sections of the pipe to prevent floating. Take all other necessary precautions to prevent the floating of the pipeline by the accumulation of water in the trench, or the collapse of the pipeline from any cause. Place enough backfill over the center sections of the pipe to prevent floating. Should floating or collapse occur, restoration will be at the Contractor's expense.

10) Prevent foreign material from entering the pipe while it is being placed. Do not place debris, tools, clothing, or other materials in the pipe during laying operations. Close all openings in the pipeline with watertight plugs when pipe laying is stopped at the close of the day's work, or for other reasons such as rest breaks or meal periods.

11) Only cut pipe with equipment specifically designed for cutting pipe such as an abrasive wheel, a rotary wheel cutter, a guillotine pipe saw, or a milling wheel saw. Do not use chisels or hand saws. Grind cut ends and rough edges smooth. Bevel the cut end slightly for push-on connections as per manufacturer recommendations.

12) In distributing material at the site of the Work, unload each piece

opposite or near the place where it is to be laid in the trench. If the pipe is to be strung out, do so in a straight line or in a line conforming to the curvature of the street. Block each length of pipe adequately to prevent movement. Block stockpiled pipe adequately to prevent movement. Do not place pipe, material, or any other object on unauthorized private property, obstructing walkways or driveways, or in any manner that interferes with the normal flow of traffic.

13) Exercise special care to avoid damage to the bells, spigots or flanged ends of pipe during handling, temporary storage, and construction. Replace damaged pipe that cannot be repaired to the Contracting Officer's satisfaction, at the Contractor's expense.

14) Remove all existing pipe, fittings, valves, pipe supports, blocking, and all other items necessary to provide space for making connections to existing pipe and installing all piping required under this Contract.

15) Maintain the minimum required distance between the water line and other utility lines in strict accordance with all Federal, State, and local requirements and all right-of-way limitations.

16) Provide and install polyethylene encasement for ductile iron pipe as required by the Contract Drawing.

17) The maximum allowable deflection at the joints for push-on joint pipe shall be the lesser of manufacturer’s recommendations or as described in the DIPRA Guideline, Ductile Iron Pipe Joints and Their Uses. Use short lengths of pipe (minimum length 3 feet, no more than three short sections), when approved by the Contracting Officer, to make curves that cannot be made with full length sections of pipe without exceeding the allowable deflection. Making these curves will be at no additional cost to the Government.

18) Furnish air relief valve assemblies in accordance with detail drawings provided or as specified in the specification Special Conditions section. Contracting Officer will provide standard detail for additional air release valve assemblies. Any deviation from the standard detail proposed by contractor must be approved in advance.

19) Exercise particular care so that no high points are established where air can accumulate. Install an air release valve and manhole, as extra Work to the Contract, when the Contracting Officer determines that unforeseen field conditions necessitate a change in the pipe profile that requires the installation of an air release valve and manhole. If the Contractor requests a change in the pipe profile solely for ease of construction, and the requested change requires the installation of an air release valve and manhole as determined by the Contracting Officer, the cost of furnishing and installing the air release valve and manhole will be at the expense of the Contractor.

3.2.1.2 Construction Methods to Avoid Contamination

1) Heavy particulates generally contain bacteria and prevent even very high chlorine concentrations from contacting and killing such organisms. It is essential that the procedures of this Specification Section be observed to assure that a water main and its appurtenances are thoroughly clean for the final disinfection by chlorination.

2) Take precautions to protect the interior of pipes, fittings, and valves

against contamination. String pipe delivered for construction so as to keep foreign material out of the pipe. Close all openings in the pipeline with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Use rodent-proof plugs approved by Contracting Officer, where it is determined that watertight plugs are not practical and where thorough cleaning will be performed.

3) Delay in placement of delivered pipe invites contamination. The more closely the rate of delivery is correlated to the rate of pipe laying, the lower the likelihood of contamination. Complete the joints of all pipe in the trench before stopping work. If water accumulates in the trench, keep the plugs in place until the trench is dry.

4) When encountering conditions on pre-existing pipe that requires packing, employ yarning or packing material made of molded or tubular rubber rings, or rope of treated paper or other approved materials. Do not use materials such as jute, asbestos, or hemp. Handle packing material in a manner that avoids contamination.

5) Do not use contaminated material or any material capable of supporting prolific growth of microorganisms for sealing joints. Handle sealing material or gaskets in a manner that avoids contamination. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water. Deliver the lubricant to the job in closed containers and keep it clean.

6) If dirt enters the pipe, and in the opinion of the Contracting Officer the dirt will not be removed by the flushing operation, clean the interior of the pipe by mechanical means, then swab with a 1 percent hypochlorite disinfecting solution. Clean using a pig, swab, or "go-devil" only when the Contracting Officer has specified such and has determined that such operation will not force mud or debris into pipe joint spaces.

7) If the main is flooded during construction, the flooded section must be isolated from the remainder of the installation as soon as practical. Submit a plan to the Contracting Officer on correcting the condition and do not proceed until authorized by the Engineer. Replace or fully clean and disinfect the affected pipe at no additional cost to the Government.

3.2.1.3 Earthwork

Perform earthwork operations in accordance with Section 31 23 00.99 TRENCHING AND BACKFILL.

3.2.2 Ductile Iron Pipe and Fittings

3.2.2.1 Push-On Joints

Clean the surfaces that the gasket will contact thoroughly, just prior to assembly using a bacteria free solution (bleach, potable water or NSF approved material).

Insert the gasket into the groove in the bell. Apply a liberal coating of special lubricant to the gasket and the spigot end of the pipe before assembling the joint. Center the spigot end in the bell and push home the spigot end.

3.2.2.2 Mechanical Joints

Clean and lubricate all components with soapy water prior to assembly. Slip the follower gland and gasket over the pipe plain end making sure that the small side of the gasket and lip of the gland face the bell socket. Insert the plain end into socket. Push gasket into position with fingers. Seat gasket evenly. Slide gland into position, insert bolts, and tighten nuts by hand. Tighten bolts alternately (across from one another) to the recommended manufacturing rating or if not provided, to the following normal torques:

a. Bolt Size: 5/8 inch; Torque Range: 40-60 pounds.
b. Bolt Size: 3/4 inch; Torque Range: 60-90 pounds.
c. Bolt Size: 1 inch; Torque Range: 70-100 pounds.
d. Bolt Size: 1-1/4 inch; Torque Range: 90-120 pounds.

After field installation, all bolts shall receive petrolatum tape or petroleum wax protection or other approved coating material. Protection shall be applied before applying polywrap

3.2.2.3 Restrained Joints

a. Ball and Socket: Assemble and install the ball and socket joint according to the manufacturer's recommendations. Thoroughly clean and lubricate the joint. Check the retainer ring fastener.

b. Push-On: Assemble and install the push-on joint according to the manufacturer's recommendations. Thoroughly clean and lubricate the joint. Check the retainer ring fastener. Protect pipe from damage from the jacking device (backhoe bucket, pipe jack, etc.) when “pushing home” any pipe by using wood or other suitable (non metallic) material.

c. Mechanical Joint: Assemble and install the mechanical joint according to the manufacturer's recommendations. Thoroughly clean and lubricate the joint. Use approved restrained joint device on fittings and valves where required and approved for use by Contracting Officer.

3.2.2.4 Pipe Protection

Protect pipe from damage from the jacking device (backhoe bucket, pipe jack, etc.) when “pushing home” any pipe. Wood or other suitable material (non metallic) shall be used to push home the pipe.

3.2.2.5 Gaskets

Gaskets shall be as provided or recommended by the manufacturer and satisfy AWWA C111/A21.11 in all respects. As noted in the products section of this specification, some gasket materials are prone to permeation of certain hydrocarbons which may exist in the soil . Under these conditions and at the Contracting Officer’s discretion require contractor to provide FKM (Viton, Flourel) gasket material in areas of concern.

3.2.3 Installation of Restrained Joint Marking Tape

Install the joint marking tape by adhering directly to the pipe as it is installed. The marking tape shall be installed along the entire length of pipe, including around the circumference of the bells of all fittings and valves. The pipe must be free of any foreign matter along the surface of

the pipe for the marking tape installation. If clear polywrap is used, the restrained joint tape can be applied on the top of the pipe so long as it is visible. Otherwise the joint marking tape shall be applied on top of the polywrap and secured so the tape is not shifted by backfilling. The tape does not adhere in wet or cold conditions. The tape should be stored in temperatures above 50 degrees F until the time of application. The pipe must be free of frost and moisture along the surface of the pipe receiving the tape.

3.2.4 Installation of Identification Tape

Install the identification tape with all buried potable water lines in accordance with the manufacturer's installation instructions and as specified. Install identification tape one foot above the top of the pipe.

3.2.5 Installation of Polyethylene Encasement

Encase piping in polyethylene as required to prevent contact with surrounding backfill and bedding material in all areas shown on the plans or designated by the Contracting Officer. Polyethylene shall be 12 mils. Install the polyethylene wrap material in accordance with the DIPRA Field Polyethylene Installation Guide and AWWA C105/A21.5. Polyethylene shall fit snugly and not tightly stretched. All holes or tears shall be repaired with tape. Large holes or tears shall be repaired by taping another piece of polyethylene over the hole. Tape or plastic tie straps at joint overlaps and at every 3 foot interval. Dig bell holes and slide polywrap over the adjacent pipe and provide a minimum of 1 foot of overlap. Tightly secure bottom of polywrap using two to three passes of polyethylene tape on the pipe to polywrap connection and the overlap polywrap to polywrap connection. Where polyethylene wrapped pipe being installed connects to a pipe that is not wrapped (including existing pipe), extend the wrap a minimum of 3 feet onto the previously uncovered pipe. This includes service lines which may be wrapped in polyethylene or dielectric tape. Direct service taps for polyethylene encased pipe shall follow the procedure described in AWWA C600. Access to the main for tapping through polyethylene is accomplished by making two to three passes of polyethylene tape around the pipe and over the polywrap. The tap is to be made directly through the tape and polywrap.

3.2.6 Connections to Existing Water Lines

Make connections to existing water lines after coordination with NJAW and with a minimum interruption of service on the existing line. Make connections to existing lines under pressure in accordance with the recommended procedures of the manufacturer of the pipe being tapped and as indicated.

3.2.7 Existing Utilities and Structures

3.2.7.1 Obstructions by Other Utility Structures

Support, relocate, remove, or reconstruct existing utility structures such as conduits, ducts, pipes, branch connections to main sewers, or drains. The obstruction shall be permanently supported, relocated, removed or reconstructed where they obstruct the grade or alignment of the pipe. Contractor must do so in cooperation with the owners of such utility structures. Before proceeding, the Contractor must reach an agreement with the Contracting Officer on the method to work around the obstruction. No deviation shall be made from the required line or depth without the consent

of the Contracting Officer.

3.2.7.2 Repairs

Repair or replace any damage to existing structures, work, materials, or equipment incurred by Contractor's operations. Repair all damage to streets, roads, curbs, sidewalks, highways, shoulders, ditches, embankments, culverts, bridges, trees, shrubs or other public or private property caused by transporting equipment, materials or personnel to or from the work site. Make satisfactory and acceptable arrangements with the persons or agencies having jurisdiction over the damaged property concerning repair or replacement.

Brace and support existing pipes or conduits crossing the trench, or otherwise exposed to prevent trench settlement from disrupting the line or grade of the pipe or conduit. Before proceeding, the Contractor must reach an agreement with the Contracting Officer on the method of bracing and support. Repair or replace all utility services broken or damaged at once to avoid inconvenience to customers. Storm sewers shall not be interrupted overnight. Use temporary arrangements, as approved by the Contracting Officer, until any damaged items can be permanently repaired. Maintain all items damaged or destroyed by construction and subsequently repaired.

3.2.7.3 Relocation

Relocate existing utilities or structures, where necessary, and restore to a condition equal to that of the original facility. Obtain approval of the owner of the utility or structure prior to relocating and/or restoring the facility.

3.2.7.4 Separation of Water Mains and Sanitary Sewers

3.2.7.4.1 Parallel Installation

Lay water mains at least 10 feet horizontally from any existing or proposed sanitary sewer. Measure the distance from edge to edge. In cases where it is not practical to maintain a 10-foot separation, the applicable State Agency may allow deviation on a case-by-case basis, if supported by data from the Contracting Officer. Such deviation may allow installation of the water main closer to a sanitary sewer, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sanitary sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the sanitary sewer.

3.2.7.4.2 Crossings

Whenever water mains must cross sanitary sewer laterals or sanitary sewers, lay the water main at such an elevation that the bottom of the water main is 18 inches above the top of the sanitary sewer pipe. Maintain this vertical separation for the portion of the water main located within 10 feet horizontally of any sanitary sewer it crosses. The 10 feet is measured as a perpendicular distance from sanitary sewer line to the water line.

3.2.7.4.3 Exception

Notify the Contracting Officer when it is impossible to obtain the proper horizontal and vertical separation as stipulated above. If directed by the Contracting Officer, both the water main and sanitary sewer line shall be constructed of mechanical joint ductile iron or welded joint protected

steel pipe. Other types of restrained joints of equal or greater integrity may be used at the discretion of the Contracting Officer after consultation with the applicable State Agency. Thermoplastic sanitary sewer pipe may be used provided mechanical or solvent weld pipe joints are used and accepted by the Contracting Officer. Pressure test these joints before backfilling to assure that they are water tight. Where water mains must cross under a sanitary sewer, additional protection shall be provided by:

(a) A vertical separation of at least 18 inches between the bottom of the sanitary sewer and the top of the water line,

(b) Adequate structural support for the sanitary sewer to prevent excessive deflection of the joints and the settling on and breaking of the water line,

(c) Centering the section of water pipe at the point of the crossing so that the joints shall be equidistant and as far as possible from the sanitary sewer line.

Consult the applicable State Agency, through the Contracting Officer, to discuss the use of double casing or concrete encasement of sanitary sewer and/or water lines as possible alternatives when the above conditions cannot be met.

3.2.7.5 Separation of Water Mains and Storm Sewers

Where water mains and storm sewers would run parallel, lay water mains at least 10 feet horizontally from the existing or proposed storm sewer (measured from edge to edge). Where storm sewers and water mains would cross, place water mains at least 12 inches from the storm sewer (measured from edge to edge). In cases were it is not practical to maintain the specified separation, the Contracting Officer may allow deviation on a case by case basis or as clearly called out in the plans. If the Contracting Officer deems that such deviation will be allowed, install the water main as directed by the Contracting Officer in such a way that does not compromise more stringent and desired separation from sanitary sewers.

3.2.8 Pipe Anchorage Installation

Place concrete thrust blocking between undisturbed solid ground and the fitting to be anchored. Install the concrete thrust blocking in accordance with Section 03 30 00.99.99 CAST-IN-PLACE CONCRETE and drawing details provided. Locate the thrust blocking to contain the resultant thrust force while keeping the pipe and fitting joints accessible for repair, unless otherwise shown or directed.

Provide temporary thrust restraint at temporary caps and plugs. Submit details of temporary restraint to the Contracting Officer for approval.

At connections with existing water mains where there is a limit on the time the water main may be removed from service, use metal harnesses of anchor clamps, tie rods and straps; mechanical joints utilizing set-screw retainer glands; or restrained push-on joints as permitted by the Contracting Officer. No restraining system can be installed without the approval of the Contracting Officer and NJAW. Submit details of the proposed installation to the Contracting Officer and NJAW for approval. For pipe up to 12 inches in size, use a minimum of two 3/4-inch tie rods. If approved for use, install retainer glands in accordance with the manufacturer’s instructions. Material for metal harnessing and tie-rods shall be ASTM A36/A36M or

ASTM A307, as a minimum requirement.

Protect tie rods, clamps and other metal components against corrosion by hand application of petrolatum tape and by encasement of the entire assembly with 8-mil thick (12 mil thick in corrosive soils) loose polyethylene film in accordance with AWWA C105/A21.5. Apply tape on all exposed tie rods prior to installing polyethylene.

3.2.9 Disinfection

Prior to disinfection, provide disinfection procedures, proposed neutralization and disposal methods of waste water from disinfection procedures as part of the disinfection submittal. Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with NJAW's requirements for disinfecting pipelines and AWWA C651.

The Contractor shall consult the Contracting Officer to coordinate bacteriological sampling with NJAW. Bacteriological tests must show complete absence of coliforms and acceptable HPCs. If tests show the presence of coliform or unacceptable HPCs, perform additional flushing and disinfection of the pipeline until acceptable tests are obtained, at no cost to the Government. The Contractor will not be charged for the additional testing performed by the Government or NJAW. Submit results of the bacteriological samples.

3.3 INSTALLATION OF VALVES

3.3.1 General

a. Prior to installation, inspect valves for direction of opening, freedom of operation, tightness of pressure containing bolting, cleanliness of valve ports and especially of seating surfaces, handling damage, and cracks. Correct defective valves or hold for inspection by the Contracting Officer.

b. Provide valves with adequate support, such as crushed stone and concrete pads, so that the pipe will not be required to support the weight of the valve. Set truly vertical. After field installation of the valve all exposed ferrous restraint materials and external bolts except the operating nut shall receive a layer of petrolatum tape coating or, where approved, rubberized-bitumen based spray-on undercoating applied before backfill. If polyethylene is applied to the pipe, the entire valve shall be encased in polyethylene prior to backfill. The polyethylene encasement shall be installed up to the operating nut leaving the operating nut exposed and free to be operated.

c. Provide a valve box for each valve, unless as otherwise directed. Set the top of the valve box neatly to existing grade, unless directed otherwise by the Contracting Officer. Do not install in a way that allows the transfer shock or stress to the valve. Center and plumb the box over the wrench nut of the valve. Do not use valves to bring misaligned pipe into alignment during installation. Support pipe in such manner as to prevent stress on the valve.

d. Provide valve marking posts, when authorized by NJAW, at locations designated by the Contracting Officer and in accordance with NJAW standards.

3.3.2 Butterfly Valves

All butterfly valves shall be restrained.

After field installation of the valve all external bolts except the operating nut shall receive a layer of tape coating or approved rubberized-bitumen based spray-on undercoating applied before backfill. If polyethylene is applied to the pipe, the entire valve shall be encased in polyethylene prior to backfill. The polyethylene encasement shall be installed up to the operating nut leaving the operating nut exposed and free to be operated.

3.3.3 Gate Valves

All large gate valves shall be restrained.

After field installation of the valve all external bolts except the operating nut shall receive a layer of tape coating or approved rubberized-bitumen based spray-on undercoating applied before backfill. If polyethylene is applied to the pipe, the entire valve shall be encased in polyethylene prior to backfill. The polyethylene encasement shall be installed up to the operating nut leaving the operating nut exposed and free to be operated. Valve box shall be installed per Piping Specialties Specification 15130 or 15131.

3.3.4 Combination Air/Vacuum Release Valves

Install pressure vacuum assemblies of type, size, and capacity indicated. Install in accordance with Contract Drawings and manufacturers recommendations.

3.3.5 Valve Boxes

Valve boxes shall be supported so that no load can be transmitted from the valve box to the valve in accordance with NJAW's standards. Install a self-centering alignment ring at the operating nut American Flow Control, or equal or otherwise make sure that the bottom of the box is centered over the operating and runs perpendicular to the horizontal.

3.4 INSTALLATION OF FIRE HYDRANT

Locate hydrant on the plans or as directed by the Contracting Officer and in compliance with local regulations. Final location will be selected in the field with NJAW, Contracting Officer, and the Borough of South Plainfield. The location shall provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians. When placed behind the curb, the hydrant barrel shall be set so that no portion of the pumper or hose nozzle cap will be less than eighteen to twenty- four inches, depending on local requirements, from the gutter face of the curb. Hydrant shall stand plumb with the pumper nozzle facing the curb. Set hydrant with nozzles at least 18 inches above the finished grade as shown on the plans. Set the break flange at least two but no more than six inches above finished grade. Connect hydrant to the main with a 6-inch branch connection controlled by an independent 6-inch gate valve, unless otherwise shown on the plans. Hydrant assembly must be restrained from the hydrant back to the main. Paint hydrant above the bury line in accordance with the local operations standards. Touch up paint (as specified by the Government or Local Water Authority under Special Conditions) shall be applied upon completion of installation as needed. Take extreme care to avoid getting

any paint on the "O" ring under the top operating nut or on the hydrant nozzles. Should paint be found on the "O" ring, the Contractor shall remove the paint and replace the "O" ring at his expense. Any paint on the hydrant nozzles shall be removed at the Contractor's expense.

3.4.1 Drainage Pit

Unless otherwise directed by the Contracting Officer, excavate a drainage pit 2 feet in diameter and 2 feet deep below but not beyond each hydrant. Fill the pit with compacted 3/4 inch clean granular under and around the base of the hydrant to a level 12 inches above the hydrant drain opening. No hydrant drainage pit shall be connected to a sewer. Cover the drainage area with geotextile fabric. The fabric shall completely isolate the gravel or stone so that no fill material or adjacent earth comes in contact with pit material. Notify the Contracting Officer of situations where the ground water table is above the drain opening of dry barrel hydrant. If directed by Contracting Officer, plug the drain opening using a method acceptable to the hydrant manufacturer. No drainage pit is required when the hydrant drain is plugged. Mark the hydrant, in a manner acceptable to the Government, to indicate that the drain opening has been plugged. Operation of a hydrant with plugged drain leaves the hydrant barrel full of water. Pump the hydrant barrel dry after each use. Reaction or thrust blocking at the base of each hydrant must not obstruct the drainage outlet of the hydrant. The size and shape of concrete thrust backing and the number and size of tie rods, when required, shall be approved by the Contracting Officer. Use the thrust blocking material specified in PIPE ANCHORAGE paragraph of this specification.

3.5 INSTALLATION OF SERVICE LINES

3.5.1 Installation of Corporation Stops

1. Use experienced craftsmen familiar with installation of water service lines when tapping water mains. Make all taps with a suitable tapping machine using the proper combined drill and tap. Hand held drilling equipment is not acceptable.

2. Before making the tap, inspect corporation stops for cleanliness, damaged threads, and proper operation of the ball valve prior to installation. Do not install corporation stops that fail this inspection.

3. The main may be tapped along the top half of the pipe as directed by the Contracting Officer or as shown on Standard Details. Use a tapping saddle when the water main wall thickness or material (plastic, concrete or A-C pipeline material) make it unsuitable for direct tapping. Verify saddle use with Contracting Officer.

4. In the case of multiple services of small diameter (less than 2” diameter), corporation stops shall be at least 12 inches apart and at least 22-1/2 degrees above or below the location of any adjacent tap(s) and curb stops and boxes shall be at least one foot apart. In the case of large diameter multiple services, tap at least 24 inches apart and at least 22-1/2 degrees above or below the location of any adjacent tap(s).

5. Install all corporation stops so that between 2 and 3 threads extend beyond the inside wall of the main. If necessary, make a test tap with the boring bar marked to the proper depth. The corporation stop, when

properly installed, will not be shouldered with the main. Do not use lubricants of any type when installing the corporation stop.

6. Use the procedures outlined in AWWA C600 for installing taps on grey iron or ductile iron mains encased in polyethylene.

3.5.2 Installation of Service Line and Fittings

1. Install service line between the tap connection and the curb stop location making only gradual changes in grade or alignment as required. Sharp bends (greater than 15 degrees) in any direction are not allowed unless approved by the Contracting Officer. 1-1/2- and 2-inch service lines may be installed using three (3) 1-inch corporation stops and a 3-branch connection. This is in lieu of installing a 1-1/2- or 2-inch corporation stop. Installation shall be in accordance with NJAW standards and local regulators.

2. Install all services straight and at right angles to the main. If this cannot be accomplished, provide the NJAW with accurate as-built dimensions to the tee or corporation stop. The Contractor may be required to attach NJAW supplied magnets to curb box and valve box.

3. All trench services shall be installed with marking tape. This tape shall provide an early warning at shallow depth excavation. The non-detectable tape shall be 6 inches wide, and buried approximately 12 inches above the service pipe, but a minimum of 12 inches below finished grade. It shall consist of multiple layers of polyethylene with an overall thickness of 3 to 5 mils. The black colored lettering on the warning tape shall be abrasion resistant and be imprinted on a color coded background that conforms to APWA color code standards. It shall be installed continuous from the corporation stop to the curb stop.

4. All plastic service line connections shall use insert stiffeners of the appropriate length and size.

3.5.3 Polyethylene Encasement (For Service Lines)

Provide polyethylene encasement, or other protective wrap approved by the Contracting Officer, on all metal service lines and fittings (pile, valves, stops, etc.) when they are made of different materials than the water main. When the polyethylene is applied on the main, it shall extend for a minimum clear distance of three (3) feet away from the main when services are not being renewed or extend from the main connection to and including the curb stop or curb meter setter for all new copper service lines. Encasement material and installation shall be per NJAW standards and AWWA Standard C105.

3.6 INSTALLATION OF ACCESSORIES

3.6.1 Tapping Sleeves, Saddles, and Valves

1. Install the tapping sleeves, tapping saddles, and tapping valves in accordance with the manufacturer’s instructions. The tapping procedure is to be in accordance with the tapping machine manufacturer's instructions.

2. After field installation of the valve all external bolts except the operating nut shall receive a layer of tape coating or approved

rubberized-bitumen based spray-on undercoating applied before backfill. If polyethylene is applied to the pipe, the entire sleeve and valve assembly shall be encased in polyethylene encasement prior to backfill. The polyethylene encasement shall be installed up to the operating nut leaving the operating nut of the tapping valve exposed and free to be operated

3. Perform a hydrostatic test of the tapping sleeve and valve assembly in accordance with NJAW requirements after installation of the tapping sleeve and valve, but prior to making the tap. The test shall be made with the valve open using a tapped mechanical joint cap. No leakage is acceptable. The test pressure shall be maintained for a minimum of 15 minutes. Perform hydrostatic test of tapping saddles in accordance with AWWA Standard C800.

3.6.2 Linestop

Install linestop as shown on the Contract Drawings and in accordance with manufacturers instructions.

3.6.3 Marking Posts

Install Marker Posts using equipment designed for its installation per manufacturer guidelines and place at locations noted in the drawings or as approved by Contracting Officer.

3.7 ABANDONMENT OF MAINS, HYDRANTS, AND SERVICE LINES

Transfer all services from main to be abandoned to the new main, make designated connections to existing water lines, and install new hydrant(s). Upon completion, testing and satisfactory operation of the new mains and connections, cut the existing pipeline to provide a break between the portion of the system remaining in use and the portion to be abandoned, remove all hydrants designated to be abandoned and cap all remaining live ends of the existing mains including hydrant laterals. Completely cover existing hydrants designated to be abandoned to prohibit use until the hydrants are removed. Remove and deliver hydrants to the NJAW or disposed of as directed by the Contracting Officer. Remove valve boxes of abandoned valves as directed by the Contracting Officer.

Abandonment in place of water mains using controlled density fill will be utilized when abandoning water mains as specified on the Contract Drawings.

3.7.1 Cutting and Capping

1. Water Mains: Cut the existing pipe at the point shown on the plans or designated by the Contracting Officer. Additional access points may be provided with the approval of the Contracting Officer. The method of cutting shall be approved by the Contracting Officer. The plugs and/or caps used in connection with the work under this item shall be either mechanical joint or slip joint as compatible with the pipe being capped and shall be manufactured in accordance with AWWA C110/A21.10. After the plug or cap is installed, provide the required blocking to adequately brace the plug or cap. Blocking may be used temporarily against the abandoned pipe. However, the permanent blocking shall be installed such that future disturbances of the abandoned pipe shall not affect the permanent blocking. After the water line has been plugged or capped and the permanent blocking has been installed, backfill the excavation as specified.

2. Service Lines: Do not begin cut, plug, and abandonment operations until replacement service, if necessary, has been constructed and tested, and all service connections have been installed. Service lines shall be cut and capped at location as directed by the Contracting Officer. Plug or cap ends or opening in abandoned service in manner approved by the Contracting Officer. Install concrete around cap and over pipe to ensure its not penetratable by groundwater. Remove all water service surface identifications and appurtenances such as valves and valve boxes, meters, and backflow devices. Return appurtenances to NJAW. Backfill as specified.

3.7.2 Abandonment Using Controlled Density Fill

3.7.2.1 Preparation

a. Have fill mix design reports and other submittals required by Paragraph 2.07 accepted by the Contracting Officer prior to start of placement. Notify the Contracting Officer at least 24 hours in advance of grouting with controlled density fill.

b. Select fill placement equipment and follow procedures with sufficient safety and care to avoid damage to existing underground utilities and structures. Operate equipment at pressure that will not distort or imperil portion of work, new or existing.

c. Clean water lines and video with closed circuit television to identify connections, locate obstructions, and assess condition of pipe. Locate previously unidentified connections, which have not been redirected and reconnected as part of the Work, and report them to the Contracting Officer. During placement of fill, compensate for irregularities in water pipe, such as obstructions, open joints, or broken pipe to ensure no voids remain unfilled.

d. Perform demolition work prior to starting fill placement. Clean placement areas of water mains of debris that may hinder fill placement. Remove excessive amounts of tuberculations and other substances that may degrade performance of fill. Do not leave debris in place if filling more than 2 percent of placement volume.

e. Remove free water prior to starting fill placement.

3.7.2.2 Equipment for Abandonment Via Controlled Density Fill

a. Mix controlled density fill in automated batch plant and deliver it to site in ready-mix trucks. Performance additives may be added at placement site if required by mix design.

b. Use concrete or grout pumps capable of continuous delivery at planned placement rate.

3.7.2.3 Installation of Controlled Density Fill

a. Abandon existing water lines at specified locations by completely filling water mains with controlled density fill.

b. Place controlled density fill to fill volume between intermediate access points. Continuously place controlled density fill with minimal intermediate pour points. The maximum distance between intermediate

access points shall not exceed 500 feet.

c. Have filling operation performed by experienced crews with equipment to monitor density of controlled density fill and to control pressure.

d. Pump controlled density fill through bulkheads constructed for placement of two 2-inch PVC pipes or use other suitable construction methods to contain controlled density fill in lines to be abandoned. These pipes will act as injection points or vents for placement of controlled density fill.

e. Place controlled density fill under pressure flow conditions into properly vented open system until controlled density fill emerges from vent pipes. Pump controlled density fill with sufficient pressure to overcome friction and to fill water main from downstream end, to discharge at upstream end.

f. Remediate placement of controlled density fill which does not fill voids in water main or where voids develop due to excessive shrinkage or bleeding of fill, by using pressure grouting either from inside watermain or from surface.

g. Plug each end of the water main being abandoned.

h. Collect and dispose of excess controlled density fill material and other debris in accordance with waste material disposal or as directed by the Contracting Officer.

3.8 FIELD QUALITY CONTROL

3.8.1 Field Tests and Inspections

Notify the Contracting Officer a minimum of seven days in advance of hydrostatic testing. Coordinate the proposed method for disposal of waste water from hydrostatic testing. Perform field tests, and provide labor, equipment, and incidentals required for testing, except that water needed for field tests will be furnished as set forth in "AVAILABILITY AND USE OF UTILITY SERVICES" in Section 01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS. Provide documentation that all items of work have been constructed in accordance with the Contract documents.

3.8.2 Pressure and Leakage Tests

3.8.2.1 General

a. Perform hydrostatic pressure and leak tests in accordance with AWWA C600, Section 4 - Hydrostatic Testing after the pipe or section of pipe has been laid, thrust blocking cured (min. 5 days), and the trench is completely or partially backfilled. Where practical, testing shall be performed fully isolated from the active distribution system.

b. The Contractor may, at his option, completely backfill the trench or partially backfill the trench over the center portion of each pipe section to be tested. However, the Contracting Officer may direct the Contractor to completely backfill the trench if local traffic or safety conditions require.

c. For system operating pressures of 200 psi or less, perform the hydrostatic test at a pressure of no less than 100 psi above the normal

operating pressure without exceeding the rating of the pipe and appurtenances. For system operating pressures in excess of 200 psi, perform the hydrostatic test at a pressure that is 1.5 times the normal operating pressure, but no more than the design rating of the pipe and appurtenances.

d. Valves shall not be operated in either direction at a differential pressure exceeding the rated valve working pressure. A test pressure greater than the rated valve working pressure can result in trapped test pressure between the gates of a double-disc gate valve. For tests exceeding the rated valve working pressure, the test setup should include a provision, independent of the valve, to reduce the line pressure to the rated valve working pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or the valve can be fully opened if desired.

e. The test pressure shall not exceed the rated working pressure or differential pressure of the valves when the pressure boundary of the test section includes closed, resilientseated gate valves or butterfly valves.

f. Attach a tapping sleeve and valve assembly to the main. Pressure test the assembly prior to making the tap. The required test pressure shall be determined in the same manner as for pipe. The test is acceptable if there is no pressure drop in 15 minutes at test pressure.

3.8.2.2 Filling and Testing

a. Slowly fill each segregated section of pipeline with water ensuring that all air is expelled. Extreme care must be taken to ensure that all air is expelled during the filling of pipe. The line shall stand full of water for at least twenty-four hours prior to testing to allow all air to escape. If necessary, tap the main at points of highest elevation to expel air as the pipe is filled. Remove the corporation stops and plug the taps after successfully filling the pipeline and expelling all air as approved by the Contracting Officer.

b. Apply the specified test pressure, measured at the point of lowest elevation, using a pump connected to the pipe in a manner satisfactory to the Contracting Officer. If the elevation of the high point of the pipeline being tested is such that the pressure during testing will be below 85% of the required test pressure, the Contracting Officer will require a separate test to be performed on this section of pipeline. In lieu of a separate test, the test pressure measured at the lowest elevation may be increased, within the pressure rating of the pipeline material, such that the resulting pressure at the highest point exceeds 85% of the required test pressure. The test will be conducted for at least two hours at the required test pressure ± 5 psi.

c. Conduct a leakage test concurrently with the pressure test. Leakage is defined as the volume of the water that must be supplied into the newly laid pipeline to maintain pressure within 5 psi of the test pressure after it is filled and purged of air. Measure the volume of water using a calibrated container or meter.

d. No pipeline installation will be accepted by the Contracting Officer if the leakage is greater than that shown in the following table:

Avg. Test Pressure (psi)	Allowable Leakage per 1000 ft. of Pipeline (gph)		
	6-Inch Pipe	8-Inch Pipe	36-Inch Pipe
450	0.86	1.15	5.16
400	0.81	1.08	4.86
350	0.76	1.01	4.55
300	0.70	0.94	4.21
275	0.67	0.90	4.03
250	0.64	0.85	3.85
225	0.61	0.81	3.65
200	0.57	0.76	3.44
175	0.54	0.72	3.22
150	0.50	0.66	2.98
125	0.45	0.60	2.72
100	0.41	0.54	2.43

e. Should any test disclose damaged or defective materials or leakage greater than that permitted, the Contractor shall, at Contractor's expense, locate and repair and/or replace the damaged or defective materials. Materials used for repair must be approved by the Contracting Officer and meet the specifications. Repeat the tests until the leakage is within the permitted allowance and is satisfactory to the Contracting Officer.

3.8.3 Fire Service and Hydrant Testing

3.8.3.1 Special Testing Requirements for Fire Service

Test water mains and water service lines providing fire service or water and fire service in accordance with NFPA 24. The additional water added to the system must not exceed the limits given in NFPA 24.

3.8.3.2 Fire Hydrant Testing

3.8.3.2.1 Pressure Test

1) Open the hydrant fully and fill with water; close all outlets.

2) To prevent caps from being blow off dry-barrel hydrants and to prevent other possible damage, vent air from the hydrant by leaving one of the caps slightly loose as the hydrant is being filled. After all air has escaped, tighten the cap before proceeding.

3) Apply line pressure.

4) Check for leakage at flanges, nozzles and operating stem.

5) If leakage is noted, repair or replace components or complete hydrant until no leaks are evident.

3.8.3.2.2 Drainage Test for Dry-Barrel Hydrants

1) Following the pressure test, close hydrant.

2) Remove one nozzle cap and place pylon or hand over nozzle opening.

3) Drainage rate should be sufficiently rapid to create a noticeable suction.

4) After backfilling, operate the hydrant to flush out any foreign material.

5) Tighten nozzle caps, them back them off slightly so that they will not be excessively tight; leave tight enough to prevent removal by hand.

3.9 AS BUILTS DRAWINGS

Contractor shall supply the Government with as-built drawings for all water utilities installed on the property including dimensional locations to at-grade features, size and type of lines, and depth.

Contractor shall supply the NJAW with as-built drawings and field sketches in accordance with their requirements.

3.10 CLEANUP

Upon completion of the installation of water lines and appurtenances, remove all debris and surplus materials resulting from the work.

-- End of Section --

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SECTION 33 39 45.99

PRECAST CONCRETE STRUCTURES
11/17

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 within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C478	(2015a) Standard Specification for Precast Reinforced Concrete Manhole Sections
ASTM C62	(2013a) Building Brick (Solid Masonry Units Made from Clay or Shale)

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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Precast Manhole Sections

Ladder Rungs

Frame and Cover

PART 2 PRODUCTS

2.1 MANHOLE SECTIONS

Submit product data for Precast Manhole Sections. Manhole riser sections shall be designed, manufactured, tested, finished and marked in accordance with the Contract Drawings and ASTM C478, "Precast Reinforced Concrete Manhole Sections".

2.2 BRICK

Brick used to bring manhole to grade shall comply with ASTM C62, Grade SW.

2.3 LADDER

Submit product data for Ladder Rungs. For heavy duty traffic manholes specified in paragraph 2.04, ladder rungs shall be provided in accordance with OSHA regulations. Rungs shall have a minimum diameter of 1-inch and 10-inch clear tread width and be of the drop front design. Rungs shall be polypropylene coated 1/2 inch grade 60 deformed rebar by Lane International

Corporation, M.A. Industries, or approved equal.

2.4 FRAME AND COVER

Submit product data for Frame and Cover. For areas of heavy duty traffic or as noted on plans (flush mount), manhole frame with vented lid shall be Neenah Foundry Company's R-1752 Series Heavy Duty (36-inch round) or approved equal. For non traffic areas with limited traffic (flush mount) Bilco’s J-4H2O Series Floor, Vault and Sidewalk Door or approved equal shall be used (36-inch square). For areas of non traffic (mounted 8-12 inches above the surrounding surface). Bilco’s J-4H2O Series Floor, Vault and Sidewalk Door or approved equalshall be used (36-inch square).

PART 3 EXECUTION

3.1 HANDLING

Lift and move all precast manhole components using suitable lifting slings and plugs that will not damage the precast manhole lip.

Thoroughly repair all damage to precast sections in the presence of the Contracting Officer. Repair and patch minor breaks by chipping and scarifying the defective area before applying grout. All sufficient curing time before the precast sections are put together. Form and key concrete cast-in-place bases specially to accommodate the bottom precast section.

3.2 INSTALLATION

Unless otherwise noted in the Contract Drawings, rest and support manhole bases uniformly on a 6-inch mat of compacted crushed stone or gravel placed over a base of sound, level, undisturbed earth. Before placing concrete base, set the downstream and upstream pipes to proper grade so the pipe ends will be flush with the inside of the manhole.

Set the pipes securely in the opening of the precast sections of manholes and grout at the correct line and grade. There shall be at least a one-half inch clearance between the outside of the pipe and the manhole opening to insure proper grouting. Clean the pipe and base thoroughly before the grout is applied.

Bring the top of all precast manholes to proper grade for receiving manhole frames. If proposed grade is to be flush to existing grade, the top of the manhole ring and cover shall be within 1 inch of surrounding grade. If proposed grade is to be above existing grade, the top of the manhole ring and cover shall be between 8-12 inches of surrounding grade unless otherwise noted on the plans.

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
CDE OU4 Phase 2: Water Line Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02 32 00.99	SD-01 Preconstruction Submittals															
			Test Pit Excavation Plan	1.5.1	G													
			Shoring And Sheeting Plan	1.5.1	G													
			Lift Plan	1.5.1	G													
			SD-03 Product Data															
			Permits, Certifications, and	1.8	G													
			Licenses															
			SD-11 Closeout Submittals															
			Test Pit Logs	3.3														
		02 81 00.99	SD-01 Preconstruction Submittals															
			Waste Management Plan	1.5.4	G													
			SD-06 Test Reports															
			Recordkeeping	3.8	G													
			SD-07 Certificates															
			Transporter Certification	1.5.3														
			Designated Transportation and	1.5.1	G													
			Disposal Coordinator															
			Training Certificates	1.5.2														
			Waste Minimization Certification	3.7														
			Vehicle Decontamination	1.5.5														
			Verification															
			SD-11 Closeout Submittals															
			Closeout Submittals	1.5.6														
			Certificates of Disposal	1.5.6														
		03 30 00.99	SD-01 Preconstruction Submittals															

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		03 30 00.99	Cold Weather Concrete Curing	1.4.2.1														
			Plan															
			SD-02 Shop Drawings															
			Formwork	3.1														
			Reinforcing Steel	3.2	G													
			SD-03 Product Data															
			Portland Cement	2.1.1	G													
			Concrete Aggregates	2.1.3	G													
			Reinforcing Bars	2.1.5	G													
			SD-05 Design Data															
			Concrete Mix Design	1.4.1.1	G													
			SD-06 Test Reports															
			Mill Test And All Other Test	1.4.1.1	G													
			Results															
			Compressive Strength	2.2.1	G													
		31 23 00.99	SD-01 Preconstruction Submittals															
			Shoring and Sheeting Plan	1.7.1	G													
			Sampling And Analysis Plan	1.6.1	G													
			Sampling And Analysis Plan	1.6.1	G													
			SD-05 Design Data															
			Material Delineation And	1.6.2	G													
			Handling Plan															
			SD-06 Test Reports															
			Borrow Site Testing	1.5														
			Density tests	3.13.2.3														
			Moisture Content Tests	3.13.2.4														

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		31 23 00.99	Fill And Backfill Material Testing	3.13.2.1	G													
			Select Material	3.13.2.2	G													
		31 25 00.99	SD-02 Shop Drawings															
			Shop Drawings	2.16	G													
			Reinforcing Steel	2.16	G													
			Layout Of Reinforcing Steel	3.1.1	G													
			SD-03 Product Data															
			Brochures	2.16	G													
			SD-04 Samples															
			Samples	2.16	G													
			SD-05 Design Data															
			Design Mixes	2.16	G													
		32 12 16.99	SD-01 Preconstruction Submittals															
			Commercial Laboratory Approved	2.2.1														
			By The Contracting Officer															
			SD-05 Design Data															
			Bituminous Mix Tests	3.8.2.2														
			Asphalt Mix Design	1.4.4	G													
			SD-06 Test Reports															
			Specific Gravity Of Mineral Filler	3.8.1.4														
			Specific Gravity Of Asphalt	3.8.1.5														
			Pavement Courses Testing	3.8.2.3														
			Aggregates Tests	3.8.2.1														
		32 12 17.99	SD-03 Product Data															
			Mix Design	1.3.2	G													
			Quality Control	3.11	G													

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		32 12 17.99	SD-04 Samples															
			Asphalt Cement Binder	2.2.1														
			Aggregates	2.2.1														
			SD-06 Test Reports															
			Aggregates	2.2.1	G													
			QC Monitoring	3.11.6														
			SD-07 Certificates															
			Asphalt Cement Binder	2.2.1	G													
			Testing Laboratory	3.7														
		32 92 19.99	SD-03 Product Data															
			Mulch	2.4														
			Fertilizer	2.2														
			Topsoil	2.1														
			Seed	2.3														
			SD-06 Test Reports															
			Testing	1.3.2.4														
		33 10 02.99	SD-01 Preconstruction Submittals															
			Bypass Plan	1.5	G													
			SD-02 Shop Drawings															
			Shop Drawings Or Brochures, Or	2.1														
			Both															
			SD-07 Certificates															
			Written Notification To The	1.5														
			Borough Of South Plainfield Fire															
			Department															
		33 11 00.99	SD-03 Product Data															

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		33 11 00.99	Pipe, Fittings, Joints and	2.2	G	AE												
			Couplings															
			Valves	2.3	G	AE												
			Valve Boxes	2.3.4	G	AE												
			Hydrants	2.4.1	G	AE												
			Pipe Anchorage	2.2.3	G	AE												
			Marking Posts	2.6.3	G													
			Tapping Sleeves And Valves	2.6.1	G													
			Folding Head Linestop	2.6.2.1	G													
			SD-06 Test Reports															
			Bacteriological Samples	3.2.9														
			Pressure And Leakage Tests	3.8.2	G													
			SD-07 Certificates															
			Pipe, Fittings, Joints and	2.2														
			Couplings															
			Valves	2.3														
			Hydrants	2.4.1														
			Disinfection Procedures	3.2.9														
			SD-08 Manufacturer’s Instructions															
			Manufacturer's Instructions	3.2.1.1														
			SD-11 Closeout Submittals															
			As Builts Drawings	3.9	G													
		33 39 45.99	SD-03 Product Data															
			Precast Manhole Sections	2.1														
			Ladder Rungs	2.3														
			Frame and Cover	2.4														

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APPENDIX A

Supplementary Information

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APPENDIX A-1

Supporting Tables for Section 01 35 45 - Chemical Data Quality Control

- Table 1: Analytical Methods for Chemical Parameters
- Table 2: Data Quality Objectives for Chemical Parameters

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Cornell-Dubilier Electronics Superfund Site Operable Unit 4
Section 01 35 45 - Table 1
Analytical Methods for Chemical Parameters

Data Use	Media	Parameter	Method		CLP SOW
			Prep/Extraction	Analysis	
Waste Characterization	Solid	TCLP VOCs	SW1311	SW8260	SOW SOM02.4
		TCLP SVOCs	SW1311	SW8270	SOW SOM02.4
		TCLP Metals	SW1311	SW6010, SW7470	SOW ISM02.4
		TCLP Pesticides	SW1311	SW8081	SOW SOM02.4
		TCLP Herbicides	SW1311	SW8151	SOW SOM02.4
		PCBs	SW3541, SW3550	SW8082	SOW SOM02.4
		Paint Filter	Refer to Analytical Method	SW9095	NA
		Corrosivity		SW9045	NA
		Ignitability		Pensky Martens	NA
	Water	TCL VOCs	SW5030	SW8260	SOW SOM02.4
		TCL SVOCs	SW3510, SW3520	SW8270	SOW SOM02.4
		TAL Metals (total and dissolved)	SW3010	SW6010/SW6020, SW7470	SOW ISM02.4
		TCL Pesticides	SW3510, SW3520	SW8081	SOW SOM02.4
		TCL Herbicides	SW3510, SW3520	SW8081	SOW SOM02.4
		TCL PCBs	SW3520	SW8082	SOW SOM02.4
		pH	Refer to Analytical Method	SW9045	NA
Imported Material (Backfill, Topsoil, Sand) Chemical Characterization	Solid	PCBs	SW3541, SW3550	SW8082	SOW SOM02.4
		TCL VOCs	SW5035	SW8260	SOW SOM02.4
		TCL SVOCs	SW3550	SW8270	SOW SOM02.4
		TAL Metals	SW3050	SW6010, SW7471	SOW ISM02.4
		Cyanide	Refer to Analytical Method	SW9012	SOW ISM02.4
		TCL Pesticides	SW3550	SW8081	SOW SOM02.4
		Radium (Ra-226)	NA	SM7500RaB or equivalent	NA
		Gamma Radiation	NA	DOE-GA-01-R or equivalent	NA
In-Situ of Soil	Solid	PCBs	SW3541, SW3550	SW8082	SOW SOM02.4
Perimeter Air Monitoring	Solid	PCBs	Refer to Analytical Method	EPA TO-4A	NA

Notes:
NA = Not Applicable
TCL = Target Compound List
TAL = Target Analyte List
TCLP = Toxicity Characteristic Leaching Procedures
PCBs = Polychlorinated biphenyls
VOC = Volatile Organic Compounds
SVOC = Semivolatile Organic Compounds
SOW = Statement of Work

Cornell-Dubilier Electronics Superfund Site Operable Unit 4
SECTION 01 35 45 - Table 2
Data Quality Objectives for Chemical Parameters

Data Use	Media	Parameter	Precision (RPD) *				Accuracy *			Completeness
			Field Duplicate	Laboratory Duplicate	LCS/LCSD	MS/MSD	Surrogate Recoveries	LCS Recoveries	MS/MSD Recoveries	
Waste Characterization	Solid	TCLP VOCs	<50%	NA	<30%	NA	<35%		NA	>90%
		TCLP SVOCs	<50%	NA	<30%	NA	<35%		NA	>90%
		TCLP Metals	<50%	NA	<30%	NA	NA	20%	NA	>90%
		TCLP Pesticides	<50%	NA	<30%	NA	<35%		NA	>90%
		TCLP Herbicides	<50%	NA	<30%	NA	<35%		NA	>90%
		PCBs	<50%	NA	<30%	NA	<35%		NA	>90%
		Moisture Content	<50%	<50%	NA	NA	NA			>90%
		Paint Filter	<50%	<50%	NA	NA	NA			>90%
		Corrosivity	<50%	<50%	NA	NA	NA			>90%
		Ignitability	<50%	<50%	NA	NA	NA			>90%
	Water	TCL VOCs	<40%	NA	<30%	NA	<35%		NA	>90%
		TCL SVOCs	<40%	NA	<30%	NA	<35%		NA	>90%
		TAL Metals (total and dissolved)	<40%	NA	<30%	NA	NA	20%	NA	>90%
		TCL Pesticides	<40%	NA	<30%	NA	<35%		NA	>90%
		TCL Herbicides	<40%	NA	<30%	NA	<35%		NA	>90%
		TCL PCBs	<40%	NA	<30%	NA	<35%		NA	>90%
		pH	<40%	NA	NA	NA	NA		NA	>90%
Imported Material (Backfill, Topsoil, Sand) Chemical Characterization	Solid	PCBs	<40%	NA	<30%	NA	<35%		NA	>90%
		TCL VOCs	<50%	NA	<30%	NA	<35%		NA	>90%
		TCL SVOCs	<50%	NA	<30%	NA	<35%		NA	>90%
		TAL Metals	<50%	NA	<30%	NA	NA	20%	NA	>90%
		Cyanide	<50%	NA	<30%	NA	NA	20%	NA	>90%
		TCL Pesticides	<50%	NA	<30%	NA	<35%		NA	>90%
		Radium (Ra-226)	<50%	<40%	<30%	NA	NA		NA	>90%
		Gamma Radiation	<50%	<40%	<30%	NA	NA	35%	NA	>90%
In-Situ of Soil	Solid	PCBs	<50%	NA	<30%	NA	<35%		NA	>90%
Perimeter Air Monitoring	Solid	PCBs	<50%	<30%	<30%	NA	<35%		NA	>90%

Notes:
NA = Not Applicable
TCL = Target compound list
TAL = Target analyte list
TCLP = toxicity characteristic leaching procedures
PCBs = polychlorinated biphenyls
VOC = volatile organic compounds
SVOC = semivolatile organic compounds
LCS/LCSD = laboratory control sample/laboratory control sample duplicate

APPENDIX A-2

Supporting Information for Section 01 58 00 – Project Identification Signage Details

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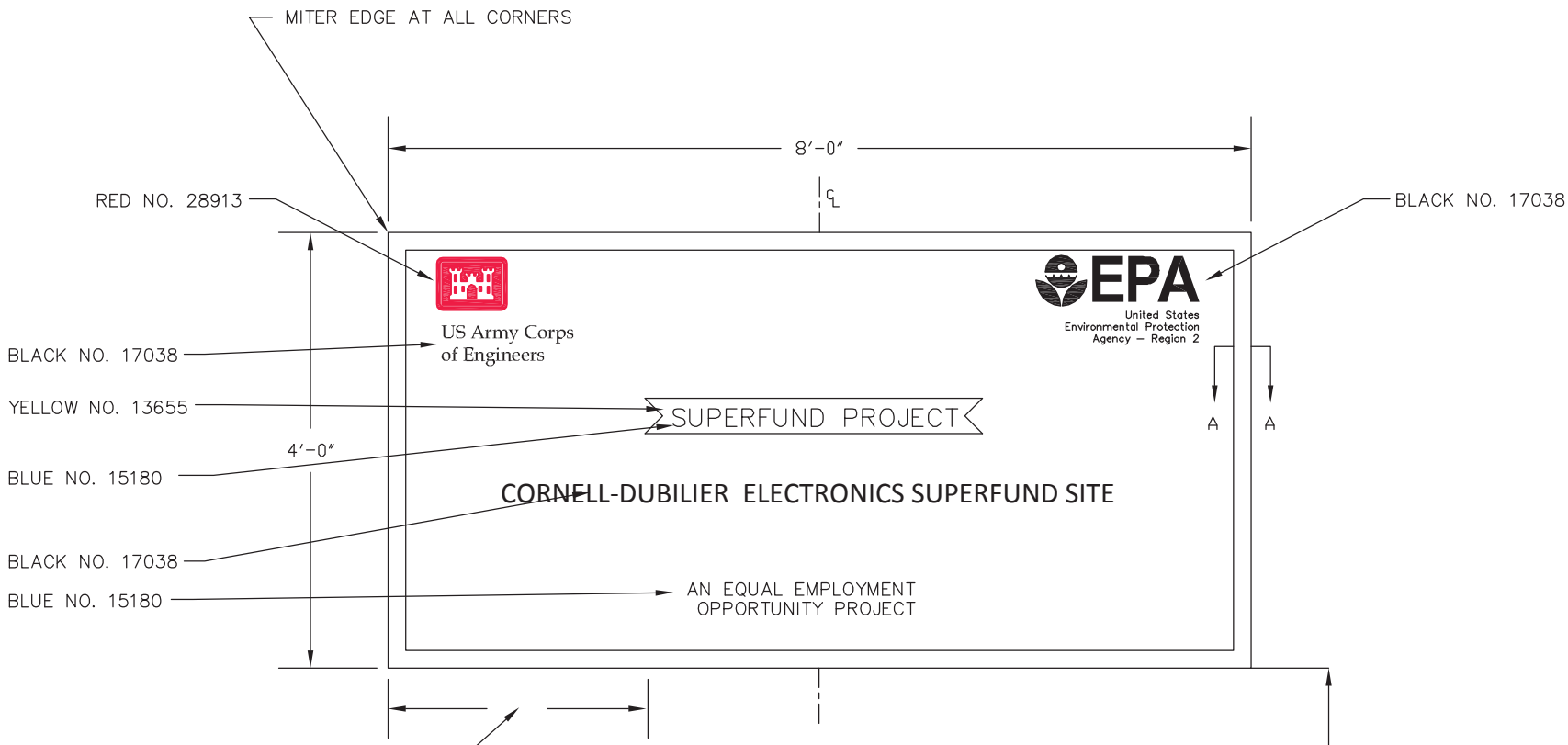
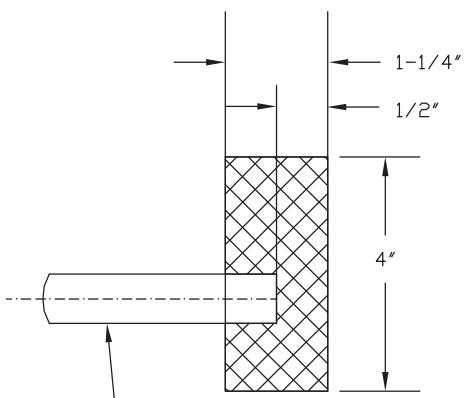


LEFT BORDER SHALL BE DETERMINED USING THE LONGEST LINE CENTERED ON THE SIGN PROVIDING EQUAL BORDERS

PROVIDE ADEQUATE SUPPORTS FOR SIGN AS SITE CONDITIONS MAY REQUIRE AND KEEP SIGN A PROPER DISTANCE ABOVE PREVAILING GRADE TO PERMIT PUBLIC VIEWING.



EXTERIOR TYPE HIGH DENSITY OVERLAID PLYWOOD OR APPROVED MATERIAL SUITABLE FOR SIGNS

SECTION "A-A"

COLOR NUMBERS REFER TO FEDERAL COLOR STANDARDS NO . 595a (1–68), WHICH ARE AVAILABLE FROM GSA SUPPLIES.

BACKGROUND AND ALL OTHER SIGN COMPONENTS NOT DESIGNATED ARE PAINTED WHITE NO. 17886.

Each contractor's safety record is to be posted on Corps managed or supervised construction projects and mounted with the Construction Project Identification sign specified on page 16-2.

The graphic format, color, size and typefaces used on the sign are to be reproduced exactly as specified below. The title with First Aid logo in the top section of the sign, and the performance record captions are standard for all signs of this type. Legend groups 2 and 3 below identify the project and the contractor and are to be placed on the sign as shown.

Safety record numbers are mounted on individual metal plates and are screw-mounted to the background to allow for daily revisions to posted safety performance record.

Special applications or situations not covered in these guidelines should be referred to the district Sign Program Manager.

Legend Group 1: Standard two-line title "Safety is a Job Requirement" with 8" (outside diameter) Safety Green first aid logo.
Color: To match Pantone system 347
Typeface: 3" Helvetica Bold
Color: Black

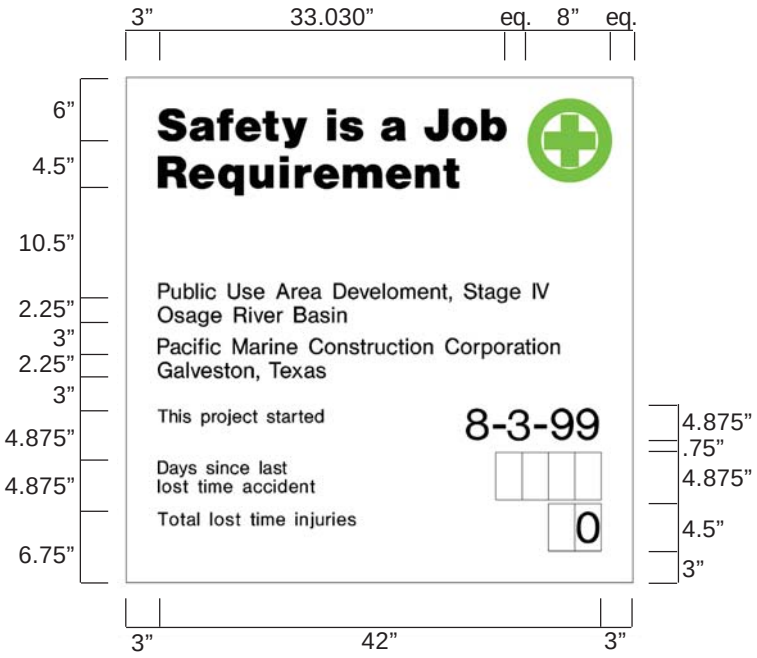
Legend Group 2: One- to two-line project title legend describes the work being done under this contract and name of host project.
Color: Black
Typeface: 1.5" Helvetica Regular
Maximum line length: 42"

Legend Group 3: One- to two-line identification: name of prime contractor and city, state address. Color: Black
Typeface: 1.5" Helvetica Regular
Maximum line length: 42"

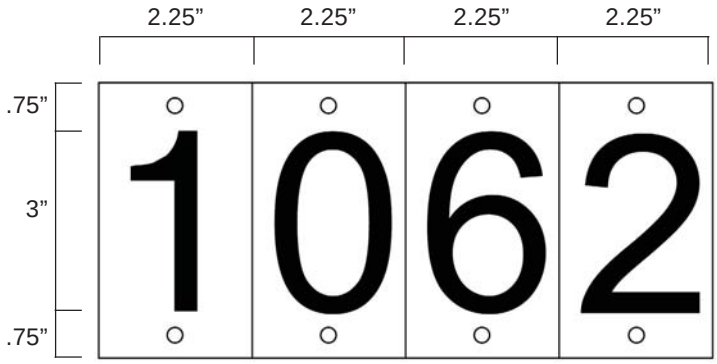
Legend Group 4: Standard safety record captions as shown.
Color: Black
Typeface: 1.25" Helvetica Regular

Replaceable numbers are to be mounted on white .060 aluminum plates and screw-mounted to background.
Color: Black
Typeface: 3" Helvetica Regular
Plate size: 2.5" x 4.5"

All typography is flush left and rag right, upper and lower case with initial capitals only as shown. Letter- and word-spacing to follow Corps standards as specified in Appendix D.



Sign Type	Legend Size (A)	Panel Size	Post Size	Specification Code	Mounting Height	Color Bkg/Lgd
CID-02	various	4'x4'	4"x4"	HDO-3	48"	WH/BK-SG



01580-4

Fabrication and Mounting Guidelines

All Construction Project Identification signs and Safety Performance signs are to be fabricated and installed as described below. The signs are to be erected at a location designated by the contracting officer representative and shall conform to the size, format, and typographic standards shown on pages16-2 and 16-3. Detailed specifications for HDO plywood panel preparation are provided in Appendix B.

Shown below the mounting diagram is a panel layout grid with spaces provided for project information. Photocopy this page and use as a worksheet when preparing sign legend orders.

For additional information on the proper method to prepare sign panel graphics, contact the district Sign Program Manager.

The sign panels are to be fabricated from .75" High Density Overlay Plywood. Panel preparation to follow HDO specifications provided in Appendix B.

Sign graphics to be prepared on a white nonreflective vinyl film with positionable adhesive backing.

All graphics except for the Communication Red background with Corps Signature on the project sign are to be die-cut or computer-cut nonreflective vinyl, prespaced legends prepared in the sizes and typefaces specified and applied to the background panel following the graphic formats shown on pages 16-2 and 16-3.

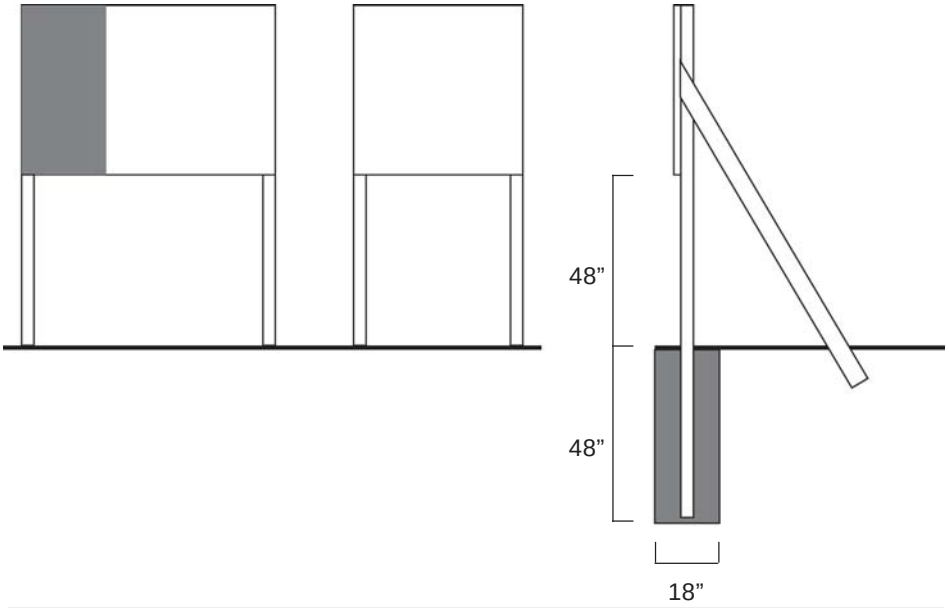
The 2'x 4' Communication Red panel (to match Pantone system 032) with full Corps Signature (reverse version) is to be screen-printed on the white background. Identification of the district or division may be applied under the signature with white cut vinyl letters prepared to Corps standards.

Drill and insert six (6) .375" T-nuts from the front face of the HDO sign panel. Position holes as shown. Flange of T-nut to be flush with sign face.

Apply graphic panel to prepared HDO plywood panel following manufacturers' instructions.

Sign uprights to be structural grade 4" x 4" treated Douglas Fir or Southern Yellow Pine, No.1 or better. Post to be 12' long. Drill six (6) .375" mounting holes in uprights to align with T-nuts in sign panel. Countersink (.5") back of hole to accept socket head cap screw (4" x .375").

Assemble sign panel and uprights. Imbed assembled sign panel and uprights in 4' hole. Local soil conditions and/or wind loading may require bolting additional 2" x 4" struts on inside face of uprights to reinforce installation as shown.



Construction Project Identification Sign
Legend Group 1: Corps Relationship

1. _____
2. _____

Legend Group 2: Division/District Name

1. _____
2. _____

Legend Group 2a: Military/Civil Works Sponsor

1. _____
2. _____

Legend Group 3: Project Title

1. _____
2. _____
3. _____

Legend Group 4: Facility Name

1. _____
2. _____

Legend Group 5: Contractor/A&E

1. _____
2. _____
3. _____
4. _____
5. _____

Legend Group 5b: Contractor/A&E

1. _____
2. _____
3. _____
4. _____
5. _____

Safety Performance Sign
Legend Group 2: Project Title

1. _____
2. _____

Legend Group 3: Contractor/A&E

1. _____
2. _____

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APPENDIX A-3

Water Flow Modeling

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CALCULATION SHEET

CLIENT:
United States Army Corps of Engineers, Kansas City District

PROJECT NUMBER:
28825CDE.001

PROJECT:
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4

TITLE:
Hydrologic and Hydraulic (H&H) Calculations

PREPARED BY:
Kellie E Hebert, Arcadis

DATE:
5/11/18

REVIEWED BY:
Thomas A. Steiner, Arcadis

DATE:
5/11/18

OBJECTIVE

The following calculations were prepared by Arcadis U.S., Inc. (Arcadis) to evaluate different bypass approaches that could be utilized during sediment removal activities at the Cornell-Dubilier Electronics (CDE) Superfund Site (CDE Site) located in South Plainfield, New Jersey. The following bypass approaches were evaluated:

- Open-channel bypass system using jersey barriers and plastic liner;
- Open-channel bypass system using bin blocks and plastic liner;
- Gravity-pipe bypass system; and
- Pumped bypass system.

To identify the most efficient strean bypass system, the capacity, potential for the stream to overtop the hydraulic barrier system, and the stability (if applicable) of each barrier system was calculated. Based on the following analyses, the gravity-pipe and pumped bypass systems appear most feasible, with the pumped bypass as the preferred method.

Additionally, to meet local floodplain regulations, the project must ensure that no rise occurs in the Federal Emergency Management Agency (FEMA) 100-year base flood elevation from pre- to post-remediation conditions. No rise in base flood elevations is expected as a result of remediation activities based on the modelling results.

The following sections summarize the calculations and conclusions regarding each objective.

REFERENCES

1. Brooks, Hugh & Nielsen, John P. Basics of Retaining Wall Design, 10th Edition. HBA Publications. 1992.
2. Brunner, Gary W. Hydraulic Engineering Center River Analysis System (HEC-RAS), Version 5.0. US ACE HEC, 2016.
3. National Oceanic and Atmospheric Administration (NOAA), National Center for Environmental information. Climate Data Online. Available at: https://www.ncdc.noaa.gov/cdo-web/
4. NOAA Hydrometeorological Design Studies Center, Precipitation Frequency Data Server. Available at: https://hdsc.nws.noaa.gov/hdsc/pfds/
5. United States Geological Survey (USGS) StreamStats, version 4. Available at: https://water.usgs.gov/osw/streamstats/
6. Federal Emergency Management Agency (FEMA). Flood Insurance Study, Middlesex County, New Jersey (All Jurisdictions), Volume 1 of 3. July 6, 2010.

ATTACHMENTS

- Attachment 1 – Estimated Peak Flow vs Rainfall Depth Relationship
- Attachment 2 – Estimated Overtopping Frequencies
- Attachment 3 – Hydrology and Hydraulic Model

STREAM FLOWS AND LOCAL PRECIPITATION DATA

Stream Flows

The FEMA flood insurance study (FIS) for Middlesex County, New Jersey provides the calculated peak discharge-frequency relationship for Bound Brook. These peak discharge-frequencies were developed using regression analysis of gages in New Jersey and estimate the peak flood magnitudes of selected recurrence intervals. A summary of the peak discharges (cubic feet per second [cfs]) is shown in the table below.

Location	10-percent	2-percent	1-percent	0.2-percent
BOUND BROOK	10 years	50 years	100 years	500 years
Just upstream of the second crossing of railroad	930	1,800	2,400	4,500

USGS's StreamStats online was used to estimate flows for the site. A summary of StreamStats peak-flow statistics (cfs) is shown in the table below.

Peak Flood	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Flow (cfs)	561	824	1,000	1,230	1,400	1,580	1,960

NOAA's Precipitation Frequency Data Server provides partial duration series precipitation frequency estimates with 90% confidence intervals for average recurrence intervals. A summary of the precipitation frequency estimates (inches [in]) for South Plainfield, New Jersey and a 24-hour storm duration are shown in the table below.

Rainfall Event	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Depth (in)	3.37	4.32	5.14	6.36	7.43	8.61	11.9

Daily historical rainfall data from January 2009 to January 2018 was obtained from the NOAA Climate Data Online. Station US1NJMD0023 had the most available data and was used as the primary source, but there appeared to be data gaps in the data collected for that station. Therefore, rainfall data from four other stations close to the site were also used to fill in the data gaps (Stations US1NJMD0071, US1NJMD0066, US1NJMD0044, and US1NJMD0033). The locations of these stations are shown in Figure 1.

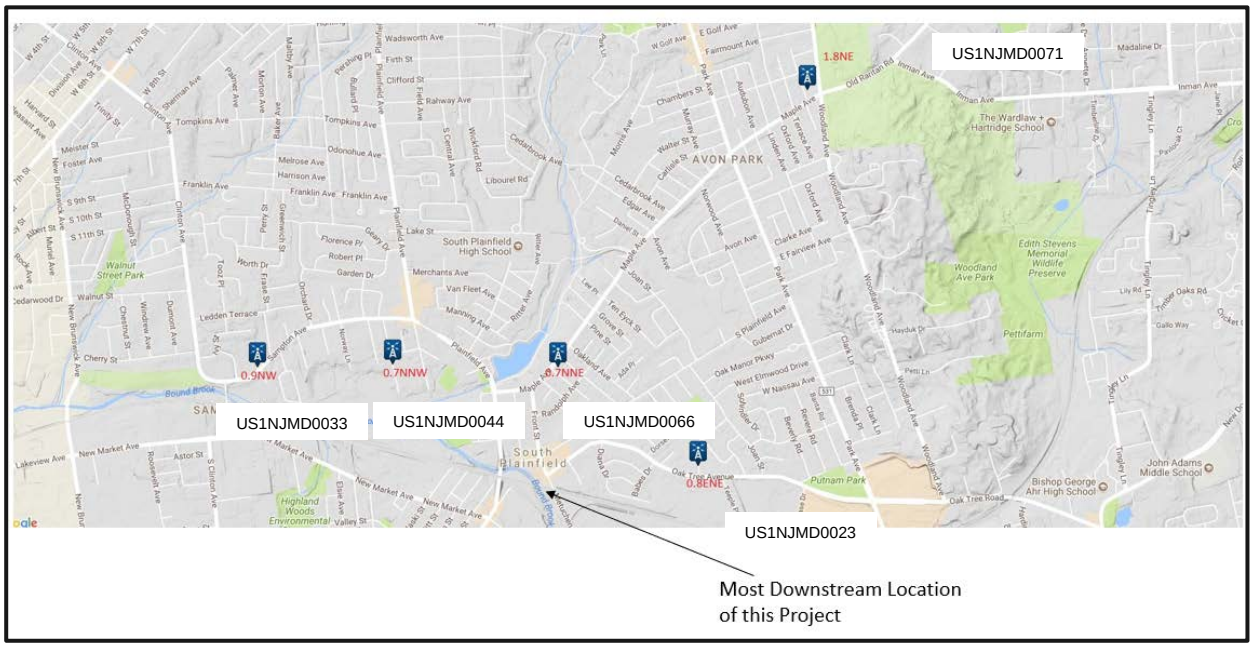

Figure 1 Historical Rainfall Data Station Locations

To evaluate each stream bypass system and the potential for overtopping, a relationship between the estimated peak flows at the site and rainfall depths was created by plotting the USGS StreamStats return-interval flows against the NOAA Precipitation Frequency Data Server return-interval precipitation data, and fitting a polynomial trendline. This analysis is provided in Attachment 1, Estimated Peak Flow vs Rainfall Depth Relationship.

HYDROLOGY & HYDRAULIC (H&H) MODEL

To aid in the evaluation of the open-channel bypass systems a H&H model using the U.S. Army Corps of Engineers' HEC-RAS software was created. The hydrologic information from FEMA's FIS was used in the

H&H model along with topographic cross sections based on field-survey data, State of New Jersey LIDAR data, and proposed grading.

CONCRETE OR PLASTIC WATER-FILLED JERSEY BARRIER SYSTEM

Concrete or plastic water-filled jersey barrier systems were evaluated for heights of 32 in, 42 in, 46 in, and 54 in. Modeled stream flows were varied to determine the maximum allowable flow capacity for each height of the barrier system at which the lowest point of the barrier system (i.e., relative to the modeled water surface) was subject to overtopping (a freeboard of 0.3 feet was used to account for potential variation between actual and modeled conditions). The table below shows the estimated maximum bypass capacities for each of the jersey-barrier based open-channel bypass systems.

Stream Bypass Barrier Height (in)	Maximum Bypass Capacity (cfs)
32	2[1]
42	8
46	16
54	35

Additionally, the jersey barriers must resist both overturning and sliding forces due to hydrostatic loading. Stability calculations were performed for each of the jersey barrier heights and materials. The calculations concluded that the 32 in concrete jersey barrier system would be the only system that would not overturn or slide. Because the 32 in height provides a maximum bypass capacity of only 2 cfs, which is nearly equivalent to the approximate base flow of the stream, the jersey-barrier approach was determined to be infeasible. Supporting calculations for this analysis are not included in this package, but can be provided upon request.

BIN BLOCK BARRIER SYSTEM

A bin block barrier system using 30-in x 30-in bin blocks was evaluated using two different arrangements. The arrangements included two bin blocks stacked one on top of the other and three bin blocks, with two side-by-side on the bottom and one centered on top of the bottom two. Stability calculations showed the two-bin-block arrangement is not stable and the three-bin-block arrangement is stable. The three-bin-block arrangement bottom width is 5 feet and will require a flat bottom surface to remain stable within the channel bottom. In addition, this arrangement consumes valuable capacity within the channel for stream flows. Due to the width of streambed occupied by this system and associated complications this creates for sediment removal, as well as the limited maximum bypass capacity, the bin-block bypass system was determined to be infeasible. Supporting calculations for this analysis are not included in this package but can be provided upon request.

[1] Based on the USGS StreamStats data, the typical base flow (low flow) for Bound Brook during the construction season (i.e., May-Oct) is approximately 1 to 3 cfs.

GRAVITY-PIPE BYPASS SYSTEM WITH COFFERDAMS

Two different bypass scenarios using a gravity-pipe bypass system with upstream and downstream cofferdams were evaluated using Bentley System's "Culvert Master" software. The first scenario was set up in a multi-phase approach where the upstream portion of the in-stream removal area is excavated first, then the cofferdams are moved downstream for the remainder of the in-stream removals. The second scenario was set up as a single-phase approach, where the entire in-stream removal area is bypassed at once. For each analysis, three different layouts were considered: (2) 24" diameter discharge pipes, (1) 36" diameter discharge pipe, and (1) 48" diameter discharge pipe. Each analysis utilized the following criteria:

- a smooth interior high-density polyethylene pipe with a manning's coefficient of 0.12; and
- a square edge with a headwall inlet type, and an entrance loss coefficient (Ke) value of 0.50.

Field survey data were evaluated to determine the gravity-pipe inlet and outlet elevations for each approach. Tailwater conditions were derived from the HEC-RAS model and input into Culvert Master as a tailwater rating curve. The maximum bypass capacity for each scenario was the flow that would reach 1 foot below the top of the upstream cofferdam (to allow for some freeboard). The table below shows the determined capacities of each analysis for both scenarios.

Gravity-Pipe Bypass Size	Multi-Phase Scenario Max Bypass Capacity (cfs)	Single-Phase Scenario Max Bypass Capacity (cfs)
(2) 24"	25 (upstream) / 14 (downstream)	15
(1) 36"	30 (upstream) / 10 (downstream)	25
(1) 48"	N/A*	35

*The 48" gravity-pipe bypass system will not fit within the channel bank heights of the downstream removal area.

The historical rainfall data were then used to determine the potential frequency at which the stream might overtop the cofferdam. The maximum bypass capacities were converted to equivalent rainfall depths (in) using the relationship developed for return-interval stream flows versus return-interval precipitation depths, and then compared against historical rainfall records to determine the average number of days the system would have overtopped in prior years. The table below summarizes these results.

Bypass System	Max Capacity (cfs)	Equivalent Rainfall Depths (in)	Average Number of Days System Overtops (days)	Average Frequency of Overtopping (days/week)
(2) 24" Multi-Phase (Upstream)	25	0.19	27	2
(2) 24" Multi-Phase (Downstream)	14	0.09	36	2
(2) 24" Single-Phase	15	0.10	35	2
(1) 36" Multi-Phase (Upstream)	30	0.23	25	1
(1) 36" Multi-Stage (Downstream)	10	0.05	42	2
(1) 36" Single-Phase	25	0.19	27	2
(1) 48" Single-Phase	35	0.28	22	1

Based on these results, the two 24-in diameter pipes appear to be the most reasonable configuration for a gravity-pipe bypass system. The backup calculations for these analyses are not included in this package but can be provided upon request.

STREAM BYPASS PUMPING SYSTEM

The stream bypass pumping system analysis consisted of comparing potential pump-bypass flows to equivalent rainfall events and then evaluating the typical frequency of exceedance (i.e., when stream flow would be expected to overwhelm and overtop the bypass system). The estimated stream flows evaluated were 10, 20, 50, and 100 cfs. The table below summarizes the results.

Estimated Storm Event Flow in Bound Brook at Project Site		Equivalent 24-hour Rainfall Amount	Typical Frequency of Exceedances of 24-hour Rainfall Amount During Construction Season (days/week)						
cfs	gpm	inches	May	Jun	Jul	Aug	Sep	Oct	Nov
10	4,500	0.05	3	2	2	2	2	2	1
20	9,000	0.15	2	2	1	1	1	1	1
50	22,500	0.40	<1	1	<1	<1	<1	<1	<1
100	44,900	0.77	<1	<1	<1	<1	<1	<1	<1

Based on these results, a pumped bypass system is the prefered alternative and allows the contractor to size their pumping system based on the level of risk they are willing to accept (i.e., frequency of overtopping) they are willing to accept.

BASE FLOOD ELEVATIONS

Remediation activities will include an overall net removal of soil and sediment from within the floodplain and creek (i.e., less backfill will be put back than what is removed), as well as removal of an existing abandoned railroad embankment and culverts. As described in more detail in Attachment 3 to this appendix, modeling demonstrates that no rise in base flood elevations is expected as a result of remediation activities and modification to the existing channel and there is an overall net increase in floodplain storage capacity.

ATTACHMENT 1

ESTIMATED PEAK FLOW VS RAINFALL DEPTH RELATIONSHIP

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Estimated Peak Flow vs. Rainfall Depth Relationship

Rainfall Data Source: Precipitation Frequency Data Server; South Plainfield, New Jersey; 40.576°N, -74.4115°W; 24-hr storm

Flood Flows Data Source: USGS StreamStats; 40.57599°N, -74.41028°W

Rainfall Event	Precipitation (in)	Peak Flood Flow (cfs)	gpm	
				1200
				89
low flow	0	2	898	
2-Year	3.37	561	251,777	595
5-Year	4.32	824	369,811	831
10-Year	5.14	1000	448,800	1037
25-Year	6.36	1230	552,024	1348
50-Year	7.43	1390	623,832	1622
100-Year	8.61	1570	704,616	1925
500-Year	11.9	1960	879,648	2772

Desired flow = 35 cfs

Use Solver to solve for precip depth

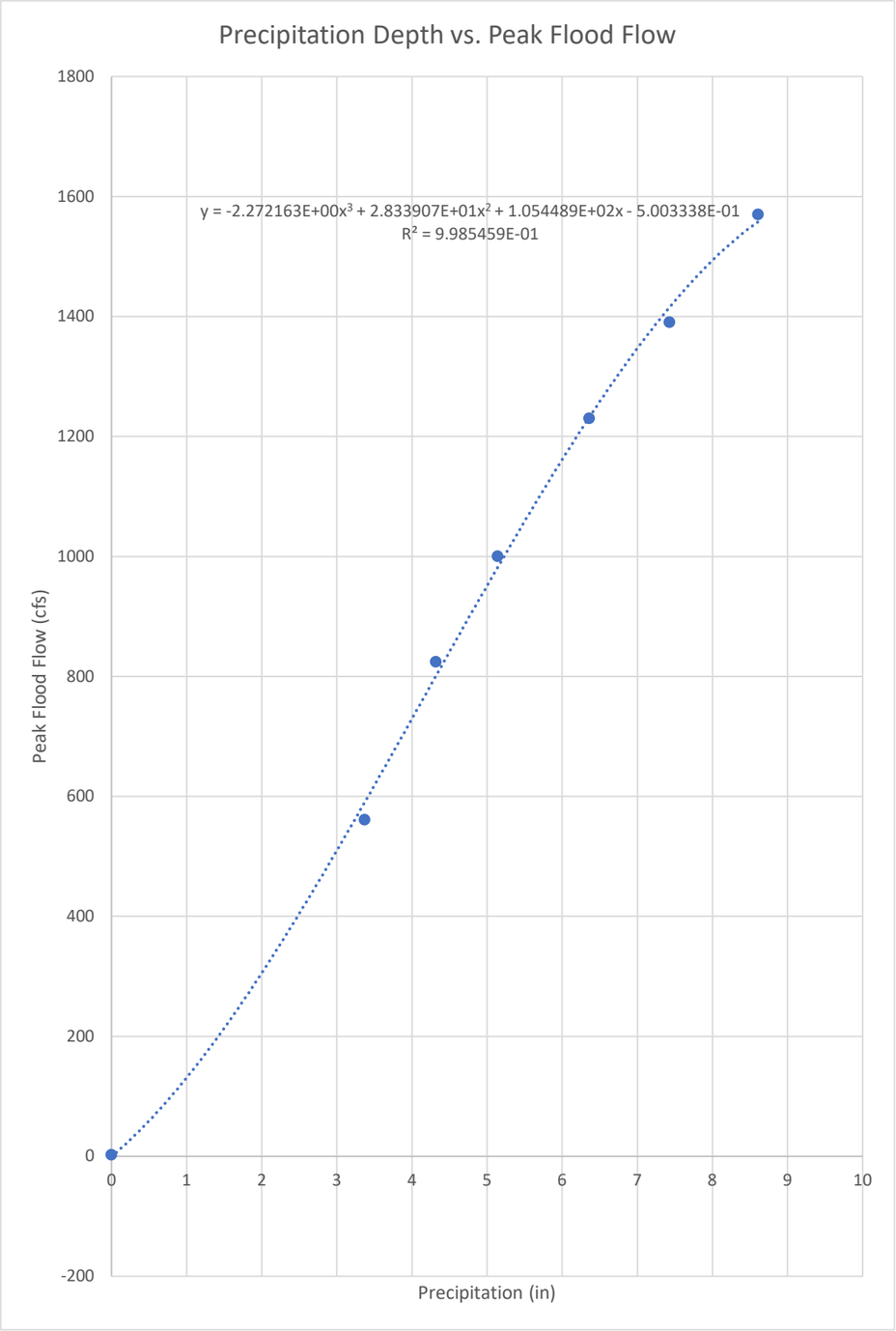
Precip = 0.28 in

Flow = 35 cfs

Bypass System	Max Capacity (cfs)	Equivalent Rainfall Depth (in)
32" Bypass Capacity (standard height)	2**	N/A
42" Bypass Capacity	8	0.03
46" Bypass Capacity	16	0.11
*54" Bypass Capacity (w/o HW dam pad)	35	0.28
*54" Bypass Capacity (w/ HW dam pad)	80	0.63
2-24" 1 CulvertPhase II/III	25	0.19
2-24" 1 CulvertPhase IV/V	14	0.09
36" Culvert Phase II/III	30	0.23
36" Culvert Phase IV/V	10	0.05
2-24" 1 Culvert Bypass	15	0.1
36" 1 Culvert Bypass	25	0.19
48" 1 Culvert Bypass	35	0.28

* Have only been able to locate 42"+ barriers in plastic, water-filled and difficult to find (Discount Directionals).

** Note that base flow is approximately 2 cfs, based on USGS StreamStats Report.



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USGS STREAMSTATS REPORT

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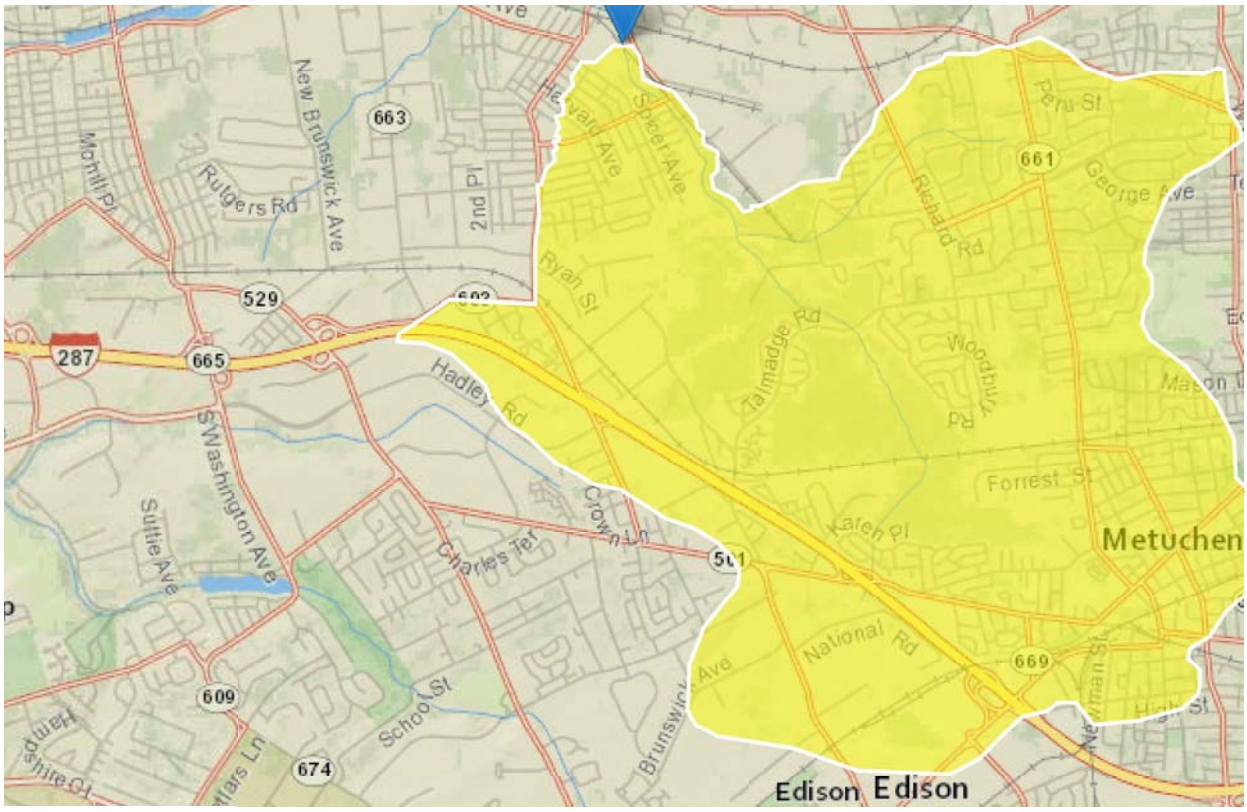
StreamStats Report CDE Site

Region ID: NJ
Workspace ID: NJ20180221121145371000
Clicked Point (Latitude, Longitude): 40.57621, -74.41035
Time: 2018-02-21 07:11:59 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	8.05	square miles
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	21.6	percent

Parameter Code	Parameter Description	Value	Unit
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	6.18	feet per mi
POPDENS	Basin Population Density	3160	persons per square mile
PERMSSUR	Area-weighted average soil permeability from NRCS SSURGO database	3.04	inches per hour
JUNAVPRE	Mean June Precipitation	3.84	inches
APRAVPRE	Mean April Precipitation	4.02	inches
FOREST	Percentage of area covered by forest	5.01	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	79.6	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	33.6	percent

Peak-Flow Statistics Parameters [37 Percent (2.99 square miles) Peak Glaciated Piedmont Region 2009 5167]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	1.27	56.4
STORAGE	Percent Storage	21.6	percent	0.62	11.6
CSL10_85	Stream Slope 10 and 85 Method	6.18	feet per mi	9.37	176
POPDENS	Basin Population Density	3160	persons per square mile	645	13492

Peak-Flow Statistics Parameters [63 Percent (5.06 square miles) Peak Unglaciated Piedmont Region 2009 5167]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.25	779
STORAGE	Percent Storage	21.6	percent	0.23	32
CSL10_85	Stream Slope 10 and 85 Method	6.18	feet per mi	4.31	191
POPDENS	Basin Population Density	3160	persons per square mile	83	11084

Peak-Flow Statistics Disclaimers [37 Percent (2.99 square miles) Peak Glaciated Piedmont Region 2009 5167]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [37 Percent (2.99 square miles) Peak Glaciated Piedmont Region 2009 5167]

Statistic	Value	Unit
2 Year Peak Flood	368	ft^3/s
5 Year Peak Flood	530	ft^3/s
10 Year Peak Flood	639	ft^3/s
25 Year Peak Flood	777	ft^3/s
50 Year Peak Flood	876	ft^3/s
100 Year Peak Flood	979	ft^3/s
500 Year Peak Flood	1210	ft^3/s

Peak-Flow Statistics Flow Report [63 Percent (5.06 square miles) Peak Unglaciated Piedmont Region 2009 5167]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp	Equiv. Yrs.
2 Year Peak Flood	675	ft^3/s	50.3	1
5 Year Peak Flood	998	ft^3/s	50.9	2
10 Year Peak Flood	1220	ft^3/s	52.2	3
25 Year Peak Flood	1500	ft^3/s	54.5	4
50 Year Peak Flood	1700	ft^3/s	56.8	5

Statistic	Value	Unit	SEp	Equiv. Yrs.
100 Year Peak Flood	1930	ft^3/s	59.5	5
500 Year Peak Flood	2410	ft^3/s	66.3	6

Peak-Flow Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
2 Year Peak Flood	561	ft^3/s
5 Year Peak Flood	824	ft^3/s
10 Year Peak Flood	1000	ft^3/s
25 Year Peak Flood	1230	ft^3/s
50 Year Peak Flood	1400	ft^3/s
100 Year Peak Flood	1580	ft^3/s
500 Year Peak Flood	1960	ft^3/s

Peak-Flow Statistics Citations

Watson, K.M.,and Schopp, R.D.,2009, Methodology for estimation of flood magnitude and frequency for New Jersey streams, U.S. Geological Survey Scientific Investigations Report 2009-5167, 51 p. (http://pubs.usgs.gov/sir/2009/5167/)

Seasonal Flow Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88

Seasonal Flow Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88

Seasonal Flow Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit

Statistic	Value	Unit
Aug Sep 75 Pct Dur Min 1 Day Low Flow	2.83	ft^3/s
Aug Sep 90 Pct Dur Min 1 Day Low Flow	1.93	ft^3/s
Aug Sep 99 Pct Dur Min 1 Day Low Flow	0.989	ft^3/s

Seasonal Flow Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit
Aug Sep 75 Pct Dur Min 1 Day Low Flow	2.03	ft^3/s
Aug Sep 90 Pct Dur Min 1 Day Low Flow	1.33	ft^3/s
Aug Sep 99 Pct Dur Min 1 Day Low Flow	0.79	ft^3/s

Seasonal Flow Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

Monthly Flow Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.43	6.99
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.81

Monthly Flow Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.38	6.73
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.76

Monthly Flow Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit
Jan 7 Day 10 Year Low Flow	2.73	ft^3/s
Feb 7 Day 10 Year Low Flow	3.38	ft^3/s
Mar 7 Day 10 Year Low Flow	5.28	ft^3/s
Apr 7 Day 10 Year Low Flow	4.56	ft^3/s
May 7 Day 10 Year Low Flow	2.96	ft^3/s
Jun 7 Day 10 Year Low Flow	2.51	ft^3/s
Jul 7 Day 10 Year Low Flow	1.35	ft^3/s
Aug 7 Day 10 Year Low Flow	0.989	ft^3/s
Sep 7 Day 10 Year Low Flow	0.942	ft^3/s
Oct 7 Day 10 Year Low Flow	1.21	ft^3/s
Nov 7 Day 10 Year Low Flow	2.15	ft^3/s
Dec 7 Day 10 Year Low Flow	2.35	ft^3/s

Monthly Flow Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit
Jan 7 Day 10 Year Low Flow	2.71	ft^3/s
Feb 7 Day 10 Year Low Flow	2.81	ft^3/s
Mar 7 Day 10 Year Low Flow	4.29	ft^3/s
Apr 7 Day 10 Year Low Flow	3.8	ft^3/s
May 7 Day 10 Year Low Flow	1.94	ft^3/s
Jun 7 Day 10 Year Low Flow	1.99	ft^3/s
Jul 7 Day 10 Year Low Flow	0.954	ft^3/s

Statistic	Value	Unit
Aug 7 Day 10 Year Low Flow	0.542	ft^3/s
Sep 7 Day 10 Year Low Flow	0.58	ft^3/s
Oct 7 Day 10 Year Low Flow	0.83	ft^3/s
Nov 7 Day 10 Year Low Flow	1.6	ft^3/s
Dec 7 Day 10 Year Low Flow	2.67	ft^3/s

Monthly Flow Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

December Flow-Duration Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.43	6.99
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.81

December Flow-Duration Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.38	6.73
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.76

December Flow-Duration Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit
Dec 99 Pct Duration Min 1 Day Low Flow	1.21	ft^3/s
Dec 90 Pct Duration Min 1 Day Low Flow	2.31	ft^3/s
Dec 85 Pct Duration Min 1 Day Low Flow	1.69	ft^3/s
Dec 75 Pct Duration Min 1 Day Low Flow	2.86	ft^3/s
Dec 50 Pct Duration Min 1 Day Low Flow	4.25	ft^3/s
Dec 25 Pct Duration Min 1 Day Low Flow	5.71	ft^3/s

December Flow-Duration Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit
Dec 99 Pct Duration Min 1 Day Low Flow	0.908	ft^3/s
Dec 90 Pct Duration Min 1 Day Low Flow	1.78	ft^3/s
Dec 85 Pct Duration Min 1 Day Low Flow	2.98	ft^3/s
Dec 75 Pct Duration Min 1 Day Low Flow	2.57	ft^3/s
Dec 50 Pct Duration Min 1 Day Low Flow	3.73	ft^3/s
Dec 25 Pct Duration Min 1 Day Low Flow	4.95	ft^3/s

December Flow-Duration Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

January Flow-Duration Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.43	6.99
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.81

January Flow-Duration Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.38	6.73
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.76

January Flow-Duration Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit
Jan 99 Pct Duration Min 1 Day Low Flow	1.1	ft^3/s
Jan 90 Pct Duration Min 1 Day Low Flow	2.25	ft^3/s
Jan 85 Pct Duration Min 1 Day Low Flow	2.82	ft^3/s
Jan 75 Pct Duration Min 1 Day Low Flow	3.33	ft^3/s
Jan 50 Pct Duration Min 1 Day Low Flow	4.61	ft^3/s
Jan 25 Pct Duration Min 1 Day Low Flow	6.09	ft^3/s

January Flow-Duration Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit
Jan 99 Pct Duration Min 1 Day Low Flow	0.822	ft^3/s
Jan 90 Pct Duration Min 1 Day Low Flow	2.06	ft^3/s
Jan 85 Pct Duration Min 1 Day Low Flow	2.56	ft^3/s
Jan 75 Pct Duration Min 1 Day Low Flow	3.07	ft^3/s
Jan 50 Pct Duration Min 1 Day Low Flow	4.3	ft^3/s

Statistic	Value	Unit
Jan 25 Pct Duration Min 1 Day Low Flow	5.63	ft^3/s

January Flow-Duration Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

February Flow-Duration Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.43	6.99
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.81

February Flow-Duration Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.76
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.38	6.73

February Flow-Duration Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit
Feb 99 Pct Duration Min 1 Day Low Flow	1.61	ft^3/s
Feb 90 Pct Duration Min 1 Day Low Flow	2.56	ft^3/s

Statistic	Value	Unit
Feb 85 Pct Duration Min 1 Day Low Flow	3.17	ft^3/s
Feb 75 Pct Duration Min 1 Day Low Flow	3.68	ft^3/s
Feb 50 Pct Duration Min 1 Day Low Flow	5.22	ft^3/s
Feb 25 Pct Duration Min 1 Day Low Flow	6.94	ft^3/s

February Flow-Duration Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit
Feb 99 Pct Duration Min 1 Day Low Flow	1.67	ft^3/s
Feb 90 Pct Duration Min 1 Day Low Flow	1.9	ft^3/s
Feb 85 Pct Duration Min 1 Day Low Flow	2.6	ft^3/s
Feb 75 Pct Duration Min 1 Day Low Flow	3.04	ft^3/s
Feb 50 Pct Duration Min 1 Day Low Flow	4.72	ft^3/s
Feb 25 Pct Duration Min 1 Day Low Flow	6.22	ft^3/s

February Flow-Duration Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

March Flow-Duration Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.43	6.99
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.81

March Flow-Duration Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.38	6.73
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.76

March Flow-Duration Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit
Mar 99 Pct Duration Min 1 Day Low Flow	2.72	ft^3/s
Mar 90 Pct Duration Min 1 Day Low Flow	3.92	ft^3/s
Mar 85 Pct Duration Min 1 Day Low Flow	4.33	ft^3/s
Mar 75 Pct Duration Min 1 Day Low Flow	5.19	ft^3/s
Mar 50 Pct Duration Min 1 Day Low Flow	6.73	ft^3/s
Mar 25 Pct Duration Min 1 Day Low Flow	7.92	ft^3/s

March Flow-Duration Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit
Mar 99 Pct Duration Min 1 Day Low Flow	1.72	ft^3/s
Mar 90 Pct Duration Min 1 Day Low Flow	3.34	ft^3/s
Mar 85 Pct Duration Min 1 Day Low Flow	4.09	ft^3/s
Mar 75 Pct Duration Min 1 Day Low Flow	4.96	ft^3/s
Mar 50 Pct Duration Min 1 Day Low Flow	6.02	ft^3/s
Mar 25 Pct Duration Min 1 Day Low Flow	7.05	ft^3/s

March Flow-Duration Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific

Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

April Flow-Duration Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.43	6.99
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.81

April Flow-Duration Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.38	6.73
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.76

April Flow-Duration Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit
Apr 99 Pct Duration Min 1 Day Low Flow	2.25	ft^3/s
Apr 90 Pct Duration Min 1 Day Low Flow	4.01	ft^3/s
Apr 85 Pct Duration Min 1 Day Low Flow	4.45	ft^3/s
Apr 75 Pct Duration Min 1 Day Low Flow	5.12	ft^3/s
Apr 50 Pct Duration Min 1 Day Low Flow	6.31	ft^3/s
Apr 25 Pct Duration Min 1 Day Low Flow	8.09	ft^3/s

April Flow-Duration Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit

Statistic	Value	Unit
Apr 99 Pct Duration Min 1 Day Low Flow	3.38	ft^3/s
Apr 90 Pct Duration Min 1 Day Low Flow	3.1	ft^3/s
Apr 85 Pct Duration Min 1 Day Low Flow	3.58	ft^3/s
Apr 75 Pct Duration Min 1 Day Low Flow	4.34	ft^3/s
Apr 50 Pct Duration Min 1 Day Low Flow	5.51	ft^3/s
Apr 25 Pct Duration Min 1 Day Low Flow	6.82	ft^3/s

April Flow-Duration Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

May Flow-Duration Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.43	6.99
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.81

May Flow-Duration Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.76
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.38	6.73

May Flow-Duration Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit
May 99 Pct Duration Min 1 Day Low Flow	2.24	ft^3/s
May 90 Pct Duration Min 1 Day Low Flow	2.4	ft^3/s
May 85 Pct Duration Min 1 Day Low Flow	2.57	ft^3/s
May 75 Pct Duration Min 1 Day Low Flow	3.12	ft^3/s
May 50 Pct Duration Min 1 Day Low Flow	4.12	ft^3/s
May 25 Pct Duration Min 1 Day Low Flow	5.4	ft^3/s

May Flow-Duration Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit
May 99 Pct Duration Min 1 Day Low Flow	2.5	ft^3/s
May 90 Pct Duration Min 1 Day Low Flow	2.07	ft^3/s
May 85 Pct Duration Min 1 Day Low Flow	2.19	ft^3/s
May 75 Pct Duration Min 1 Day Low Flow	2.32	ft^3/s
May 50 Pct Duration Min 1 Day Low Flow	3.2	ft^3/s
May 25 Pct Duration Min 1 Day Low Flow	4.39	ft^3/s

May Flow-Duration Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

June Flow-Duration Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.43	6.99
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.81

June Flow-Duration Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.76
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.38	6.73

June Flow-Duration Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit
Jun 99 Pct Duration Min 1 Day Low Flow	1	ft^3/s
Jun 90 Pct Duration Min 1 Day Low Flow	2.21	ft^3/s
Jun 85 Pct Duration Min 1 Day Low Flow	2.47	ft^3/s
Jun 75 Pct Duration Min 1 Day Low Flow	1.34	ft^3/s
Jun 50 Pct Duration Min 1 Day Low Flow	2.63	ft^3/s
Jun 25 Pct Duration Min 1 Day Low Flow	3.55	ft^3/s

June Flow-Duration Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit
Jun 99 Pct Duration Min 1 Day Low Flow	1	ft^3/s
Jun 90 Pct Duration Min 1 Day Low Flow	1.68	ft^3/s
Jun 85 Pct Duration Min 1 Day Low Flow	1.88	ft^3/s
Jun 75 Pct Duration Min 1 Day Low Flow	2.24	ft^3/s
Jun 50 Pct Duration Min 1 Day Low Flow	1.23	ft^3/s

Statistic	Value	Unit
Jun 25 Pct Duration Min 1 Day Low Flow	2.81	ft^3/s

June Flow-Duration Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

July Flow-Duration Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.43	6.99
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.81

July Flow-Duration Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.76

July Flow-Duration Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit
Jul 99 Pct Duration Min 1 Day Low Flow	0.487	ft^3/s
Jul 90 Pct Duration Min 1 Day Low Flow	1.17	ft^3/s
Jul 85 Pct Duration Min 1 Day Low Flow	1.37	ft^3/s

Statistic	Value	Unit
Jul 75 Pct Duration Min 1 Day Low Flow	1.74	ft^3/s
Jul 50 Pct Duration Min 1 Day Low Flow	2.71	ft^3/s
Jul 25 Pct Duration Min 1 Day Low Flow	2.65	ft^3/s

July Flow-Duration Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit
Jul 99 Pct Duration Min 1 Day Low Flow	0.326	ft^3/s
Jul 90 Pct Duration Min 1 Day Low Flow	0.791	ft^3/s
Jul 85 Pct Duration Min 1 Day Low Flow	0.928	ft^3/s
Jul 75 Pct Duration Min 1 Day Low Flow	1.2	ft^3/s
Jul 50 Pct Duration Min 1 Day Low Flow	1.64	ft^3/s
Jul 25 Pct Duration Min 1 Day Low Flow	1.92	ft^3/s

July Flow-Duration Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

August Flow-Duration Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.43	6.99
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.81

August Flow-Duration Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.76

August Flow-Duration Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit
Aug 99 Pct Duration Min 1 Day Low Flow	0.378	ft^3/s
Aug 90 Pct Duration Min 1 Day Low Flow	0.903	ft^3/s
Aug 85 Pct Duration Min 1 Day Low Flow	1.08	ft^3/s
Aug 75 Pct Duration Min 1 Day Low Flow	1.41	ft^3/s
Aug 50 Pct Duration Min 1 Day Low Flow	2.31	ft^3/s
Aug 25 Pct Duration Min 1 Day Low Flow	2.51	ft^3/s

August Flow-Duration Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit
Aug 99 Pct Duration Min 1 Day Low Flow	0.242	ft^3/s
Aug 90 Pct Duration Min 1 Day Low Flow	0.51	ft^3/s
Aug 85 Pct Duration Min 1 Day Low Flow	0.622	ft^3/s
Aug 75 Pct Duration Min 1 Day Low Flow	0.83	ft^3/s
Aug 50 Pct Duration Min 1 Day Low Flow	1.39	ft^3/s
Aug 25 Pct Duration Min 1 Day Low Flow	1.48	ft^3/s

August Flow-Duration Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

September Flow-Duration Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.43	6.99
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.81

September Flow-Duration Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.76

September Flow-Duration Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit
Sep 99 Pct Duration Min 1 Day Low Flow	0.38	ft^3/s
Sep 90 Pct Duration Min 1 Day Low Flow	0.84	ft^3/s
Sep 85 Pct Duration Min 1 Day Low Flow	1	ft^3/s
Sep 75 Pct Duration Min 1 Day Low Flow	1.32	ft^3/s
Sep 50 Pct Duration Min 1 Day Low Flow	2.24	ft^3/s
Sep 25 Pct Duration Min 1 Day Low Flow	2.49	ft^3/s

September Flow-Duration Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit
Sep 99 Pct Duration Min 1 Day Low Flow	0.237	ft^3/s
Sep 90 Pct Duration Min 1 Day Low Flow	0.515	ft^3/s
Sep 85 Pct Duration Min 1 Day Low Flow	0.593	ft^3/s
Sep 75 Pct Duration Min 1 Day Low Flow	0.745	ft^3/s

Statistic	Value	Unit
Sep 50 Pct Duration Min 1 Day Low Flow	1.2	ft^3/s
Sep 25 Pct Duration Min 1 Day Low Flow	1.54	ft^3/s

September Flow-Duration Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

October Flow-Duration Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.43	6.99
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.81

October Flow-Duration Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.38	6.73
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.76

October Flow-Duration Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit
Oct 99 Pct Duration Min 1 Day Low Flow	0.454	ft^3/s

Statistic	Value	Unit
Oct 90 Pct Duration Min 1 Day Low Flow	1.05	ft^3/s
Oct 85 Pct Duration Min 1 Day Low Flow	1.25	ft^3/s
Oct 75 Pct Duration Min 1 Day Low Flow	1.62	ft^3/s
Oct 50 Pct Duration Min 1 Day Low Flow	2.58	ft^3/s
Oct 25 Pct Duration Min 1 Day Low Flow	2.98	ft^3/s

October Flow-Duration Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit
Oct 99 Pct Duration Min 1 Day Low Flow	0.366	ft^3/s
Oct 90 Pct Duration Min 1 Day Low Flow	0.716	ft^3/s
Oct 85 Pct Duration Min 1 Day Low Flow	0.83	ft^3/s
Oct 75 Pct Duration Min 1 Day Low Flow	1.09	ft^3/s
Oct 50 Pct Duration Min 1 Day Low Flow	1.68	ft^3/s
Oct 25 Pct Duration Min 1 Day Low Flow	2.41	ft^3/s

October Flow-Duration Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

November Flow-Duration Statistics Parameters [Lowflow Non Coast baseline SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.6	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.43	6.99
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.81

November Flow-Duration Statistics Parameters [Lowflow Non Coast current SIR 2014 5004]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.05	square miles	0.35	159.88
PERMSSUR	Average Soil Permeability from SSURGO	3.04	inches per hour	0.38	6.73
JUNAVPRE	Mean June Precipitation	3.84	inches	3.79	4.76

November Flow-Duration Statistics Flow Report [Lowflow Non Coast baseline SIR 2014 5004]

Statistic	Value	Unit
Nov 99 Pct Duration Min 1 Day Low Flow	0.683	ft^3/s
Nov 90 Pct Duration Min 1 Day Low Flow	1.74	ft^3/s
Nov 85 Pct Duration Min 1 Day Low Flow	2.01	ft^3/s
Nov 75 Pct Duration Min 1 Day Low Flow	2.51	ft^3/s
Nov 50 Pct Duration Min 1 Day Low Flow	3.17	ft^3/s
Nov 25 Pct Duration Min 1 Day Low Flow	4.58	ft^3/s

November Flow-Duration Statistics Flow Report [Lowflow Non Coast current SIR 2014 5004]

Statistic	Value	Unit
Nov 99 Pct Duration Min 1 Day Low Flow	0.549	ft^3/s
Nov 90 Pct Duration Min 1 Day Low Flow	1.16	ft^3/s
Nov 85 Pct Duration Min 1 Day Low Flow	1.55	ft^3/s
Nov 75 Pct Duration Min 1 Day Low Flow	2.37	ft^3/s
Nov 50 Pct Duration Min 1 Day Low Flow	2.62	ft^3/s
Nov 25 Pct Duration Min 1 Day Low Flow	3.92	ft^3/s

November Flow-Duration Statistics Citations

Watson, K.M., and McHugh, A.R.,2014, Regional regression equations for the estimation of selected monthly low-flow duration and frequency statistics at ungaged sites on streams in New Jersey: U.S. Geological Survey Scientific

Investigations Report 2014–5004, 59 p. (baseline, period-or-record statistics) (http://pubs.er.usgs.gov/publication/sir20145004)

ATTACHMENT 2

ESTIMATED OVERTOPPING FREQUENCIES

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Estimated Overtopping Frequencies

Precipitation	Number of Days Exceeded Precipitaiton in the Calendar Year						Average Number of Days	Days/Week Potential of Overtopping
(in)	2010	2011	2012	2013	2016	2017		
0.03	39	38	65	55	45	45	48	2
0.05	36	37	53	49	43	42	43	2
0.09	28	31	49	40	36	38	37	2
0.10	26	30	48	40	35	37	36	2
0.11	26	29	47	38	35	36	35	2
0.19	19	25	41	33	27	26	29	2
0.23	15	23	38	28	25	25	26	1
0.28	12	22	34	26	22	21	23	1

Values are based on a construction season of May 1 to October 31

Historical Daily Precipitation Data

1/1/2010	0.28	1/1/2011		1/1/2012	0	1/1/2013	0	1/1/2016		1/1/2017	0
1/2/2010	0	1/2/2011	0.04	1/2/2012	0.08	1/2/2013	0	1/2/2016		1/2/2017	0.4
1/3/2010		1/3/2011		1/3/2012	0	1/3/2013	0	1/3/2016		1/3/2017	0.49
1/4/2010	0	1/4/2011	0	1/4/2012	0	1/4/2013	0	1/4/2016		1/4/2017	
1/5/2010	0	1/5/2011	0	1/5/2012	0	1/5/2013	0	1/5/2016		1/5/2017	0
1/6/2010	0	1/6/2011		1/6/2012	0	1/6/2013	0	1/6/2016		1/6/2017	0.04
1/7/2010	0	1/7/2011	0	1/7/2012	0	1/7/2013	0	1/7/2016		1/7/2017	
1/8/2010	0	1/8/2011		1/8/2012	0	1/8/2013	0	1/8/2016		1/8/2017	
1/9/2010	0	1/9/2011	0	1/9/2012	0	1/9/2013	0	1/9/2016		1/9/2017	
1/10/2010	0	1/10/2011	0	1/10/2012	0	1/10/2013	0	1/10/2016		1/10/2017	
1/11/2010	0	1/11/2011		1/11/2012	0	1/11/2013	0	1/11/2016		1/11/2017	
1/12/2010	0	1/12/2011		1/12/2012	1.42	1/12/2013	0.38	1/12/2016		1/12/2017	
1/13/2010	0	1/13/2011	0	1/13/2012	0.12	1/13/2013	0.01	1/13/2016		1/13/2017	
1/14/2010	0	1/14/2011	0	1/14/2012	0	1/14/2013	0.03	1/14/2016		1/14/2017	
1/15/2010		1/15/2011	0	1/15/2012	0	1/15/2013	0.15	1/15/2016		1/15/2017	
1/16/2010		1/16/2011	0	1/16/2012		1/16/2013	0.73	1/16/2016		1/16/2017	0
1/17/2010		1/17/2011	0	1/17/2012	0.11	1/17/2013	0	1/17/2016		1/17/2017	0.6
1/18/2010	0.63	1/18/2011		1/18/2012	0.21	1/18/2013	0	1/18/2016		1/18/2017	0.05
1/19/2010		1/19/2011		1/19/2012	0	1/19/2013	0	1/19/2016		1/19/2017	0
1/20/2010	0	1/20/2011	0	1/20/2012		1/20/2013	0	1/20/2016		1/20/2017	0.17
1/21/2010	0	1/21/2011		1/21/2012	0.25	1/21/2013	0	1/21/2016		1/21/2017	0
1/22/2010		1/22/2011		1/22/2012	0	1/22/2013	0	1/22/2016		1/22/2017	0.02
1/23/2010	0	1/23/2011		1/23/2012		1/23/2013	0	1/23/2016		1/23/2017	1.56
1/24/2010	0	1/24/2011	0	1/24/2012	0.27	1/24/2013	0	1/24/2016		1/24/2017	0.48
1/25/2010	0.11	1/25/2011		1/25/2012		1/25/2013	0	1/25/2016	0	1/25/2017	0
1/26/2010	1.25	1/26/2011	0	1/26/2012	0.04	1/26/2013	0.04	1/26/2016		1/26/2017	0.04
1/27/2010	0	1/27/2011		1/27/2012	0.19	1/27/2013		1/27/2016		1/27/2017	0
1/28/2010	0	1/28/2011	0	1/28/2012		1/28/2013	0	1/28/2016		1/28/2017	0
1/29/2010		1/29/2011	0	1/29/2012		1/29/2013	0.11	1/29/2016		1/29/2017	0
1/30/2010	0	1/30/2011	0	1/30/2012		1/30/2013		1/30/2016		1/30/2017	0
1/31/2010		1/31/2011	0	1/31/2012		1/31/2013	1.07	1/31/2016		1/31/2017	0
2/1/2010	0	2/1/2011		2/1/2012	0.08	2/1/2013	0	2/1/2016		2/1/2017	0
2/2/2010	0	2/2/2011		2/2/2012	0	2/2/2013	0	2/2/2016		2/2/2017	0
2/3/2010	0.17	2/3/2011		2/3/2012	0	2/3/2013	0	2/3/2016	0.71	2/3/2017	0
2/4/2010	0	2/4/2011		2/4/2012	0	2/4/2013	0	2/4/2016		2/4/2017	0
2/5/2010	0	2/5/2011		2/5/2012	0	2/5/2013	0.02	2/5/2016		2/5/2017	0
2/6/2010	0.21	2/6/2011	0.25	2/6/2012	0	2/6/2013	0	2/6/2016		2/6/2017	0
2/7/2010		2/7/2011	0	2/7/2012	0	2/7/2013	0	2/7/2016		2/7/2017	0.26
2/8/2010	0	2/8/2011	0.1	2/8/2012	0	2/8/2013	0	2/8/2016		2/8/2017	0.05
2/9/2010	0	2/9/2011	0	2/9/2012	0	2/9/2013	1.22	2/9/2016		2/9/2017	
2/10/2010	0.63	2/10/2011	0	2/10/2012	0	2/10/2013	0	2/10/2016		2/10/2017	0
2/11/2010	0.57	2/11/2011	0	2/11/2012	0	2/11/2013	0.05	2/11/2016		2/11/2017	
2/12/2010	0	2/12/2011	0	2/12/2012	0	2/12/2013	0.26	2/12/2016		2/12/2017	0.4
2/13/2010	0	2/13/2011	0	2/13/2012	0	2/13/2013	0	2/13/2016		2/13/2017	0
2/14/2010		2/14/2011	0	2/14/2012	0	2/14/2013	0	2/14/2016		2/14/2017	0
2/15/2010		2/15/2011	0	2/15/2012	0.04	2/15/2013	0	2/15/2016		2/15/2017	0
2/16/2010	0.12	2/16/2011	0	2/16/2012	0	2/16/2013	0.09	2/16/2016		2/16/2017	0
2/17/2010	0	2/17/2011	0	2/17/2012	0.16	2/17/2013	0	2/17/2016		2/17/2017	0
2/18/2010		2/18/2011		2/18/2012	0	2/18/2013	0	2/18/2016		2/18/2017	0
2/19/2010	0	2/19/2011		2/19/2012	0.03	2/19/2013	0	2/19/2016		2/19/2017	0
2/20/2010		2/20/2011		2/20/2012	0	2/20/2013	0	2/20/2016		2/20/2017	0
2/21/2010		2/21/2011		2/21/2012	0	2/21/2013	0	2/21/2016		2/21/2017	0
2/22/2010	0	2/22/2011		2/22/2012	0	2/22/2013	0	2/22/2016		2/22/2017	0
2/23/2010	0.26	2/23/2011		2/23/2012	0	2/23/2013	0.02	2/23/2016		2/23/2017	0
2/24/2010	1.12	2/24/2011		2/24/2012	0.2	2/24/2013	0.27	2/24/2016		2/24/2017	
2/25/2010	0.13	2/25/2011	0.72	2/25/2012	0.29	2/25/2013	0	2/25/2016		2/25/2017	
2/26/2010	0.93	2/26/2011		2/26/2012	0	2/26/2013	0	2/26/2016		2/26/2017	
2/27/2010		2/27/2011		2/27/2012	0	2/27/2013	0.79	2/27/2016		2/27/2017	0
2/28/2010		2/28/2011		2/28/2012	0	2/28/2013	0	2/28/2016		2/28/2017	0
				2/29/2012	0			2/29/2016			
3/1/2010	0	3/1/2011	0.42	3/1/2012	0.6	3/1/2013	0	3/1/2016		3/1/2017	0.01
3/2/2010	0	3/2/2011	0	3/2/2012	0	3/2/2013	0	3/2/2016		3/2/2017	0.14
3/3/2010		3/3/2011		3/3/2012	0.21	3/3/2013	0	3/3/2016		3/3/2017	0
3/4/2010	0	3/4/2011	0	3/4/2012	0	3/4/2013	0	3/4/2016		3/4/2017	0
3/5/2010	0	3/5/2011		3/5/2012	0	3/5/2013	0	3/5/2016		3/5/2017	0
3/6/2010	0	3/6/2011		3/6/2012	0	3/6/2013	0	3/6/2016		3/6/2017	0
3/7/2010		3/7/2011	2.37	3/7/2012	0	3/7/2013	0.02	3/7/2016		3/7/2017	0.02
3/8/2010	0	3/8/2011		3/8/2012	0	3/8/2013	0.27	3/8/2016		3/8/2017	0.13

Highlighted values are the maximum value for that calendar year.

Historical Daily Precipitation Data

3/9/2010	0	3/9/2011	0	3/9/2012	0.05	3/9/2013	0	3/9/2016		3/9/2017	0
3/10/2010		3/10/2011	0.05	3/10/2012	0	3/10/2013	0	3/10/2016	0	3/10/2017	0
3/11/2010	0	3/11/2011	1.89	3/11/2012	0	3/11/2013	0	3/11/2016	0.02	3/11/2017	0.22
3/12/2010	0	3/12/2011		3/12/2012	0	3/12/2013	0.07	3/12/2016	0	3/12/2017	0
3/13/2010	1.74	3/13/2011		3/13/2012	0.07	3/13/2013	0.59	3/13/2016	0	3/13/2017	0
3/14/2010	3.38	3/14/2011		3/14/2012	0.02	3/14/2013	0	3/14/2016		3/14/2017	
3/15/2010	0.63	3/15/2011	0	3/15/2012	0	3/15/2013	0	3/15/2016	0.58	3/15/2017	
3/16/2010	0.06	3/16/2011		3/16/2012	0.01	3/16/2013	0	3/16/2016	0	3/16/2017	0
3/17/2010	0	3/17/2011	0.1	3/17/2012	0.02	3/17/2013	0.06	3/17/2016	0.02	3/17/2017	0
3/18/2010	0	3/18/2011		3/18/2012	0	3/18/2013	0	3/18/2016	0	3/18/2017	0
3/19/2010		3/19/2011		3/19/2012	0	3/19/2013	0.73	3/19/2016	0	3/19/2017	0.02
3/20/2010	0	3/20/2011		3/20/2012	0	3/20/2013	0	3/20/2016	0	3/20/2017	0
3/21/2010	0	3/21/2011	0.11	3/21/2012	0	3/21/2013	0	3/21/2016	0.08	3/21/2017	0
3/22/2010	0	3/22/2011	0.32	3/22/2012	0	3/22/2013	0	3/22/2016		3/22/2017	0
3/23/2010	1.34	3/23/2011	0.32	3/23/2012	0	3/23/2013	0	3/23/2016	0	3/23/2017	0
3/24/2010	0.05	3/24/2011		3/24/2012		3/24/2013	0	3/24/2016	0	3/24/2017	0
3/25/2010	0	3/25/2011	0	3/25/2012	0.15	3/25/2013	0	3/25/2016		3/25/2017	0
3/26/2010	0.11	3/26/2011	0	3/26/2012		3/26/2013	0.19	3/26/2016	0.07	3/26/2017	0.01
3/27/2010		3/27/2011	0	3/27/2012	0	3/27/2013		3/27/2016		3/27/2017	0.15
3/28/2010		3/28/2011	0	3/28/2012		3/28/2013		3/28/2016	0.04	3/28/2017	0.25
3/29/2010	1.43	3/29/2011	0	3/29/2012	0.03	3/29/2013		3/29/2016	0.36	3/29/2017	0.87
3/30/2010	0.17	3/30/2011	0	3/30/2012	0	3/30/2013		3/30/2016		3/30/2017	0
3/31/2010	2.06	3/31/2011		3/31/2012	0.61	3/31/2013		3/31/2016		3/31/2017	0.79
4/1/2010	0	4/1/2011	0.1	4/1/2012	0.03	4/1/2013	0.15	4/1/2016	0.05	4/1/2017	1.37
4/2/2010		4/2/2011		4/2/2012	0.3	4/2/2013	0	4/2/2016	0.05	4/2/2017	0
4/3/2010		4/3/2011		4/3/2012	0	4/3/2013	0	4/3/2016	0.17	4/3/2017	0
4/4/2010		4/4/2011	0.15	4/4/2012	0	4/4/2013	0	4/4/2016		4/4/2017	0.94
4/5/2010	0	4/5/2011	0.02	4/5/2012	0	4/5/2013	0	4/5/2016	0.37	4/5/2017	0.07
4/6/2010	0	4/6/2011		4/6/2012	0	4/6/2013	0	4/6/2016	0	4/6/2017	0.05
4/7/2010	0	4/7/2011	0.1	4/7/2012	0	4/7/2013	0	4/7/2016	0	4/7/2017	0.75
4/8/2010		4/8/2011		4/8/2012	0	4/8/2013	0	4/8/2016	0.2	4/8/2017	0
4/9/2010	0.37	4/9/2011		4/9/2012	0	4/9/2013	0	4/9/2016	0	4/9/2017	0
4/10/2010	0	4/10/2011		4/10/2012	0	4/10/2013	0	4/10/2016	0.09	4/10/2017	0
4/11/2010	0	4/11/2011	0	4/11/2012	0	4/11/2013	0.56	4/11/2016		4/11/2017	0
4/12/2010	0	4/12/2011		4/12/2012	0	4/12/2013	0	4/12/2016	0.01	4/12/2017	0
4/13/2010	0	4/13/2011	0.93	4/13/2012	0	4/13/2013	0.72	4/13/2016	0.22	4/13/2017	0
4/14/2010	0.05	4/14/2011		4/14/2012	0	4/14/2013	0	4/14/2016		4/14/2017	
4/15/2010	0	4/15/2011		4/15/2012	0	4/15/2013	0	4/15/2016	0	4/15/2017	0
4/16/2010	0.04	4/16/2011	0	4/16/2012	0	4/16/2013		4/16/2016	0	4/16/2017	0
4/17/2010	0.35	4/17/2011	2.79	4/17/2012	0	4/17/2013	0.02	4/17/2016	0	4/17/2017	0
4/18/2010	0	4/18/2011	0	4/18/2012	0	4/18/2013	0	4/18/2016		4/18/2017	0
4/19/2010	0	4/19/2011	0	4/19/2012	0.06	4/19/2013	0.03	4/19/2016		4/19/2017	0
4/20/2010		4/20/2011		4/20/2012	0	4/20/2013	0.38	4/20/2016		4/20/2017	0.05
4/21/2010		4/21/2011		4/21/2012	0	4/21/2013		4/21/2016		4/21/2017	0.09
4/22/2010	0.61	4/22/2011		4/22/2012	0.19	4/22/2013		4/22/2016		4/22/2017	0.05
4/23/2010	0	4/23/2011	0.31	4/23/2012	1.96	4/23/2013		4/23/2016	0.07	4/23/2017	0.05
4/24/2010		4/24/2011		4/24/2012	0.02	4/24/2013		4/24/2016		4/24/2017	0
4/25/2010	0.9	4/25/2011		4/25/2012	0	4/25/2013		4/25/2016	0	4/25/2017	0.08
4/26/2010	0.52	4/26/2011		4/26/2012	0	4/26/2013		4/26/2016	0.07	4/26/2017	0.99
4/27/2010	0.6	4/27/2011	0	4/27/2012	0	4/27/2013	0	4/27/2016	0	4/27/2017	0.01
4/28/2010		4/28/2011	0	4/28/2012	0	4/28/2013	0	4/28/2016	0	4/28/2017	0.02
4/29/2010	0	4/29/2011		4/29/2012	0	4/29/2013	0.03	4/29/2016	0.03	4/29/2017	0.92
4/30/2010	0	4/30/2011		4/30/2012	0	4/30/2013	0.16	4/30/2016	0.02	4/30/2017	0
5/1/2010	0	5/1/2011		5/1/2012	0.3	5/1/2013	0	5/1/2016	0.01	5/1/2017	0
5/2/2010	0	5/2/2011	0	5/2/2012	0.1	5/2/2013	0	5/2/2016	0.26	5/2/2017	0.02
5/3/2010	0.71	5/3/2011	0	5/3/2012		5/3/2013	0	5/3/2016	0.71	5/3/2017	0
5/4/2010	0.27	5/4/2011	0	5/4/2012	0.04	5/4/2013	0	5/4/2016	0.08	5/4/2017	0
5/5/2010	0.07	5/5/2011		5/5/2012	0	5/5/2013	0	5/5/2016	0.05	5/5/2017	0.06
5/6/2010	0	5/6/2011		5/6/2012	0.03	5/6/2013	0	5/6/2016	0.15	5/6/2017	1.51
5/7/2010	0	5/7/2011		5/7/2012	0	5/7/2013	0	5/7/2016	0.35	5/7/2017	0
5/8/2010	0	5/8/2011		5/8/2012	0.02	5/8/2013	0.52	5/8/2016	0.18	5/8/2017	0.02
5/9/2010	0	5/9/2011	0	5/9/2012	0.27	5/9/2013	1.08	5/9/2016	0.13	5/9/2017	0
5/10/2010	0	5/10/2011	0	5/10/2012	0.25	5/10/2013	0.43	5/10/2016	0	5/10/2017	0
5/11/2010	0	5/11/2011	0	5/11/2012	0	5/11/2013	0.33	5/11/2016		5/11/2017	0
5/12/2010	0.51	5/12/2011	0	5/12/2012	0	5/12/2013	0.25	5/12/2016	0	5/12/2017	0
5/13/2010	0.11	5/13/2011	0	5/13/2012	0	5/13/2013	0	5/13/2016		5/13/2017	0.4
5/14/2010	0	5/14/2011		5/14/2012	0	5/14/2013	0	5/14/2016	0.32	5/14/2017	1.37
5/15/2010	0	5/15/2011	0.8	5/15/2012	0.13	5/15/2013	0	5/15/2016	0.02	5/15/2017	0.07
5/16/2010	0	5/16/2011	0.08	5/16/2012	0.77	5/16/2013	0.01	5/16/2016	0.02	5/16/2017	0

Highlighted values are the maximum value for that calendar year.

Historical Daily Precipitation Data

5/17/2010	0	5/17/2011	0.32	5/17/2012	0	5/17/2013		5/17/2016	0	5/17/2017	0
5/18/2010	0.09	5/18/2011		5/18/2012	0	5/18/2013		5/18/2016	0.03	5/18/2017	0
5/19/2010	1.1	5/19/2011	0.72	5/19/2012	0	5/19/2013	0.2	5/19/2016	0.01	5/19/2017	
5/20/2010	0	5/20/2011		5/20/2012	0	5/20/2013	0.2	5/20/2016		5/20/2017	0.03
5/21/2010	0	5/21/2011		5/21/2012	0.34	5/21/2013		5/21/2016	0	5/21/2017	
5/22/2010	0	5/22/2011		5/22/2012	1.12	5/22/2013	0	5/22/2016	0.39	5/22/2017	0.23
5/23/2010	0.05	5/23/2011	0.06	5/23/2012	0	5/23/2013	0	5/23/2016		5/23/2017	0.44
5/24/2010	0.06	5/24/2011		5/24/2012	0.04	5/24/2013	0.19	5/24/2016	0.2	5/24/2017	0.02
5/25/2010	0	5/25/2011	0	5/25/2012	0	5/25/2013	0.56	5/25/2016	0.04	5/25/2017	0.28
5/26/2010	0	5/26/2011	0	5/26/2012	0	5/26/2013		5/26/2016		5/26/2017	1.23
5/27/2010	0	5/27/2011	0	5/27/2012	0.02	5/27/2013		5/27/2016	0	5/27/2017	0
5/28/2010		5/28/2011		5/28/2012	0	5/28/2013		5/28/2016	0	5/28/2017	0
5/29/2010		5/29/2011	0.13	5/29/2012	0	5/29/2013		5/29/2016	0	5/29/2017	0.31
5/30/2010		5/30/2011	0.34	5/30/2012	0	5/30/2013		5/30/2016	0.8	5/30/2017	0
5/31/2010	0	5/31/2011	0	5/31/2012	0	5/31/2013		5/31/2016	0	5/31/2017	0.11
6/1/2010		6/1/2011	0	6/1/2012	0	6/1/2013	0	6/1/2016		6/1/2017	0.02
6/2/2010	0.41	6/2/2011	0	6/2/2012	0.49	6/2/2013	0	6/2/2016		6/2/2017	0
6/3/2010		6/3/2011	0	6/3/2012	0	6/3/2013	0.5	6/3/2016	0.02	6/3/2017	0.14
6/4/2010	0	6/4/2011	0	6/4/2012	0.04	6/4/2013	0	6/4/2016	0.02	6/4/2017	0
6/5/2010	0	6/5/2011	0	6/5/2012	0.28	6/5/2013	0	6/5/2016	0	6/5/2017	0.42
6/6/2010	0	6/6/2011	0	6/6/2012	0.03	6/6/2013	0	6/6/2016	0.52	6/6/2017	0.16
6/7/2010	0	6/7/2011		6/7/2012	0	6/7/2013	1.1	6/7/2016	0	6/7/2017	
6/8/2010	0	6/8/2011		6/8/2012	0	6/8/2013	2.4	6/8/2016	0.02	6/8/2017	0
6/9/2010	0	6/9/2011	0	6/9/2012	0	6/9/2013	0	6/9/2016	0.57	6/9/2017	0
6/10/2010	0.98	6/10/2011	0.08	6/10/2012	0	6/10/2013	0	6/10/2016		6/10/2017	0
6/11/2010	0.05	6/11/2011	0.41	6/11/2012	0.61	6/11/2013	1.41	6/11/2016	0	6/11/2017	0
6/12/2010	0	6/12/2011	0.31	6/12/2012	0	6/12/2013	0	6/12/2016		6/12/2017	0
6/13/2010	0	6/13/2011	0	6/13/2012	1.83	6/13/2013	0.05	6/13/2016		6/13/2017	0
6/14/2010		6/14/2011	0	6/14/2012	0	6/14/2013	1.44	6/14/2016		6/14/2017	0.01
6/15/2010	0	6/15/2011	0.59	6/15/2012	0	6/15/2013	0.1	6/15/2016		6/15/2017	0
6/16/2010	0	6/16/2011	0	6/16/2012	0	6/16/2013	0	6/16/2016		6/16/2017	0
6/17/2010	0.19	6/17/2011	0.99	6/17/2012	0	6/17/2013	0	6/17/2016		6/17/2017	0.01
6/18/2010	0	6/18/2011		6/18/2012	0	6/18/2013	0.02	6/18/2016		6/18/2017	0.97
6/19/2010	0	6/19/2011		6/19/2012	0	6/19/2013	0.17	6/19/2016		6/19/2017	0.04
6/20/2010	0	6/20/2011	0	6/20/2012	0	6/20/2013	0	6/20/2016		6/20/2017	1.8
6/21/2010		6/21/2011	0	6/21/2012	0	6/21/2013	0	6/21/2016	0.02	6/21/2017	0
6/22/2010	0	6/22/2011		6/22/2012	0	6/22/2013	0	6/22/2016		6/22/2017	0
6/23/2010	0.48	6/23/2011		6/23/2012	0.53	6/23/2013	0	6/23/2016		6/23/2017	0
6/24/2010		6/24/2011	0.21	6/24/2012	0	6/24/2013	0.29	6/24/2016	0.06	6/24/2017	2.12
6/25/2010		6/25/2011	0	6/25/2012	0.24	6/25/2013	0.02	6/25/2016	0	6/25/2017	0
6/26/2010		6/26/2011	0	6/26/2012	0.28	6/26/2013	0.35	6/26/2016		6/26/2017	0
6/27/2010		6/27/2011	0	6/27/2012	0	6/27/2013	0.08	6/27/2016	0	6/27/2017	0.11
6/28/2010		6/28/2011	0	6/28/2012	0	6/28/2013	1.09	6/28/2016	0.25	6/28/2017	0
6/29/2010		6/29/2011	0	6/29/2012	0	6/29/2013	0	6/29/2016	0.55	6/29/2017	0
6/30/2010	0	6/30/2011	0	6/30/2012	0	6/30/2013	0	6/30/2016		6/30/2017	0
7/1/2010	0	7/1/2011	0	7/1/2012	0	7/1/2013	0.08	7/1/2016		7/1/2017	0
7/2/2010	0	7/2/2011	0	7/2/2012	0	7/2/2013	0.98	7/2/2016	0.34	7/2/2017	0.11
7/3/2010	0	7/3/2011		7/3/2012	0	7/3/2013	0.03	7/3/2016	0	7/3/2017	0
7/4/2010	0	7/4/2011		7/4/2012	0.04	7/4/2013	0.07	7/4/2016		7/4/2017	0.01
7/5/2010	0	7/5/2011	0	7/5/2012	0.05	7/5/2013	0	7/5/2016	0.73	7/5/2017	0
7/6/2010	0	7/6/2011	0	7/6/2012	0	7/6/2013	0	7/6/2016		7/6/2017	0
7/7/2010	0	7/7/2011		7/7/2012	0	7/7/2013	0	7/7/2016	0	7/7/2017	0
7/8/2010	0	7/8/2011		7/8/2012	0	7/8/2013	0	7/8/2016		7/8/2017	1.07
7/9/2010	0	7/9/2011	0.63	7/9/2012	0	7/9/2013	0	7/9/2016	0.19	7/9/2017	0.07
7/10/2010	0.17	7/10/2011	0	7/10/2012	0	7/10/2013	0.15	7/10/2016	0.09	7/10/2017	0
7/11/2010		7/11/2011	0	7/11/2012	0	7/11/2013	0.02	7/11/2016		7/11/2017	0
7/12/2010		7/12/2011	0	7/12/2012	0	7/12/2013	0.01	7/12/2016		7/12/2017	0.12
7/13/2010	0.08	7/13/2011	0	7/13/2012	0	7/13/2013	0.47	7/13/2016		7/13/2017	0
7/14/2010	0.31	7/14/2011	0	7/14/2012	0	7/14/2013	0.12	7/14/2016		7/14/2017	0.19
7/15/2010	0.06	7/15/2011	0	7/15/2012	0	7/15/2013	0	7/15/2016		7/15/2017	
7/16/2010	0	7/16/2011		7/16/2012	0.47	7/16/2013	0	7/16/2016		7/16/2017	
7/17/2010	0	7/17/2011		7/17/2012	0	7/17/2013	0	7/17/2016	0.13	7/17/2017	0
7/18/2010	0	7/18/2011		7/18/2012	0	7/18/2013	0	7/18/2016	0	7/18/2017	0
7/19/2010	0	7/19/2011	0.07	7/19/2012	0.16	7/19/2013	0	7/19/2016	1	7/19/2017	0
7/20/2010	0.06	7/20/2011	0	7/20/2012	0.64	7/20/2013	0.05	7/20/2016	0	7/20/2017	
7/21/2010	0	7/21/2011		7/21/2012	0.38	7/21/2013	0.51	7/21/2016		7/21/2017	0.27
7/22/2010	0.12	7/22/2011		7/22/2012	0	7/22/2013	0	7/22/2016		7/22/2017	0
7/23/2010	0	7/23/2011		7/23/2012	0	7/23/2013	0.64	7/23/2016		7/23/2017	0.57
7/24/2010	0	7/24/2011		7/24/2012	0.07	7/24/2013	0.03	7/24/2016		7/24/2017	

Highlighted values are the maximum value for that calendar year.

Historical Daily Precipitation Data

7/25/2010	0	7/25/2011		7/25/2012	0	7/25/2013	0	7/25/2016		7/25/2017	
7/26/2010	0.23	7/26/2011		7/26/2012	0	7/26/2013	0	7/26/2016	1.08	7/26/2017	0
7/27/2010	0	7/27/2011		7/27/2012	0.59	7/27/2013	0	7/27/2016		7/27/2017	0
7/28/2010	0	7/28/2011		7/28/2012	0	7/28/2013	0	7/28/2016	0	7/28/2017	0
7/29/2010	0.12	7/29/2011		7/29/2012	0.3	7/29/2013	0.56	7/29/2016	0.5	7/29/2017	0.02
7/30/2010	0.11	7/30/2011		7/30/2012	0.38	7/30/2013	0	7/30/2016	0.48	7/30/2017	0
7/31/2010	0	7/31/2011		7/31/2012	0	7/31/2013	0	7/31/2016	0.78	7/31/2017	0
8/1/2010	0.02	8/1/2011	0	8/1/2012	0.02	8/1/2013	0	8/1/2016	1.03	8/1/2017	0
8/2/2010	0	8/2/2011	0	8/2/2012	0.38	8/2/2013	1.05	8/2/2016		8/2/2017	0
8/3/2010	0	8/3/2011	0	8/3/2012	0	8/3/2013	0	8/3/2016		8/3/2017	0.37
8/4/2010	0	8/4/2011	0.48	8/4/2012	0	8/4/2013	0.05	8/4/2016		8/4/2017	0.48
8/5/2010	0	8/5/2011	0	8/5/2012	0.36	8/5/2013	0	8/5/2016		8/5/2017	1.34
8/6/2010	0	8/6/2011	0	8/6/2012	0.54	8/6/2013	0	8/6/2016		8/6/2017	0
8/7/2010	0	8/7/2011	0.21	8/7/2012	0	8/7/2013	0	8/7/2016		8/7/2017	0.09
8/8/2010	0	8/8/2011		8/8/2012	0	8/8/2013	0.18	8/8/2016		8/8/2017	0.84
8/9/2010	0	8/9/2011		8/9/2012	0	8/9/2013	1.2	8/9/2016		8/9/2017	0
8/10/2010	0	8/10/2011		8/10/2012	0.04	8/10/2013	0.06	8/10/2016		8/10/2017	0
8/11/2010	0	8/11/2011	0	8/11/2012	1	8/11/2013	0	8/11/2016	0.06	8/11/2017	0
8/12/2010	0	8/12/2011	0	8/12/2012	0.08	8/12/2013	0.21	8/12/2016	0.12	8/12/2017	0.1
8/13/2010	0.09	8/13/2011		8/13/2012	0	8/13/2013	0.25	8/13/2016	0	8/13/2017	0
8/14/2010	0	8/14/2011		8/14/2012	0	8/14/2013	0.59	8/14/2016	0	8/14/2017	0
8/15/2010	0	8/15/2011		8/15/2012	0.08	8/15/2013	0	8/15/2016		8/15/2017	
8/16/2010	0.18	8/16/2011		8/16/2012	0.9	8/16/2013	0	8/16/2016	0	8/16/2017	
8/17/2010	0	8/17/2011		8/17/2012	0	8/17/2013	0	8/17/2016	0.39	8/17/2017	0
8/18/2010	0	8/18/2011		8/18/2012	0.58	8/18/2013	0	8/18/2016	0.06	8/18/2017	0
8/19/2010	0	8/19/2011		8/19/2012	0.04	8/19/2013	0.02	8/19/2016		8/19/2017	0.23
8/20/2010	0	8/20/2011		8/20/2012	0	8/20/2013	0.03	8/20/2016		8/20/2017	
8/21/2010	0	8/21/2011	0	8/21/2012	0	8/21/2013	0	8/21/2016		8/21/2017	
8/22/2010	0.03	8/22/2011	0.51	8/22/2012	0	8/22/2013	0.12	8/22/2016	0.14	8/22/2017	
8/23/2010		8/23/2011	0	8/23/2012	0	8/23/2013	0.86	8/23/2016		8/23/2017	
8/24/2010		8/24/2011	0	8/24/2012	0	8/24/2013	0	8/24/2016	0	8/24/2017	
8/25/2010		8/25/2011	0	8/25/2012	0	8/25/2013	0	8/25/2016		8/25/2017	0
8/26/2010		8/26/2011	0.23	8/26/2012	0	8/26/2013	0	8/26/2016		8/26/2017	0
8/27/2010		8/27/2011		8/27/2012	0	8/27/2013	0.1	8/27/2016		8/27/2017	0
8/28/2010		8/28/2011	8.61	8/28/2012	1.06	8/28/2013	0	8/28/2016		8/28/2017	0
8/29/2010		8/29/2011	0.42	8/29/2012	0.03	8/29/2013	0.08	8/29/2016		8/29/2017	0
8/30/2010	0	8/30/2011	0	8/30/2012	0	8/30/2013	0.01	8/30/2016		8/30/2017	0.3
8/31/2010	0	8/31/2011	0	8/31/2012	0	8/31/2013	0	8/31/2016		8/31/2017	
9/1/2010	0	9/1/2011	0	9/1/2012	0	9/1/2013	0.04	9/1/2016		9/1/2017	
9/2/2010	0	9/2/2011	0	9/2/2012	0	9/2/2013	0.39	9/2/2016	0	9/2/2017	
9/3/2010		9/3/2011	0	9/3/2012	0.21	9/3/2013	0.19	9/3/2016	0	9/3/2017	0.83
9/4/2010	0	9/4/2011	0	9/4/2012	0.56	9/4/2013	0.02	9/4/2016	0	9/4/2017	0
9/5/2010	0	9/5/2011	0	9/5/2012	0.19	9/5/2013	0	9/5/2016	0	9/5/2017	0
9/6/2010	0	9/6/2011		9/6/2012	0.32	9/6/2013	0	9/6/2016	0	9/6/2017	0.18
9/7/2010	0	9/7/2011		9/7/2012	0	9/7/2013	0	9/7/2016	0	9/7/2017	0.37
9/8/2010	0	9/8/2011	1.17	9/8/2012	0	9/8/2013	0	9/8/2016	0	9/8/2017	0
9/9/2010	0	9/9/2011	0	9/9/2012	0.23	9/9/2013	0	9/9/2016	0	9/9/2017	0
9/10/2010	0	9/10/2011	0	9/10/2012	0	9/10/2013	0	9/10/2016	0	9/10/2017	0
9/11/2010	0	9/11/2011	0	9/11/2012	0	9/11/2013	0	9/11/2016	0	9/11/2017	0
9/12/2010	0	9/12/2011	0.03	9/12/2012	0	9/12/2013	0	9/12/2016	0	9/12/2017	0
9/13/2010	0.19	9/13/2011	0	9/13/2012	0	9/13/2013	0.37	9/13/2016	0	9/13/2017	0
9/14/2010	0.21	9/14/2011	0	9/14/2012	0	9/14/2013	0	9/14/2016	0	9/14/2017	0.23
9/15/2010	0	9/15/2011		9/15/2012	0	9/15/2013	0	9/15/2016	0	9/15/2017	0
9/16/2010	0	9/16/2011	0.09	9/16/2012	0	9/16/2013	0	9/16/2016	0	9/16/2017	0
9/17/2010	0.95	9/17/2011	0	9/17/2012	0	9/17/2013	0.07	9/17/2016	0	9/17/2017	0
9/18/2010	0	9/18/2011	0	9/18/2012	0.12	9/18/2013	0	9/18/2016	0	9/18/2017	0
9/19/2010	0	9/19/2011	0	9/19/2012	1.22	9/19/2013	0	9/19/2016	1.54	9/19/2017	0
9/20/2010	0	9/20/2011	0	9/20/2012	0	9/20/2013	0	9/20/2016		9/20/2017	0.03
9/21/2010	0	9/21/2011	0.08	9/21/2012	0.03	9/21/2013	0	9/21/2016	0	9/21/2017	0
9/22/2010	0	9/22/2011	0.07	9/22/2012	0	9/22/2013	0.76	9/22/2016	0	9/22/2017	0
9/23/2010	0.58	9/23/2011	0	9/23/2012	0.49	9/23/2013	0	9/23/2016	0	9/23/2017	0
9/24/2010		9/24/2011	1.1	9/24/2012	0	9/24/2013	0	9/24/2016	0.05	9/24/2017	0
9/25/2010		9/25/2011	0	9/25/2012	0	9/25/2013	0	9/25/2016	0	9/25/2017	0
9/26/2010	0	9/26/2011	0	9/26/2012	0	9/26/2013	0	9/26/2016	0	9/26/2017	0
9/27/2010	0.04	9/27/2011	0	9/27/2012	0.59	9/27/2013	0	9/27/2016	0.12	9/27/2017	0
9/28/2010	0.63	9/28/2011	0.1	9/28/2012	0.4	9/28/2013	0	9/28/2016	0	9/28/2017	0
9/29/2010	0.06	9/29/2011		9/29/2012	0	9/29/2013	0	9/29/2016	0	9/29/2017	0
9/30/2010	1.85	9/30/2011		9/30/2012	0	9/30/2013	0	9/30/2016	0.24	9/30/2017	0
10/1/2010		10/1/2011	0.33	10/1/2012	0.12	10/1/2013	0	10/1/2016	0	10/1/2017	0

Highlighted values are the maximum value for that calendar year.

Historical Daily Precipitation Data

10/2/2010	0.43	10/2/2011	0.64	10/2/2012	0	10/2/2013	0	10/2/2016	0	10/2/2017	0
10/3/2010	0	10/3/2011		10/3/2012	0.51	10/3/2013	0	10/3/2016	0	10/3/2017	0
10/4/2010	0.03	10/4/2011	0	10/4/2012	0.04	10/4/2013	0	10/4/2016	0	10/4/2017	0
10/5/2010	0.18	10/5/2011		10/5/2012	0.01	10/5/2013	0	10/5/2016	0	10/5/2017	0
10/6/2010		10/6/2011	0	10/6/2012	0	10/6/2013	0	10/6/2016	0	10/6/2017	0.02
10/7/2010	0	10/7/2011	0	10/7/2012	0	10/7/2013	0	10/7/2016	0	10/7/2017	0
10/8/2010	0	10/8/2011	0	10/8/2012	0.17	10/8/2013	0.33	10/8/2016	0.07	10/8/2017	0.01
10/9/2010	0	10/9/2011	0	10/9/2012	0.02	10/9/2013	0	10/9/2016	0.61	10/9/2017	0.08
10/10/2010	0	10/10/2011	0	10/10/2012	0.21	10/10/2013	0.03	10/10/2016	0	10/10/2017	0.28
10/11/2010	0	10/11/2011		10/11/2012	0.09	10/11/2013	0.03	10/11/2016	0	10/11/2017	0.01
10/12/2010	0.23	10/12/2011		10/12/2012	0	10/12/2013	0.02	10/12/2016	0	10/12/2017	0.11
10/13/2010		10/13/2011	0.4	10/13/2012	0	10/13/2013	0	10/13/2016	0.02	10/13/2017	0
10/14/2010		10/14/2011		10/14/2012	0	10/14/2013	0	10/14/2016	0	10/14/2017	0.13
10/15/2010		10/15/2011	0.37	10/15/2012	0	10/15/2013	0	10/15/2016	0	10/15/2017	
10/16/2010	0	10/16/2011	0	10/16/2012	0.34	10/16/2013	0	10/16/2016	0	10/16/2017	
10/17/2010	0	10/17/2011	0	10/17/2012	0	10/17/2013	0	10/17/2016	0	10/17/2017	0
10/18/2010	0	10/18/2011	0	10/18/2012	0	10/18/2013	0.02	10/18/2016	0	10/18/2017	0
10/19/2010	0.19	10/19/2011	0.15	10/19/2012	0.13	10/19/2013	0	10/19/2016	0	10/19/2017	0
10/20/2010	0	10/20/2011	0.94	10/20/2012	0.92	10/20/2013	0	10/20/2016	0	10/20/2017	0
10/21/2010		10/21/2011	0.01	10/21/2012	0	10/21/2013	0	10/21/2016	0.14	10/21/2017	0
10/22/2010	0	10/22/2011	0	10/22/2012	0	10/22/2013	0	10/22/2016	0.66	10/22/2017	0
10/23/2010	0	10/23/2011	0	10/23/2012	0	10/23/2013	0	10/23/2016	0	10/23/2017	0
10/24/2010	0.01	10/24/2011	0	10/24/2012	0	10/24/2013	0	10/24/2016	0	10/24/2017	0.13
10/25/2010	0	10/25/2011	0	10/25/2012	0	10/25/2013	0	10/25/2016	0	10/25/2017	
10/26/2010	0	10/26/2011	0	10/26/2012	0	10/26/2013	0	10/26/2016	0	10/26/2017	
10/27/2010		10/27/2011	0.12	10/27/2012	0	10/27/2013	0	10/27/2016	0.39	10/27/2017	
10/28/2010		10/28/2011	0.52	10/28/2012	0	10/28/2013	0	10/28/2016	0	10/28/2017	
10/29/2010	0	10/29/2011	0.16	10/29/2012	0.34	10/29/2013	0	10/29/2016	0	10/29/2017	
10/30/2010	0	10/30/2011	1.77	10/30/2012	1.02	10/30/2013	0	10/30/2016	0.44	10/30/2017	
10/31/2010	0	10/31/2011		10/31/2012	0.04	10/31/2013	0	10/31/2016	0	10/31/2017	
11/1/2010	0	11/1/2011	0	11/1/2012	0	11/1/2013	0.15	11/1/2016	0	11/1/2017	
11/2/2010	0	11/2/2011	0	11/2/2012	0	11/2/2013	0.22	11/2/2016	0	11/2/2017	
11/3/2010		11/3/2011	0	11/3/2012	0	11/3/2013	0	11/3/2016	0	11/3/2017	0
11/4/2010	0.44	11/4/2011	0	11/4/2012	0	11/4/2013	0	11/4/2016	0	11/4/2017	0
11/5/2010	0.71	11/5/2011	0	11/5/2012	0	11/5/2013	0	11/5/2016	0	11/5/2017	0.07
11/6/2010	0.02	11/6/2011	0	11/6/2012	0	11/6/2013	0	11/6/2016	0	11/6/2017	0.04
11/7/2010		11/7/2011	0	11/7/2012	0	11/7/2013	0	11/7/2016	0	11/7/2017	0
11/8/2010	0	11/8/2011	0	11/8/2012	0.64	11/8/2013	0.06	11/8/2016	0	11/8/2017	0.64
11/9/2010	0.13	11/9/2011	0	11/9/2012	0	11/9/2013	0	11/9/2016	0.4	11/9/2017	0
11/10/2010	0	11/10/2011	0	11/10/2012	0	11/10/2013	0	11/10/2016	0	11/10/2017	0.04
11/11/2010	0	11/11/2011	0.02	11/11/2012	0	11/11/2013	0	11/11/2016	0	11/11/2017	
11/12/2010	0	11/12/2011	0	11/12/2012	0	11/12/2013	0	11/12/2016	0	11/12/2017	
11/13/2010	0	11/13/2011	0	11/13/2012	0.11	11/13/2013	0.03	11/13/2016	0	11/13/2017	
11/14/2010	0	11/14/2011	0	11/14/2012	0	11/14/2013	0	11/14/2016	0	11/14/2017	
11/15/2010	0	11/15/2011	0	11/15/2012	0	11/15/2013	0	11/15/2016	0.66	11/15/2017	
11/16/2010	0.08	11/16/2011	0.04	11/16/2012	0	11/16/2013	0.03	11/16/2016	0	11/16/2017	
11/17/2010		11/17/2011	0.66	11/17/2012	0	11/17/2013	0.04	11/17/2016	0	11/17/2017	0.02
11/18/2010	0	11/18/2011	0.01	11/18/2012	0	11/18/2013	0.15	11/18/2016	0	11/18/2017	
11/19/2010	0	11/19/2011	0	11/19/2012	0	11/19/2013	0	11/19/2016	0.24	11/19/2017	0.31
11/20/2010	0	11/20/2011	0	11/20/2012	0	11/20/2013		11/20/2016	0.23	11/20/2017	0
11/21/2010	0	11/21/2011	0.21	11/21/2012	0	11/21/2013		11/21/2016	0	11/21/2017	
11/22/2010	0	11/22/2011	0.14	11/22/2012	0	11/22/2013		11/22/2016	0	11/22/2017	
11/23/2010	0	11/23/2011	1.91	11/23/2012	0	11/23/2013		11/23/2016	0	11/23/2017	
11/24/2010	0	11/24/2011	0	11/24/2012	0.01	11/24/2013	0	11/24/2016	0	11/24/2017	0
11/25/2010	0	11/25/2011	0	11/25/2012	0	11/25/2013	0	11/25/2016	0	11/25/2017	
11/26/2010		11/26/2011	0	11/26/2012	0	11/26/2013	0	11/26/2016	0	11/26/2017	
11/27/2010	0	11/27/2011	0	11/27/2012	0.01	11/27/2013	2.69	11/27/2016	0	11/27/2017	
11/28/2010	0	11/28/2011	0	11/28/2012	0.13	11/28/2013	0.25	11/28/2016	0	11/28/2017	0
11/29/2010	0	11/29/2011	0	11/29/2012	0	11/29/2013	0	11/29/2016	2.04	11/29/2017	0
11/30/2010	0	11/30/2011	0.57	11/30/2012	0	11/30/2013	0	11/30/2016	1.15	11/30/2017	0
12/1/2010	0.39	12/1/2011	0	12/1/2012	0	12/1/2013	0	12/1/2016		12/1/2017	
12/2/2010	1.03	12/2/2011	0	12/2/2012	0	12/2/2013	0	12/2/2016	0	12/2/2017	
12/3/2010	0	12/3/2011	0	12/3/2012	0.08	12/3/2013	0	12/3/2016	0	12/3/2017	
12/4/2010	0	12/4/2011	0	12/4/2012	0.03	12/4/2013	0	12/4/2016	0	12/4/2017	
12/5/2010	0	12/5/2011	0	12/5/2012	0.04	12/5/2013	0	12/5/2016	0.18	12/5/2017	0.01
12/6/2010	0	12/6/2011	0.02	12/6/2012	0	12/6/2013		12/6/2016	0.54	12/6/2017	
12/7/2010	0	12/7/2011	0.26	12/7/2012	0	12/7/2013		12/7/2016	0.07	12/7/2017	
12/8/2010		12/8/2011	2.33	12/8/2012	0.43	12/8/2013	0	12/8/2016	0	12/8/2017	
12/9/2010	0	12/9/2011	0	12/9/2012	0.07	12/9/2013		12/9/2016	0	12/9/2017	0

Highlighted values are the maximum value for that calendar year.

Historical Daily Precipitation Data

12/10/2010		12/10/2011	0	12/10/2012	0.21	12/10/2013		12/10/2016	0	12/10/2017	0.34
12/11/2010		12/11/2011	0	12/11/2012	0.1	12/11/2013		12/11/2016	0	12/11/2017	0
12/12/2010	0.71	12/12/2011	0	12/12/2012	0	12/12/2013		12/12/2016	0.65	12/12/2017	0
12/13/2010	0.73	12/13/2011	0	12/13/2012	0	12/13/2013		12/13/2016	0	12/13/2017	0
12/14/2010	0	12/14/2011	0	12/14/2012	0	12/14/2013		12/14/2016	0	12/14/2017	0.04
12/15/2010	0	12/15/2011	0	12/15/2012	0	12/15/2013		12/15/2016	0	12/15/2017	0
12/16/2010	0	12/16/2011	0	12/16/2012	0	12/16/2013		12/16/2016	0	12/16/2017	0.1
12/17/2010	0	12/17/2011	0	12/17/2012	0.43	12/17/2013		12/17/2016	0.35	12/17/2017	0
12/18/2010	0	12/18/2011	0	12/18/2012	0.84	12/18/2013		12/18/2016	0.3	12/18/2017	
12/19/2010	0	12/19/2011	0	12/19/2012	0.03	12/19/2013		12/19/2016	0	12/19/2017	
12/20/2010	0	12/20/2011	0	12/20/2012	0	12/20/2013		12/20/2016	0	12/20/2017	
12/21/2010	0	12/21/2011	0.07	12/21/2012	0.85	12/21/2013	0	12/21/2016	0	12/21/2017	
12/22/2010	0	12/22/2011	0.12	12/22/2012	0.08	12/22/2013	0	12/22/2016	0	12/22/2017	
12/23/2010	0	12/23/2011	0.91	12/23/2012	0	12/23/2013		12/23/2016	0	12/23/2017	0.12
12/24/2010		12/24/2011	0	12/24/2012	0	12/24/2013		12/24/2016	0.53	12/24/2017	0.39
12/25/2010		12/25/2011	0	12/25/2012	0	12/25/2013		12/25/2016	0.01	12/25/2017	0.22
12/26/2010	0	12/26/2011	0	12/26/2012	0	12/26/2013		12/26/2016	0	12/26/2017	
12/27/2010	1.92	12/27/2011	0	12/27/2012	1.4	12/27/2013		12/27/2016	0	12/27/2017	
12/28/2010	0	12/28/2011	0.78	12/28/2012	0	12/28/2013		12/28/2016	0	12/28/2017	0
12/29/2010		12/29/2011	0	12/29/2012	0	12/29/2013		12/29/2016	0.35	12/29/2017	0
12/30/2010		12/30/2011	0	12/30/2012	0.27	12/30/2013	1.24	12/30/2016	0	12/30/2017	0
12/31/2010		12/31/2011	0	12/31/2012	0	12/31/2013		12/31/2016	0	12/31/2017	
Events	290		248		354		316		223		290

Data Source(s): NOAA (National Oceanic and Atomospheric Administration), Climate Data Online. Daily Summaries.

STATION	STATION_NAME
GHCND:US1NJMD0071	SOUTH PLAINFIELD 1.8 NE NJ US
GHCND:US1NJMD0023	SOUTH PLAINFIELD 0.8 ENE NJ US
GHCND:US1NJMD0033	SOUTH PLAINFIELD 0.9 NW NJ US
GHCND:US1NJMD0044	SOUTH PLAINFIELD 0.7 NNW NJ US
GHCND:US1NJMD0066	SOUTH PLAINFIELD 0.7 NNE NJ US

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ATTACHMENT 3

HYDROLOGY AND HYDRAULIC MODEL

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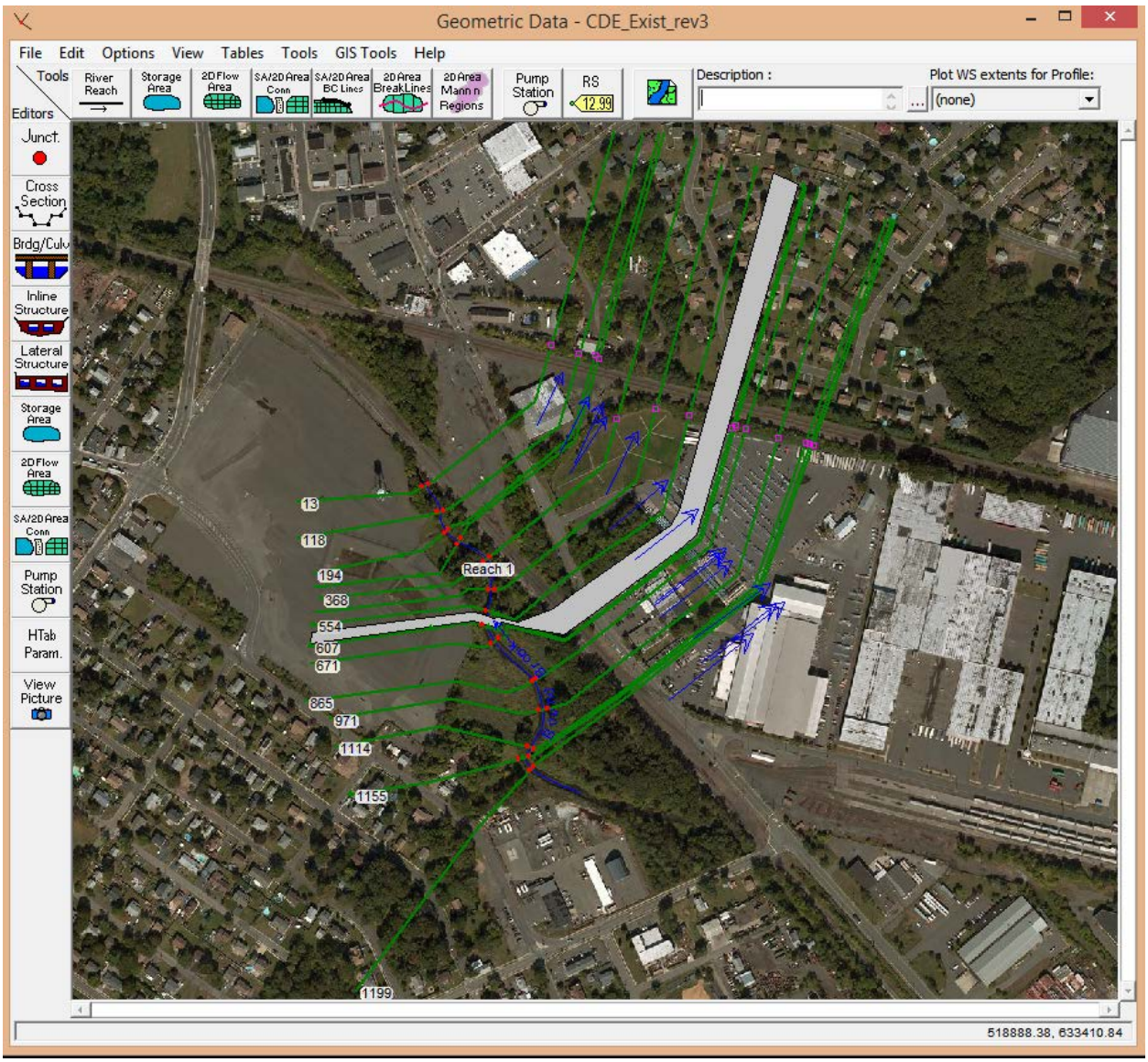
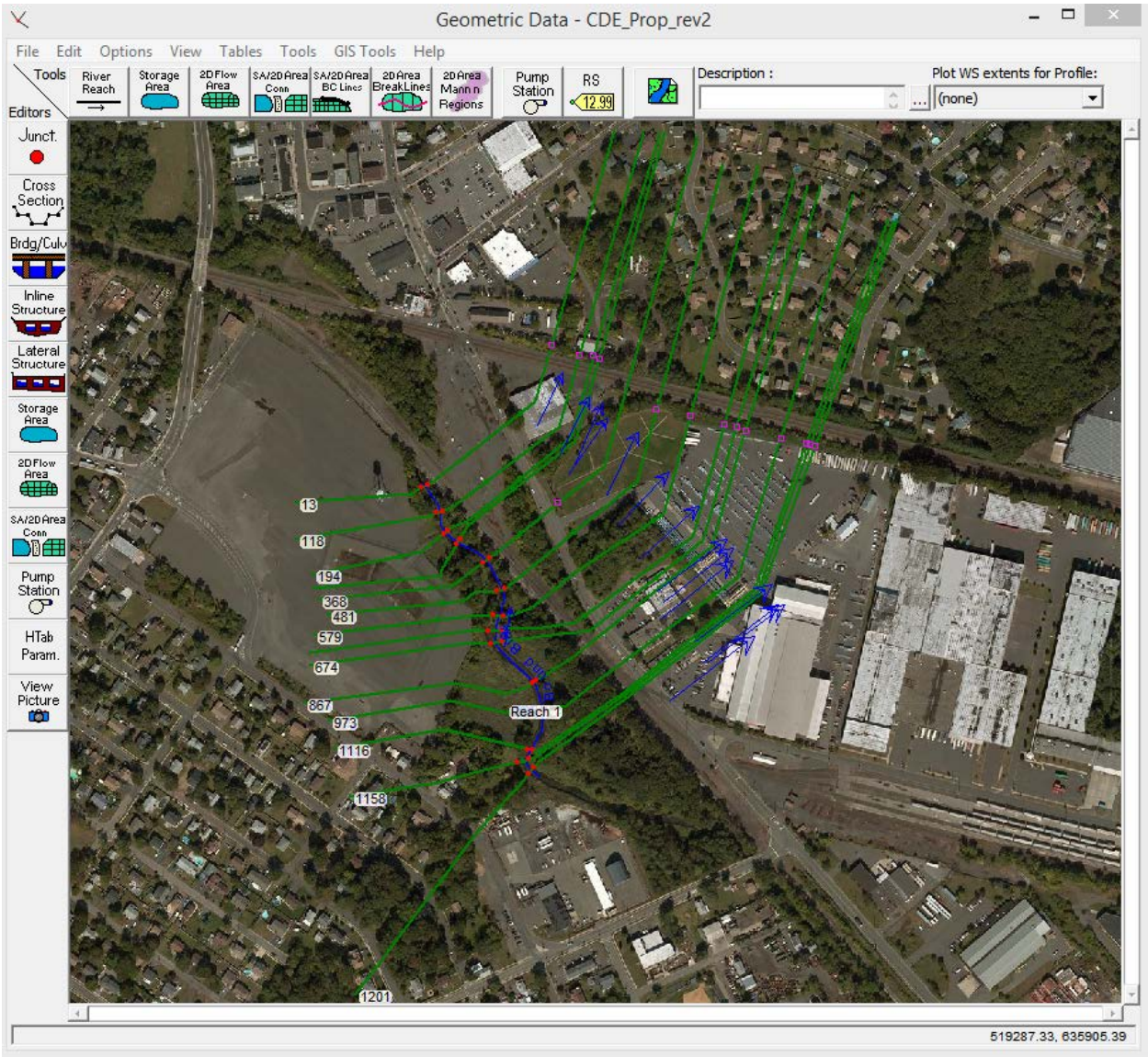
Attachment 3 – Hydrology and Hydraulic Model
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4

The pre- and post-construction base flood elevations were evaluated in the HEC-RAS H&H model. An Existing and Proposed Plan were generated and the cross-section locations for each are shown below.

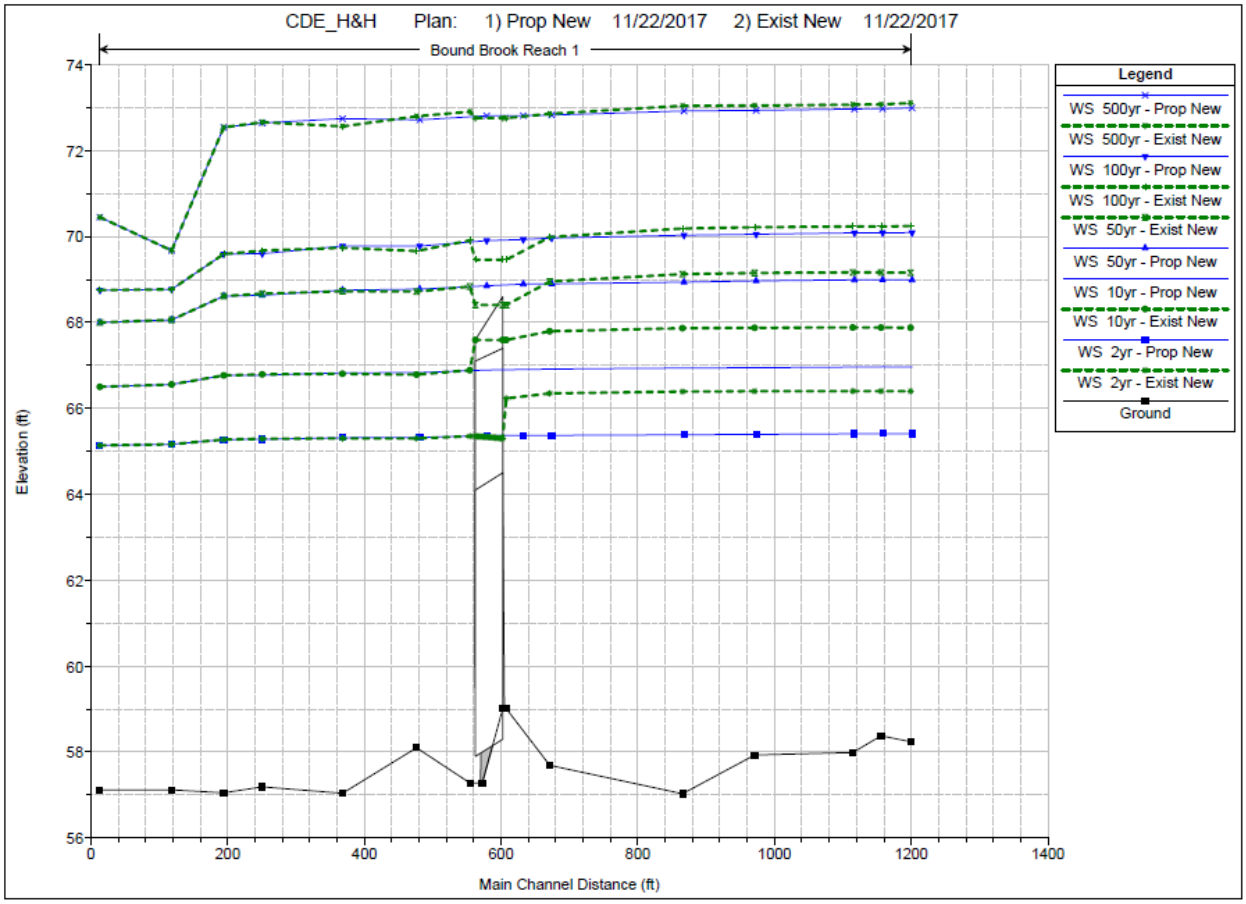
CDE Existing Plan



CDE Proposed Plan



The base flood elevation at the site were evaluated for the 2-year, 10-year, 50-year, 100-year, and 500-year storm events. The profile and tabular results of the H&H model for the pre- and post-construction plans are shown below.


CDE_H&H Plan: 1) Prop New 11/22/2017 2) Exist New 11/22/2017
Bound Brook Reach 1
Elevation (ft)
Main Channel Distance (ft)
Legend
WS 500yr - Prop New
WS 500yr - Exist New
WS 100yr - Prop New
WS 100yr - Exist New
WS 50yr - Exist New
WS 50yr - Prop New
WS 10yr - Prop New
WS 10yr - Exist New
WS 2yr - Prop New
WS 2yr - Exist New
Ground

HEC-RAS River: Bound Brook Reach: Reach 1

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1201	10yr	Prop New	930.00	58.30	66.96	62.22	66.99	0.000097	1.94	2377.93	701.36	0.12
Reach 1	1201	50yr	Prop New	1800.00	58.30	68.99	63.39	69.03	0.000128	2.59	4359.07	1323.41	0.14
Reach 1	1201	100yr	Prop New	2400.00	58.30	70.09	63.92	70.13	0.000134	2.84	5999.66	1597.81	0.15
Reach 1	1201	500yr	Prop New	4500.00	58.30	72.99	65.32	73.02	0.000100	2.85	12194.25	2431.16	0.13
Reach 1	1201	2yr	Prop New	561.00	58.30	65.41	61.49	65.43	0.000095	1.67	1514.75	469.10	0.12
Reach 1	1199	10yr	Exist New	930.00	58.24	67.88	63.07	67.90	0.000090	2.05	2821.06	953.68	0.12
Reach 1	1199	50yr	Exist New	1800.00	58.24	69.16	64.43	69.21	0.000176	3.13	4262.12	1408.99	0.17
Reach 1	1199	100yr	Exist New	2400.00	58.24	70.24	65.07	70.29	0.000153	3.12	5920.76	1646.05	0.16
Reach 1	1199	500yr	Exist New	4500.00	58.24	73.11	66.43	73.14	0.000111	3.08	12064.45	2434.20	0.14
Reach 1	1199	2yr	Exist New	561.00	58.24	66.40	61.56	66.42	0.000082	1.74	1663.91	600.01	0.11
Reach 1	1158	10yr	Prop New	930.00	58.53	66.97	62.81	66.98	0.000078	1.53	2499.90	598.64	0.11
Reach 1	1158	50yr	Prop New	1800.00	58.53	68.99	63.59	69.02	0.000098	2.05	4075.97	1002.32	0.12
Reach 1	1158	100yr	Prop New	2400.00	58.53	70.09	64.14	70.13	0.000119	2.44	5321.28	1224.91	0.14
Reach 1	1158	500yr	Prop New	4500.00	58.53	72.97	65.12	73.02	0.000114	2.85	10038.58	2034.93	0.14
Reach 1	1158	2yr	Prop New	561.00	58.53	65.41	62.14	65.43	0.000090	1.37	1621.34	547.99	0.11
Reach 1	1155	10yr	Exist New	930.00	58.38	67.88	62.87	67.90	0.000069	1.58	2596.15	735.72	0.10
Reach 1	1155	50yr	Exist New	1800.00	58.38	69.16	63.91	69.20	0.000129	2.41	3665.28	1038.46	0.14
Reach 1	1155	100yr	Exist New	2400.00	58.38	70.23	64.37	70.29	0.000152	2.82	4901.48	1240.99	0.16
Reach 1	1155	500yr	Exist New	4500.00	58.38	73.08	65.56	73.13	0.000137	3.17	9636.72	2025.07	0.16
Reach 1	1155	2yr	Exist New	561.00	58.38	66.40	62.19	66.42	0.000062	1.31	1685.70	497.92	0.09
Reach 1	1116	10yr	Prop New	930.00	58.18	66.96	62.62	66.98	0.000078	1.77	2811.16	586.89	0.11
Reach 1	1116	50yr	Prop New	1800.00	58.18	68.99	63.53	69.02	0.000108	2.42	4264.54	867.08	0.13
Reach 1	1116	100yr	Prop New	2400.00	58.18	70.09	64.27	70.12	0.000134	2.88	5396.57	1103.08	0.15
Reach 1	1116	500yr	Prop New	4500.00	58.18	72.97	64.91	73.01	0.000150	3.55	9942.69	2000.45	0.17
Reach 1	1116	2yr	Prop New	561.00	58.18	65.41	61.98	65.42	0.000078	1.55	1932.74	541.79	0.11
Reach 1	1114	10yr	Exist New	930.00	57.99	67.88	62.88	67.90	0.000054	1.56	3121.93	697.88	0.09
Reach 1	1114	50yr	Exist New	1800.00	57.99	69.17	64.02	69.20	0.000109	2.42	4101.09	971.69	0.13
Reach 1	1114	100yr	Exist New	2400.00	57.99	70.23	64.44	70.28	0.000134	2.87	5238.10	1126.28	0.15
Reach 1	1114	500yr	Exist New	4500.00	57.99	73.07	65.52	73.12	0.000152	3.54	9626.11	2007.89	0.17
Reach 1	1114	2yr	Exist New	561.00	57.99	66.40	61.46	66.41	0.000049	1.31	2177.48	582.37	0.08
Reach 1	973	10yr	Prop New	930.00	57.72	66.95	62.07	66.97	0.000073	1.78	2436.97	549.55	0.11
Reach 1	973	50yr	Prop New	1800.00	57.72	68.97	63.20	69.00	0.000105	2.44	3712.13	765.09	0.13
Reach 1	973	100yr	Prop New	2400.00	57.72	70.05	63.68	70.10	0.000133	2.94	4701.01	1143.93	0.15
Reach 1	973	500yr	Prop New	4500.00	57.72	72.94	64.93	72.99	0.000142	3.51	8716.81	1739.57	0.16
Reach 1	973	2yr	Prop New	561.00	57.72	65.40	60.73	65.41	0.000067	1.49	1689.21	459.48	0.10
Reach 1	971	10yr	Exist New	930.00	57.93	67.87	61.98	67.89	0.000045	1.43	2895.96	614.24	0.08
Reach 1	971	50yr	Exist New	1800.00	57.93	69.15	63.27	69.18	0.000094	2.25	3782.46	796.40	0.12
Reach 1	971	100yr	Exist New	2400.00	57.93	70.21	63.77	70.26	0.000117	2.69	4812.42	1289.46	0.14
Reach 1	971	500yr	Exist New	4500.00	57.93	73.05	65.01	73.11	0.000132	3.30	8754.02	1745.50	0.15
Reach 1	971	2yr	Exist New	561.00	57.93	66.40	60.79	66.41	0.000036	1.14	2088.26	496.32	0.07
Reach 1	867	10yr	Prop New	930.00	57.16	66.93	62.45	66.96	0.000106	2.18	2148.08	479.34	0.13
Reach 1	867	50yr	Prop New	1800.00	57.16	68.94	63.38	68.99	0.000164	3.11	3472.92	819.85	0.16
Reach 1	867	100yr	Prop New	2400.00	57.16	70.03	63.86	70.09	0.000179	3.45	4490.73	1427.80	0.17
Reach 1	867	500yr	Prop New	4500.00	57.16	72.92	65.15	72.98	0.000170	3.88	8797.78	1606.56	0.18
Reach 1	867	2yr	Prop New	561.00	57.16	65.38	61.31	65.41	0.000095	1.82	1522.87	380.91	0.12
Reach 1	865	10yr	Exist New	930.00	57.03	67.86	62.50	67.88	0.000066	1.82	2627.85	685.03	0.10
Reach 1	865	50yr	Exist New	1800.00	57.03	69.12	63.52	69.17	0.000148	2.95	3591.95	878.27	0.16
Reach 1	865	100yr	Exist New	2400.00	57.03	70.18	64.00	70.25	0.000179	3.45	4765.20	1492.63	0.17
Reach 1	865	500yr	Exist New	4500.00	57.03	73.04	65.29	73.09	0.000150	3.64	9151.27	1608.40	0.17
Reach 1	865	2yr	Exist New	561.00	57.03	66.39	61.19	66.40	0.000052	1.46	1870.81	399.50	0.09
Reach 1	674	10yr	Prop New	930.00	57.31	66.92	60.82	66.95	0.000067	1.70	1647.32	358.48	0.10
Reach 1	674	50yr	Prop New	1800.00	57.31	68.90	62.02	68.96	0.000116	2.56	2632.41	678.43	0.14
Reach 1	674	100yr	Prop New	2400.00	57.31	69.96	62.58	70.05	0.000145	3.05	3354.95	1205.10	0.16
Reach 1	674	500yr	Prop New	4500.00	57.31	72.83	64.33	72.94	0.000165	3.77	6970.04	1438.47	0.17
Reach 1	674	2yr	Prop New	561.00	57.31	65.37	60.12	65.39	0.000053	1.32	1212.30	260.21	0.09
Reach 1	671	10yr	Exist New	930.00	57.69	67.79	61.59	67.86	0.000124	2.38	1014.16	353.68	0.14
Reach 1	671	50yr	Exist New	1800.00	57.69	68.95	63.02	69.12	0.000277	3.87	1572.07	654.76	0.21
Reach 1	671	100yr	Exist New	2400.00	57.69	69.99	63.80	70.19	0.000311	4.37	2290.72	1284.52	0.23
Reach 1	671	500yr	Exist New	4500.00	57.69	72.86	65.99	73.04	0.000281	4.83	6022.58	1493.85	0.23
Reach 1	671	2yr	Exist New	561.00	57.69	66.35	60.81	66.39	0.000087	1.78	698.45	132.14	0.11
Reach 1	632	10yr	Prop New	930.00	57.36	66.91	60.77	66.94	0.000072	1.73	1565.84	362.37	0.10
Reach 1	632	50yr	Prop New	1800.00	57.36	68.89	62.05	68.96	0.000109	2.46	2305.63	893.80	0.13
Reach 1	632	100yr	Prop New	2400.00	57.36	69.93	62.63	70.05	0.000163	3.19	2916.55	1184.07	0.17
Reach 1	632	500yr	Prop New	4500.00	57.36	72.82	64.46	72.93	0.000157	3.65	6603.69	1374.96	0.17
Reach 1	632	2yr	Prop New	561.00	57.36	65.37	60.12	65.39	0.000053	1.30	1110.11	258.51	0.09
Reach 1	607	10yr	Exist New	930.00	59.01	67.59	63.14	67.83	0.000498	4.20	441.99	257.20	0.27
Reach 1	607	50yr	Exist New	1800.00	59.01	68.40	64.90	69.05	0.001219	7.02	704.80	422.63	0.42
Reach 1	607	100yr	Exist New	2400.00	59.01	69.46	65.94	70.12	0.001188	7.50	1284.19	1035.16	0.43

HEC-RAS River: Bound Brook Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	607	500yr	Exist New	4500.00	59.01	72.76	70.18	73.02	0.000537	6.14	5124.90	1496.13	0.30
Reach 1	607	2yr	Exist New	561.00	59.01	66.23	62.22	66.37	0.000364	3.15	290.06	86.52	0.22
Reach 1	579	10yr	Prop New	930.00	57.42	66.89	60.91	66.94	0.000095	2.07	1578.53	397.66	0.12
Reach 1	579	50yr	Prop New	1800.00	57.42	68.85	62.08	68.95	0.000166	3.12	2597.84	998.31	0.17
Reach 1	579	100yr	Prop New	2400.00	57.42	69.90	62.67	70.03	0.000206	3.70	3398.83	1152.68	0.19
Reach 1	579	500yr	Prop New	4500.00	57.42	72.81	64.33	72.92	0.000181	4.01	6709.76	1322.08	0.18
Reach 1	579	2yr	Prop New	561.00	57.42	65.36	60.20	65.39	0.000063	1.49	1116.09	274.50	0.10
Reach 1	554	10yr	Exist New	930.00	57.28	66.89	62.31	66.97	0.000230	2.82	1217.99	449.72	0.18
Reach 1	554	50yr	Exist New	1800.00	57.28	68.84	63.69	68.98	0.000342	3.98	2228.32	1043.43	0.22
Reach 1	554	100yr	Exist New	2400.00	57.28	69.91	64.32	70.09	0.000393	4.57	3078.56	1215.83	0.24
Reach 1	554	500yr	Exist New	4500.00	57.28	72.91	65.76	73.00	0.000238	4.18	6603.17	1346.92	0.20
Reach 1	554	2yr	Exist New	561.00	57.28	65.35	60.98	65.40	0.000189	2.21	758.62	305.86	0.15
Reach 1	481	10yr	Prop New	930.00	57.53	66.83	61.10	66.92	0.000168	2.74	1132.82	461.96	0.16
Reach 1	481	50yr	Prop New	1800.00	57.53	68.78	62.50	68.92	0.000250	3.82	1863.61	1009.61	0.20
Reach 1	481	100yr	Prop New	2400.00	57.53	69.78	63.31	70.00	0.000334	4.68	2508.99	1119.89	0.24
Reach 1	481	500yr	Prop New	4500.00	57.53	72.71	66.12	72.89	0.000282	4.99	5444.34	1222.61	0.23
Reach 1	481	2yr	Prop New	561.00	57.53	65.32	60.32	65.37	0.000124	2.08	717.08	304.42	0.14
Reach 1	476	10yr	Exist New	930.00	58.10	66.79	62.34	66.94	0.000381	3.86	1020.57	470.28	0.24
Reach 1	476	50yr	Exist New	1800.00	58.10	68.72	63.72	68.94	0.000492	5.06	1758.02	1024.59	0.28
Reach 1	476	100yr	Exist New	2400.00	58.10	69.66	64.48	70.02	0.000709	6.45	2376.99	1130.92	0.34
Reach 1	476	500yr	Exist New	4500.00	58.10	72.80	67.92	72.96	0.000382	5.60	5511.60	1229.87	0.26
Reach 1	476	2yr	Exist New	561.00	58.10	65.30	61.53	65.38	0.000266	2.82	631.47	278.05	0.19
Reach 1	368	10yr	Prop New	930.00	57.66	66.83	61.59	66.90	0.000166	2.65	1093.16	463.14	0.16
Reach 1	368	10yr	Exist New	930.00	57.04	66.80	60.92	66.89	0.000158	2.73	1001.95	567.37	0.16
Reach 1	368	50yr	Prop New	1800.00	57.66	68.75	62.81	68.89	0.000271	3.88	1726.38	597.24	0.21
Reach 1	368	50yr	Exist New	1800.00	57.04	68.73	62.69	68.88	0.000247	3.87	1746.19	921.41	0.20
Reach 1	368	100yr	Prop New	2400.00	57.66	69.78	63.50	69.95	0.000308	4.40	2191.23	612.65	0.23
Reach 1	368	100yr	Exist New	2400.00	57.04	69.74	63.53	69.93	0.000284	4.40	2193.66	943.78	0.22
Reach 1	368	500yr	Prop New	4500.00	57.66	72.74	65.46	72.84	0.000204	4.18	7661.16	1982.28	0.19
Reach 1	368	500yr	Exist New	4500.00	57.04	72.56	65.58	72.90	0.000423	6.17	3911.40	1062.25	0.28
Reach 1	368	2yr	Prop New	561.00	57.66	65.32	60.66	65.36	0.000124	2.02	785.16	274.32	0.13
Reach 1	368	2yr	Exist New	561.00	57.04	65.30	59.93	65.35	0.000118	2.10	662.96	264.45	0.13
Reach 1	250	10yr	Prop New	930.00	57.24	66.77	61.65	66.87	0.000222	3.24	968.01	405.94	0.19
Reach 1	250	10yr	Exist New	930.00	57.19	66.79	61.24	66.87	0.000161	2.69	928.80	364.22	0.16
Reach 1	250	50yr	Prop New	1800.00	57.24	68.63	63.10	68.85	0.000400	4.91	1494.48	1030.81	0.26
Reach 1	250	50yr	Exist New	1800.00	57.19	68.67	62.65	68.85	0.000294	4.11	1451.22	1055.79	0.22
Reach 1	250	100yr	Prop New	2400.00	57.24	69.60	63.90	69.90	0.000503	5.83	2130.95	1162.99	0.30
Reach 1	250	100yr	Exist New	2400.00	57.19	69.67	63.40	69.89	0.000338	4.68	2341.10	1169.77	0.24
Reach 1	250	500yr	Prop New	4500.00	57.24	72.64	66.09	72.81	0.000329	5.47	6450.20	2035.12	0.25
Reach 1	250	500yr	Exist New	4500.00	57.19	72.66	65.51	72.81	0.000251	4.68	6694.46	2039.14	0.21
Reach 1	250	2yr	Prop New	561.00	57.24	65.28	60.76	65.34	0.000162	2.46	724.64	300.82	0.16
Reach 1	250	2yr	Exist New	561.00	57.19	65.29	60.09	65.34	0.000117	2.03	711.78	300.05	0.13
Reach 1	194	10yr	Prop New	930.00	57.05	66.77	61.50	66.86	0.000203	3.13	1008.14	413.74	0.18
Reach 1	194	10yr	Exist New	930.00	57.05	66.77	61.50	66.86	0.000203	3.13	1008.14	413.74	0.18
Reach 1	194	50yr	Prop New	1800.00	57.05	68.61	62.93	68.83	0.000382	4.83	1558.29	1012.84	0.25
Reach 1	194	50yr	Exist New	1800.00	57.05	68.61	62.93	68.83	0.000382	4.83	1558.29	1012.84	0.25
Reach 1	194	100yr	Prop New	2400.00	57.05	69.59	63.70	69.86	0.000459	5.60	1955.59	1121.52	0.28
Reach 1	194	100yr	Exist New	2400.00	57.05	69.59	63.70	69.86	0.000459	5.60	1955.80	1121.54	0.28
Reach 1	194	500yr	Prop New	4500.00	57.05	72.54	65.89	72.78	0.000420	6.18	4708.74	1170.92	0.28
Reach 1	194	500yr	Exist New	4500.00	57.05	72.54	65.89	72.78	0.000420	6.18	4708.74	1170.92	0.28
Reach 1	194	2yr	Prop New	561.00	57.05	65.27	60.54	65.33	0.000146	2.37	760.60	306.32	0.15
Reach 1	194	2yr	Exist New	561.00	57.05	65.27	60.54	65.33	0.000146	2.37	760.60	306.32	0.15
Reach 1	118	10yr	Prop New	930.00	57.12	66.56	61.20	66.82	0.000398	4.30	364.29	150.14	0.25
Reach 1	118	10yr	Exist New	930.00	57.12	66.56	61.20	66.82	0.000398	4.30	364.29	150.14	0.25
Reach 1	118	50yr	Prop New	1800.00	57.12	68.06	63.23	68.74	0.000849	6.95	589.59	545.95	0.38
Reach 1	118	50yr	Exist New	1800.00	57.12	68.06	63.23	68.74	0.000849	6.95	589.59	545.95	0.38
Reach 1	118	100yr	Prop New	2400.00	57.12	68.77	64.54	69.74	0.001149	8.44	719.04	754.45	0.44
Reach 1	118	100yr	Exist New	2400.00	57.12	68.77	64.54	69.74	0.001148	8.44	719.16	754.61	0.44
Reach 1	118	500yr	Prop New	4500.00	57.12	69.67	68.74	72.46	0.003032	14.43	1202.30	803.94	0.73
Reach 1	118	500yr	Exist New	4500.00	57.12	69.67	68.74	72.46	0.003032	14.43	1202.30	803.94	0.73
Reach 1	118	2yr	Prop New	561.00	57.12	65.16	60.15	65.31	0.000262	3.12	275.54	75.35	0.20
Reach 1	118	2yr	Exist New	561.00	57.12	65.16	60.15	65.31	0.000262	3.12	275.54	75.35	0.20
Reach 1	13	10yr	Prop New	930.00	57.12	66.50	61.28	66.78	0.000426	4.36	356.44	130.70	0.26
Reach 1	13	10yr	Exist New	930.00	57.12	66.50	61.28	66.78	0.000426	4.36	356.44	130.70	0.26
Reach 1	13	50yr	Prop New	1800.00	57.12	68.00	63.33	68.63	0.000848	6.82	716.52	432.62	0.37
Reach 1	13	50yr	Exist New	1800.00	57.12	68.00	63.33	68.63	0.000848	6.82	716.52	432.62	0.37
Reach 1	13	100yr	Prop New	2400.00	57.12	68.75	64.51	69.58	0.001069	8.01	1032.03	690.22	0.42
Reach 1	13	100yr	Exist New	2400.00	57.12	68.75	64.51	69.58	0.001069	8.01	1032.03	690.22	0.42
Reach 1	13	500yr	Prop New	4500.00	57.12	70.45	69.87	71.58	0.001508	10.45	2258.66	731.15	0.51
Reach 1	13	500yr	Exist New	4500.00	57.12	70.45	69.87	71.58	0.001508	10.45	2258.66	731.15	0.51
Reach 1	13	2yr	Prop New	561.00	57.12	65.14	60.20	65.28	0.000270	3.12	270.88	71.47	0.20
Reach 1	13	2yr	Exist New	561.00	57.12	65.14	60.20	65.28	0.000270	3.12	270.88	71.47	0.20

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APPENDIX A-4

Waste Characterization Screening Summary

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Waste Characterization Screening Summary
Operable Unit Phase 1 – Capacitor Debris Area
Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

During the pre-design investigation (PDI), a set of soil samples were collected and submitted for Resource Conservation and Recovery Act (RCRA) waste characterization to aid in the development of waste disposal options as part of the remedial design. Analyses included full toxicity characteristic leaching procedure (TCLP) (metals, pesticides, herbicides, volatile organic compounds, semivolatile organic compounds), pH, ignitability, reactive cyanide, and reactive sulfide. Locations sampled during the initial PDI, comprised five samples in the side slope area that contained visual evidence of capacitor debris, and five samples from the other upland areas without visual evidence of capacitor debris; although, historical data have indicated PCB concentrations in soil greater than 1 milligram per kilogram (mg/kg) may be present. Based on the results from the initial PDI (summarized below), eight additional samples were collected during the supplemental PDI. All analytical samples collected during the field program were packaged and shipped via courier to SGS/Accutest located in Dayton, New Jersey.

A total of 18 samples were submitted for TCLP and waste characteristics analyses with ten samples collected during the initial PDI and eight samples collected during the supplemental PDI (Figure 1). Results from these analyses can be found in Table 1. Results for corrosivity, ignitability, and reactivity (cyanide and sulfide) were all within the acceptable ranges. TCLP results were non-detect for most analytes with detections noted for barium (five samples), cadmium (eight samples), mercury (one sample), lead (six samples), tetrachloroethene (two samples), and trichloroethene (two samples). Lead was detected above the screening criteria (5 milligrams per liter [mg/L]) in one of the ten samples collected during the initial PDI activities (boring AW-229) with a reported result of 16 mg/L. Based on this result, eight additional samples were collected for waste characterization in the vicinity of AW-229 during the supplemental PDI activities. During the supplemental PDI, lead was above the screening criteria in one sample collected from boring AB-405W at a concentration of 6.9 mg/L.

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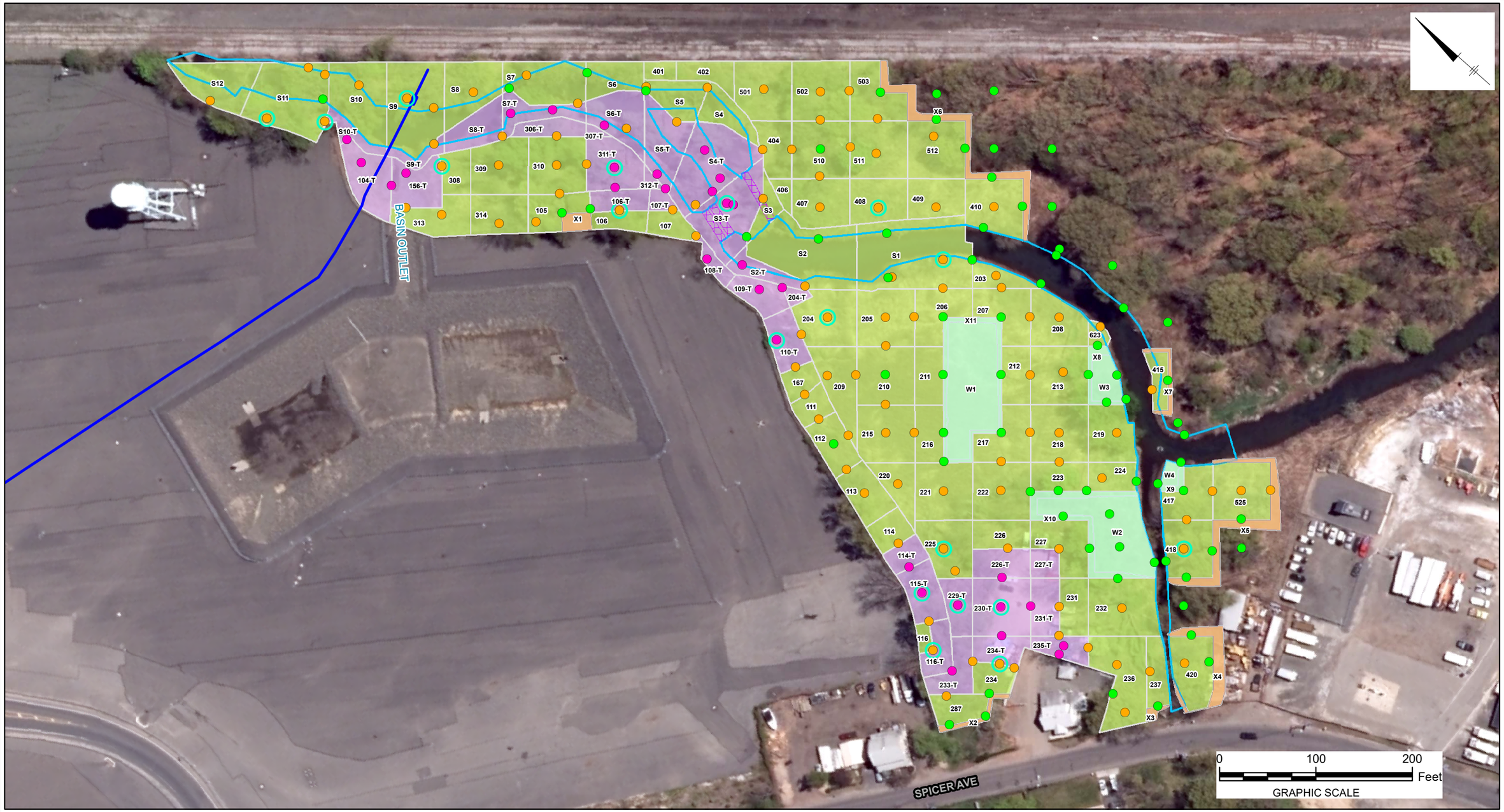

LEGEND

- MAX PCB < 1 MG/KG
- MAX PCB ≥ 1 MG/KG
- MAX PCB ≥ 50 MG/KG
- WASTE CHARACTERIZATION SCREENING SAMPLES
- EXISTING WATERLINE
- SAMPLING GRID
- CULVERT
- BOUND BROOK EXTENT
- NON-TSCA REMOVAL
- TSCA-REGULATED REMOVAL AREA
- AREAS TREATED WITH HERBICIDE FOR WETLAND RESTORATION
- AREAS EXCAVATED FOR SIDE SLOPE STABILITY

NOTES:

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ABBREVIATIONS:

MG/KG: MILLIGRAMS PER KILOGRAM
PCB: POLYCHLORINATED BIPHENYL
TSCA: TOXIC SUBSTANCE CONTROL ACT

OPERABLE UNIT 4 PHASE 1 - CAPACITOR DEBRIS AREA
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SOUTH PLAINFIELD NEW JERSEY
PRE-DESIGN INVESTIGATION
DATA SUMMARY REPORT

HORIZONTAL EXTENT OF SOIL REMOVAL

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1

City: SYR Div/Group: IM/DV Created By: K.IVES Last Saved By: kives
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Table 1 - Soil Waste Characterization Results
Cornell – Dubilier Electronics Superfund Site
Operable Unit 4: Phase I – Capacitor Debris Area

Location ID		AW-202	AW-204	AW-229	AW-303	AW-308	SS-102	SS-103	SS-106	SS-110	SS-115
Sample ID		AW-202 (0-5)	AW-204 (0-4)	AW-229 (0-2)	AW-303 (0-4)	AW-308 (0-2.3)	SS-102 (0-4)	SS-103 (5-8)	SS-106 (0-12)	SS-110 (0-2)	SS-115 (0-1.2)
Sample Date		9/27/2016	9/26/2016	9/28/2016	9/22/2016	9/22/2016	10/4/2016	10/4/2016	9/30/2016	9/28/2016	10/5/2016
Sample Depth Range (feet)		0-5	0-4	0-2	0-4	0-2.29	0-4	5-8	0-12	0-2	0-1.2
Herbicides											
2,4,5-TP (Silvex)	mg/L	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U
2,4-D	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Metals											
Arsenic	mg/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Barium	mg/L	1	1.0 U	1.0 U	1.0 U	1.0 U	1.4	1.2	1.0 U	1.1	1.0 U
Cadmium	mg/L	0.025 U	0.047	0.44	0.025 U	0.026	0.025 U	0.025 U	0.025 U	0.044	0.084
Chromium	mg/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Lead	mg/L	0.50 U	0.50 U	**16**	0.50 U	0.50 U	0.50 U	0.68	0.50 U	0.50 U	1.1
Mercury	mg/L	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
Selenium	mg/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Silver	mg/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
OC Pesticides											
Chlordane	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Chlordane (Technical)	mg/L	---	---	---	---	---	---	---	---	---	---
Endrin	mg/L	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U
Gamma-BHC	mg/L	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U
Heptachlor	mg/L	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U
Heptachlor epoxide	mg/L	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U
Methoxychlor	mg/L	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
Toxaphene	mg/L	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U
SVOCs											
1,4-Dichlorobenzene	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
2,4,5-Trichlorophenol	mg/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
2,4,6-Trichlorophenol	mg/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
2,4-Dinitrotoluene	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
2-Methylphenol	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
3-Methylphenol, 4-Methylphenol	mg/L	---	---	---	---	---	---	---	---	---	---
Hexachloro-1,3-butadiene	mg/L	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Hexachlorobenzene	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Hexachloroethane	mg/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Methylphenol	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Nitrobenzene	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Pentachlorophenol	mg/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Pyridine	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U

Table 1 - Soil Waste Characterization Results
Cornell – Dubilier Electronics Superfund Site
Operable Unit 4: Phase I – Capacitor Debris Area

Location ID		AW-202	AW-204	AW-229	AW-303	AW-308	SS-102	SS-103	SS-106	SS-110	SS-115
Sample ID		AW-202 (0-5)	AW-204 (0-4)	AW-229 (0-2)	AW-303 (0-4)	AW-308 (0-2.3)	SS-102 (0-4)	SS-103 (5-8)	SS-106 (0-12)	SS-110 (0-2)	SS-115 (0-1.2)
Sample Date		9/27/2016	9/26/2016	9/28/2016	9/22/2016	9/22/2016	10/4/2016	10/4/2016	9/30/2016	9/28/2016	10/5/2016
Sample Depth Range (feet)		0-5	0-4	0-2	0-4	0-2.29	0-4	5-8	0-12	0-2	0-1.2
VOCs											
1,1-Dichloroethene	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
1,2-Dichloroethane	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
1,4-Dichlorobenzene	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
2-Butanone (MEK)	mg/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Benzene	mg/L	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U
Carbon Tetrachloride	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Chlorobenzene	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Chloroform	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Tetrachloroethene	mg/L	0.0016 J	0.0141	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Trichloroethene	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0015 J	0.0017 J	0.0050 U
Vinyl chloride	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
FIELD											
Corrosivity	pH units	6.25 NC	5.99 NC	6.16 NC	7.54 NC	5.89 NC	7.97 NC	8.25 NC	4.85 NC	7.91 NC	6.23 NC
Corrosivity	SU	---	---	---	---	---	---	---	---	---	---
General Chemistry											
Cyanide Reactivity	mg/kg	15 U	14 U	12 U	11 U	14 U	11 U	10 U	10 U	10 U	13 U
Ignitability	deg f	> 200 U	> 200 U	> 200 U	> 200 U	> 200 U	> 200 U	> 200 U	> 200 U	> 200 U	> 200 U
Percent Solids	%	---	---	---	---	---	---	---	---	---	---
Other											
Reactive Sulfide	mg/kg	---	---	---	---	---	---	---	---	---	---
Sulfide Reactivity	mg/kg	150 U	140 U	120 U	110 U	150 U	110 U	100 U	100 U	100 U	130 U

Table 1 - Soil Waste Characterization Results
Cornell – Dubilier Electronics Superfund Site
Operable Unit 4: Phase I – Capacitor Debris Area

Location ID		AB-405W	AB-408W	AB-418W	AW-225W	AW-230W	AW-234W	AW-311W	SS-116W
Sample ID		AB-405W (0-12)_20170505	AB-408W (0-2)_20170504	AB-418W (0-4)_20170503	AW-225W (0-2)_20170510	AW-230W (0-4)_20170503	AW-234W (0-2)_20170503	AW-311W (0-8)_20170504	SS-116W (0-2)_20170510
Sample Date		5/5/2017	5/4/2017	5/3/2017	5/10/2017	5/3/2017	5/3/2017	5/4/2017	5/10/2017
Sample Depth Range (feet)		0-12	0-2	0-4	0-2	0-4	0-2	0-8	0-2
Herbicides									
2,4,5-TP (Silvex)	mg/L	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U
2,4-D	mg/L	0.0042 U	0.0042 U	0.0071	0.0042 U	0.0042 U	0.0042 U	0.0042 U	0.0042 U
Metals									
Arsenic	mg/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Barium	mg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.9	1.0 U	1.0 U
Cadmium	mg/L	0.025 U	0.048	0.025 U	0.025 U	0.025 U	0.035	0.097	0.025 U
Chromium	mg/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Lead	mg/L	**6.9**	0.50 U	0.50 U	0.50 U	0.50 U	0.75	0.50 U	0.64
Mercury	mg/L	0.00020 U	0.00020 U	0.00020 U	0.0017	0.00020 U	0.00020 U	0.00020 U	0.00073
Selenium	mg/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Silver	mg/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
OC Pesticides									
Chlordane	mg/L	---	---	---	---	---	---	---	---
Chlordane (Technical)	mg/L	0.0033 U	0.0033 U	0.0033 U	0.0033 U	0.0033 U	0.0033 U	0.0033 U	0.0033 U
Endrin	mg/L	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U
Gamma-BHC	mg/L	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U
Heptachlor	mg/L	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U
Heptachlor epoxide	mg/L	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U	0.000067 U
Methoxychlor	mg/L	0.00013 U	0.00013 U	0.00013 U	0.00013 U	0.00013 U	0.00013 U	0.00013 U	0.00013 U
Toxaphene	mg/L	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U
SVOCs									
1,4-Dichlorobenzene	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
2,4,5-Trichlorophenol	mg/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
2,4,6-Trichlorophenol	mg/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
2,4-Dinitrotoluene	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
2-Methylphenol	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
3-Methylphenol, 4-Methylphenol	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Hexachloro-1,3-butadiene	mg/L	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Hexachlorobenzene	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Hexachloroethane	mg/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Methylphenol	mg/L	---	---	---	---	---	---	---	---
Nitrobenzene	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Pentachlorophenol	mg/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Pyridine	mg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U

Table 1 - Soil Waste Characterization Results
Cornell – Dubilier Electronics Superfund Site
Operable Unit 4: Phase I – Capacitor Debris Area

Location ID		AB-405W	AB-408W	AB-418W	AW-225W	AW-230W	AW-234W	AW-311W	SS-116W
Sample ID		AB-405W (0-12)_20170505	AB-408W (0-2)_20170504	AB-418W (0-4)_20170503	AW-225W (0-2)_20170510	AW-230W (0-4)_20170503	AW-234W (0-2)_20170503	AW-311W (0-8)_20170504	SS-116W (0-2)_20170510
Sample Date		5/5/2017	5/4/2017	5/3/2017	5/10/2017	5/3/2017	5/3/2017	5/4/2017	5/10/2017
Sample Depth Range (feet)		0-12	0-2	0-4	0-2	0-4	0-2	0-8	0-2
VOCs									
1,1-Dichloroethene	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
1,2-Dichloroethane	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
1,4-Dichlorobenzene	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
2-Butanone (MEK)	mg/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Benzene	mg/L	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U
Carbon Tetrachloride	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Chlorobenzene	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Chloroform	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Tetrachloroethene	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Trichloroethene	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Vinyl chloride	mg/L	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
FIELD									
Corrosivity	pH units	---	---	---	---	---	---	---	---
Corrosivity	SU	5.11 NC	5.93 NC	4.78 NC	6.33 NC	6.31 NC	5.56 NC	5.17 NC	6.19 NC
General Chemistry									
Cyanide Reactivity	mg/kg	12 U	18 U	12 U	12 U	16 U	12 U	14 U	11 U
Ignitability	deg f	> 200	> 200	> 200	> 200	> 200	> 200	> 200	> 200
Percent Solids	%	81	53.5	82.4	76.9	62.3	82.8	74	84.3
Other									
Reactive Sulfide	mg/kg	120 U	180 U	120 U	120 U	160 U	120 U	140 U	110 U
Sulfide Reactivity	mg/kg	---	---	---	---	---	---	---	---

Notes:
Bold value indicates an exceedance of the screening criteria.

> - greater than
deg f - degrees Fahrenheit
ID - identification
J - estimated value
mg/kg - milligrams per kilogram
mg/L - milligrams per liter
NC - not corrosive
SU - standard units
U - not detected above reporting limit

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APPENDIX A-5

Water Treatment Source Calculation Summary - Assumptions and Approach

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CALCULATION SHEET

CLIENT:
United States Army Corps of Engineers, Kansas City District

PROJECT NUMBER:
28825CDE.001

PROJECT:
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4

TITLE:
Water Treatment Source Calculation Summary- Assumptions and Approach

PREPARED BY:
Shannon McGowan, Arcadis

DATE:
4/24/2018

REVIEWED BY:
Eric Dievendorf, Arcadis

DATE:
4/25/2018

OBJECTIVE

The water volume calculations and associated assumptions presented herein were prepared by Arcadis U.S., Inc. (Arcadis) to estimate the total amount of water requiring treatment that will be generated during construction activities at the Cornell-Dubilier Electronics (CDE) Superfund Site (CDE Site) located in South Plainfield, New Jersey. The calculated volume of water will be used to determine the most efficient water treatment option for the proposed construction activities.

Based on the CDE Site location and anticipated construction activities, the sources of water that would require treatment and disposal during construction include:

- Excavated sediment dewatering
- Excavated soil dewatering
- Precipitation within the CDE Site
- Precipitation within staging areas
- Infiltration of groundwater into open excavations

Detailed calculations for all water sources at the CDE Site have been included in Attachments 1 through Attachment 4.

ASSUMPTIONS

Excavated Soil Dewatering

In accordance with the Remedial Design, a volume of 37,200 cubic yards (CY) of soil below the groundwater surface was used to calculate the quantity of water within the soil.

During preliminary design investigation, 12 soil samples were submitted for laboratory analysis and resulted in the following classification of CDE Site soils:

- Silty sand
- Clayey sand
- Clayey gravel with sand

Based on the above soil classification, typical minimum, maximum, and median void ratios for the CDE Site soil were used to determine the volume of water within excavated soil. It is assumed that the excavated CDE Site soil is homogeneous.

Additionally, it is assumed that the volume of soils below the water table are fully saturated and therefore the volume of the voids will equal the quantity of water within the soil. Overall, the quantity of water will be influenced by the relative density of the soil and therefore variations in the volume water that is obtained should be anticipated. It is important to note that the calculations provide the total amount of entrained water in the soil; however, it is likely that some water will remain retained within the soil matrix during transportation and disposal of solid material following the dewatering process. This a conservative assumption that is appropriate for estimating quantities for water treatment purposes.

Excavated Sediment Dewatering

In accordance with the Remedial Design, a saturated volume of 6,227 CY of excavated sediment was used to calculate the quantity of water within the sediment. The following assumption, based on Arcadis experience with similar sediment removal projects, was used to determine the quantity of water that will be generated from excavated sediments:

- 40 gallons of water per 1 CY of sediment

CDE Site Precipitation Data

Daily historical precipitation data from January 2009 to January 2018 were obtained from the National Oceanic and Atmospheric Administration (NOAA) Climate Data Online website. Station US1NJMD0023 was found to have the most continuous available dataset and was used as the primary source. Significant gaps in dates with available recorded precipitation depths were encountered for the station, and therefore rainfall data from four other stations in the immediate vicinity of the site were used to fill in the data gaps These stations are: US1NJMD0071, US1NJMD0066, US1NJMD0044, and US1NJMD0033.

Staging Area Precipitation

It is assumed that precipitation that comes in contact with the staging area on the CDE Site during construction will be considered impacted water that will require the appropriate water treatment prior to discharge.

The calculation assumes that the staging area is approximately 1-acre and assumes an average precipitation rate of 0.12 inches of rain per day over a construction period of 122 days. The precipitation rate was approximated based on daily historical precipitation data used in the CDE Site precipitation calculations.

Groundwater Infiltration

The groundwater infiltration calculations consider the infiltration of groundwater into each open excavation area. The following values were obtained for each excavation cell, as shown on Figure 1:

- Hydraulic Conductivity – An average of the typical minimum and maximum values of hydraulic conductivity for saturated soils based on soil type were used.
- Hydraulic Gradient - The hydraulic gradients surrounding each cell in all directions were measured based on groundwater elevations shown in Figure 1 and tabulated in Attachment 4.
- Cross-sectional Area - The cross-sectional excavation area normal to the hydraulic gradient between a given set of cells was measured using Figure 1 and multiplied by the designated removal depths of each cell. All values were tabulated as shown in Attachment 4.

Once all variables were obtained for each cell, the volumetric flow rate, Q, for each cell was calculated using Darcy's law.

CALCULATIONS

Excavated Soil Dewatering

To approximate the volume of water generated from excavated soils below the groundwater table at the CDE Site, a groundwater surface, as shown in Figure 1, was developed using water level measurements taken by Arcadis and existing monitoring well data at the at the CDE Site. Water level measurements are presented in the following table.

Location ID	Top of Piezometer Elevation (feet)	Depth to Water Measured May 2, 2017 (feet)	Depth to Water Measured May 8, 2017 (feet)	Depth to Water Measured May 11, 2017 (feet)
PZ AW-236	69.6	7.23	7.07	7.31
PZ SS-103	73.7	14.40	14.37	14.53
PZ AB-413	69.6	8.62	8.47	8.71
PZ AB-404	65.0	4.92	4.87	4.96
PZ SS-105	76.8	17.08	16.67	17.02
PZ SS-112	67.8	6.52	6.44	6.56
PZ SS-208	68.3	7.48	7.33	7.52
PZ SS-211	66.0	5.05	4.92	5.06
SG-01	65.6	6.85	6.74	6.87
SG-02	67.7	7.62	7.50	7.67
SG-03	58.1	1.90	1.90	1.82

The overall calculation approach used the total volume of solids below the groundwater surface and void ratios to calculate the volume of voids as shown in the following equation:

$$e = \frac{V_v}{V_s}$$

$Where$:

$e = Void\ Ratio$

$V_v = Volume\ of\ Voids$

$V_s = Volume\ of\ Solids$

Based on the above equations, the volume of water anticipated from a given cell can be calculated as follows:

Example - Cell 204

$$e_{min}\ for\ silty\ sand = 0.33$$

$$Removal\ volume\ of\ cell\ 204\ (V_s) = 363.02\ ft^3$$

$$e = \frac{V_v}{V_s}$$

$$V_v = (e)(V_s) = (0.33)(363.02) = 119.80\ ft^3$$

Typical values for void ratio by soil type are as follows:

Clayey Sand			Silty Sand			Clayey Gravel		
min	max	median	min	max	median	min	max	median
0.17	0.59	0.38	0.33	0.98	0.65	0.21	0.37	0.29

The volume of water by specific soil type was calculated with the three different void ratios. Because the excavated CDE Site soil will be a combination clayey sand, silty sand, and clayey gravel, an average water quantity was calculated based on minimum, median and maximum values of the individual soils.

As a result, the calculated water quantities for soil dewatering are as follows:

Average Maximum Volume (gallons)	Average Median Volume (gallons)	Average Minimum Volume (gallons)
1,801,226	1,225,577	659,212

Excavated Sediment Dewatering

The sediment dewatering was determined based on the assumption that the sediment will contain 40 gallons of water for every cubic yard of saturated sediment. The water within the saturated sediments on site was calculated as follows:

$$\frac{40\ gallons\ of\ water}{Cubic\ Yard\ of\ Sediment} \times Total\ volume\ of\ saturated\ sediment$$

$$\frac{40\ gallons}{1\ CY} \times 6{,}227\ CY = 249{,}070\ gallons\ of\ water$$

CDE Site Precipitation Volume Calculation

Due to a sparse number of recorded observation dates for certain years, historical data from only 2010-2013, 2016, and 2017 was utilized to calculate average and maximum precipitation volumes for a dynamic range of dates during the anticipated construction season. These average and maximum precipitation volumes were calculated by multiplying an estimated area of disturbance on a per day basis by the average or maximum precipitation depth for that day of record. These volumes were accumulated over the specified duration of the construction season to calculate the total average and maximum volumes of precipitation that would be required to be managed during construction. The volume calculations assume that no infiltration would occur and only account for precipitation that falls directly on the open cells (i.e., runoff from outside the cells is not accounted for) and further excludes weekend days from the calculations. No other off-work days are accounted for.

To determine the amount of area that would be disturbed during construction on a per day basis (sq. ft. per day), the total proposed area of disturbance (sq. ft.) was divided by the number of work days (excluding weekends) during the specified construction window (days).

Once the average disturbed area per day was calculated, it was multiplied by both the average and maximum precipitation depth (ft.) on a per day basis during the construction window. Cumulative totals were then calculated to determine the potential total average and maximum volumes of precipitation (reported as gallons) that would require management.

Staging Area Precipitation

In addition to the CDE Site precipitation, water accumulated within the staging area due to precipitation was calculated using historical precipitation data. An average rainfall rate was calculated using average seasonal precipitation volumes from 2010 to 2017. This number was then divided by the total number of construction days resulting in a rate of 0.12 in per day (0.01 feet per day).

Once this rate was obtained, the volume of water that will be generated due to precipitation within the staging area was calculated as follows:

$$Area\ of\ the\ Staging\ Area\ (Square\ Feet) \times Staging\ Time\ (days) \times Precipitation\ Rate\ \left(\frac{feet}{day}\right) = Volume\ of\ Water\ (Cubic\ Feet)$$

$$43{,}560\ sf\ \times 122\ days\ \times 0.01\frac{ft}{day} \times \frac{1\ cf}{7.48\ gallons} = 397{,}500\ gallons$$

Groundwater Infiltration

The groundwater infiltration was evaluated using Darcy's law. In general, Darcy's law describes how the rate of flow of groundwater is related to the hydraulic conductivity, k, and hydraulic gradient, i, as shown in the equation below:

$$Q = k * i * A$$

$Where$:

$Q = volumetric\ flow\ rate$

$k = hydraulic\ conductivity$

$$i = \frac{\Delta h}{L} = \frac{change\ in\ water\ elevation}{distance\ between\ \Delta h}$$

$A = cross\ sectional\ excavation\ area\ between\ a\ given\ set\ of\ cells,$

$normal\ to\ the\ hydraulic\ gradient.$

Flowrate Variables

Hydraulic Conductivity, k

The typical values of hydraulic conductivity for saturated soils that were used in calculating the groundwater flowrate into an excavated cell are as follows:

Soil Type	Minimum k (ft/s)	Maximum k (ft/s)
Silty Sand	3.00E-05	3.00E-04
Clayey Sand	3.00E-06	3.00E-04
Clayey Gravel	1.64E-08	1.64E-05
Average	1.10E-05	2.05E-04

The average minimum and maximum values were used to evaluate the quantity of water that will be generated due to ground water infiltration. In general, the value of hydraulic conductivity is dependent upon the properties of the soil and liquid flowing through it and is influenced by the following:

Soil Properties

- Void size
- Soil structure
- Void continuity
- Particle shape and surface roughness

Liquid Properties

- Density
- Viscosity

Therefore, variations in the hydraulic conductivity of the CDE Site soil should be anticipated.

Hydraulic Gradient, i

The hydraulic gradient for each cell is measured value based on groundwater elevations of adjacent cells and its location as shown on Figure 1. The change in head between two designated groundwater elevations was calculated and divided by the distance between two elevations. These measurements and calculations were performed for each individual cell. All values are tabulated and shown in Attachment 4.

Cross-Section Area, A

The cross-sectional area for each cell is a measured value based on excavation depth and cell dimensions. The cross-sectional area value used must be an area normal to a corresponding hydraulic gradient. All measured values are tabulated and shown in Attachment 4.

Flowrate

The flows into each excavated cell were calculated based on values obtained for the hydraulic conductivity, hydraulic gradients and cross-sectional areas. The quantity of groundwater infiltration within a given cell has been tabulated and shown in Attachment 4.

Based on the above equations, the volume of groundwater infiltration anticipated into a given cell can be calculated as follows:

Example – Water entering Cell 114 during excavation:

Water from Cell	Water Entering Cell	Length	H (feet)	Area (ft^2)	Hydraulic Gradient	Q max (gal/day)	Q min (gal/day)
113	114	43.59	0.06	122.25	1.38E-03	22.3	1.20
220	114	47.4	0.01	99.26	2.11E-04	2.8	0.15

$$Q = (k)(i)(A)$$

$Where$:

$Q = volumetric\ flow\ rate$

$k = hydraulic\ conductivity$

$$i = \frac{\Delta h}{L} = \frac{change\ in\ water\ elevation}{distance\ between\ \Delta h}$$

$A = cross\ sectional\ excavation\ area\ between\ a\ given\ set\ of\ cells,$

$normal\ to\ the\ hydraulic\ gradient.$

From Cell 113 to Cell 114:

$$Q_{min} = (k_{min})(i)(A) = (1.10E-05)\left(\frac{0.06}{43.59}\right)(122.11) = 1.2\ gallons/day$$

From Cell 220 to Cell 114:

$$Q_{min} = (k_{min})(i)(A) = (1.10E-05)\left(\frac{0.01}{47.4}\right)(99.26) = 0.15\ gallons/day$$

Total volume of water entering cell 114:

$$1.2 + 0.15 = 1.35 \ {}^{gallons}/_{day}$$

CONCLUSIONS

In conclusion, the following table summarizes the volume of water anticipated during construction activities at the CDE Site: It is assumed that duration of construction is 122 days and the duration of excavation operation is 85 days.

Gallons of Water	Sediment Dewatering	Soil Dewatering	Soil Infiltration	Stream Infiltration	Stream Dewatering	Staging Precipitation	Removal Precipitation	Total
per day	2,000	5,400	265	119	1,200	3300	1,270	**13,550**
total	249,000	659,000	22,500	10,100	150,000	398,000	108,000	**1,597,000**

REFERENCES

Coduto, Donald P. 2011. Geotechnical Engineering Principles and Practices, Second Edition.

Geotechdata.info. 2013. Soil Void Ratio. March 2018. Available at: www.geotechdata.info/parameter/void-ratio.html

Arcadis. July 2017. Pre-Design Investigation Data Summary Report. Cornell-Dubilier Electronics Superfund Site. Operable Unit 4: Phase 1 – Capacitor Debris Area. South Plainfield, New Jersey.

FIGURES

Figure 1 – Groundwater Surface

ATTACHMENTS

Attachment 1 – Excavated Soils and Sediment Dewatering Calculations

Attachment 2 – CDE Site Precipitation Summary

Attachment 3 – Staging Area Precipitation

Attachment 4 – Groundwater Infiltration Calculations

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FIGURE

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NOTES:
1. 2015 IMAGERY DOWNLOADED FROM NEW JERSEY GEOGRAPHIC INFORMATION NETWORK (NJGIN). HTTPS://NJGIN.STATE.NJ.US
2. PIEZOMETER AND STAFF GAGE MEASUREMENTS WERE TAKEN DURING PRELIMINARY DESIGN INVESTIGATIONS ON MAY 2, 2017- MAY 11, 2017 (TABLE 18 - WATER LEVEL MEASUREMENTS, PRE-DESIGN INVESTIGATION DATA SUMMARY REPORT, JULY 2017)
3. GROUNDWATER SURFACE WAS ESTIMATED USING PIEZOMETER AND STAFF GAGE DATA AND INVERSE DISTANCE WEIGHTING (IDW).

ABBREVIATIONS:
FT: FEET

LEGEND

- MONITORING WELL LOCATION
- ESTIMATED GROUNDWATER ELEVATION
- STREAM GAGE LOCATION
- PIEZOMETER LOCATION
- GROUNDWATER ELEVATION CONTOUR
- APPROXIMATE WATERLINE
- CULVERT
- PARCEL BOUNDARY
- PIPELINE CORRIDOR
- CURRENT CREEK EXTENT
- CREEK REALIGNMENT
- AREA AND VOLUME ESTIMATE GRID

WATER LEVEL ELEVATION IDW (FT MSL)

- 55 - 56
- 56 - 57
- 57 - 58
- 58 - 59
- 59 - 60
- 60 - 61
- 61 - 62
- 62 - 63

OPERABLE UNIT 4 PHASE 1 - CAPACITOR DEBRIS AREA
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SOUTH PLAINFIELD NEW JERSEY

GROUNDWATER SURFACE

ARCADIS Design & Consultancy for natural and built assets

FIGURE 1

City: SYR Div/Group: IM/DV Created By: K.IVES Last Saved By: kives
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ATTACHMENT 1

Excavated Soils and Sediment Dewatering Calculations

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ARCADIS Design & Consultancy for natural and built assets

Excavated Soil Dewatering:

Typical Void Ratio values by soil type					
Clayey Sand (min/max)		Silty Sand (min/max)		Clayey Gravel (min/max)	
0.17	0.59	0.33	0.98	0.21	0.37

Void Ratio (median value)		
Clayey Sand	Silty Sand	Clayey Gravel
0.38	0.65	0.29

Void Ratio:

$e = V_v / V_s$

Where:

V_v= Total volume of water

NOTE: it is assumed that the total volume is fully saturated and therefore the volume of air, V_a, = 0

V_s= Total volume of solids below the water table

Attachment 1
Excavated Soils and Sediment Dewatering Calculations
United States Army Corps of Engineers
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4
South Plainfield, New Jersey

Cell	V_s (cy)	V_v based on void ratio values (cy)								
		Clayey Sand			Silty Sand			Clayey Gravel		
		min	max	median	min	max	median	min	max	median
		0.17	0.59	0.38	0.33	0.98	0.65	0.21	0.37	0.29
105	52.15	8.87	30.77	19.82	17.21	51.11	33.90	10.95	19.30	15.12
106	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
107	1.76	0.30	1.04	0.67	0.58	1.73	1.15	0.37	0.65	0.51
111	71.36	12.13	42.10	27.12	23.55	69.93	46.38	14.99	26.40	20.69
112	70.66	12.01	41.69	26.85	23.32	69.24	45.93	14.84	26.14	20.49
113	21.46	3.65	12.66	8.15	7.08	21.03	13.95	4.51	7.94	6.22
114	15.41	2.62	9.09	5.86	5.09	15.10	10.02	3.24	5.70	4.47
116	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
167	67.27	11.44	39.69	25.56	22.20	65.92	43.72	14.13	24.89	19.51
203	137.25	23.33	80.98	52.16	45.29	134.51	89.21	28.82	50.78	39.80
204	363.02	61.71	214.18	137.95	119.80	355.76	235.96	76.23	134.32	105.28
205	254.46	43.26	150.13	96.69	83.97	249.37	165.40	53.44	94.15	73.79
206	200.23	34.04	118.13	76.09	66.07	196.22	130.15	42.05	74.08	58.07
207	295.75	50.28	174.49	112.38	97.60	289.83	192.24	62.11	109.43	85.77
208	321.91	54.73	189.93	122.33	106.23	315.47	209.24	67.60	119.11	93.35
209	280.42	47.67	165.45	106.56	92.54	274.81	182.27	58.89	103.75	81.32
210	273.44	46.48	161.33	103.91	90.23	267.97	177.74	57.42	101.17	79.30
211	138.76	23.59	81.87	52.73	45.79	135.99	90.19	29.14	51.34	40.24
212	132.48	22.52	78.17	50.34	43.72	129.83	86.11	27.82	49.02	38.42
213	184.37	31.34	108.78	70.06	60.84	180.68	119.84	38.72	68.22	53.47
215	284.86	48.43	168.07	108.25	94.00	279.16	185.16	59.82	105.40	82.61
216	139.66	23.74	82.40	53.07	46.09	136.87	90.78	29.33	51.67	40.50
217	196.48	33.40	115.92	74.66	64.84	192.55	127.71	41.26	72.70	56.98
218	228.29	38.81	134.69	86.75	75.34	223.72	148.39	47.94	84.47	66.20
219	88.43	15.03	52.17	33.60	29.18	86.66	57.48	18.57	32.72	25.64
220	143.32	24.36	84.56	54.46	47.29	140.45	93.16	30.10	53.03	41.56
221	277.10	47.11	163.49	105.30	91.44	271.56	180.12	58.19	102.53	80.36
222	265.95	45.21	156.91	101.06	87.77	260.64	172.87	55.85	98.40	77.13
223	117.48	19.97	69.32	44.64	38.77	115.13	76.36	24.67	43.47	34.07

Attachment 1
Excavated Soils and Sediment Dewatering Calculations
United States Army Corps of Engineers
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4
South Plainfield, New Jersey

Cell	V_s (cy)	V_v based on void ratio values (cy)								
		Clayey Sand			Silty Sand			Clayey Gravel		
		min	max	median	min	max	median	min	max	median
		0.17	0.59	0.38	0.33	0.98	0.65	0.21	0.37	0.29
224	96.35	16.38	56.84	36.61	31.79	94.42	62.62	20.23	35.65	27.94
225	181.00	30.77	106.79	68.78	59.73	177.38	117.65	38.01	66.97	52.49
226	104.84	17.82	61.86	39.84	34.60	102.75	68.15	22.02	38.79	30.40
227	67.57	11.49	39.87	25.68	22.30	66.22	43.92	14.19	25.00	19.60
231	91.81	15.61	54.17	34.89	30.30	89.97	59.67	19.28	33.97	26.62
232	144.21	24.52	85.08	54.80	47.59	141.33	93.74	30.28	53.36	41.82
234	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
236	310.15	52.73	182.99	117.86	102.35	303.95	201.60	65.13	114.76	89.94
237	120.67	20.51	71.20	45.86	39.82	118.26	78.44	25.34	44.65	35.00
287	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
308	121.98	20.74	71.97	46.35	40.25	119.54	79.29	25.62	45.13	35.37
309	284.36	48.34	167.77	108.06	93.84	278.67	184.83	59.72	105.21	82.46
310	296.00	50.32	174.64	112.48	97.68	290.08	192.40	62.16	109.52	85.84
313	83.47	14.19	49.25	31.72	27.54	81.80	54.25	17.53	30.88	24.21
314	200.95	34.16	118.56	76.36	66.31	196.93	130.62	42.20	74.35	58.28
401	20.63	3.51	12.17	7.84	6.81	20.22	13.41	4.33	7.63	5.98
402	60.10	10.22	35.46	22.84	19.83	58.90	39.07	12.62	22.24	17.43
404	156.82	26.66	92.52	59.59	51.75	153.68	101.93	32.93	58.02	45.48
406	45.82	7.79	27.03	17.41	15.12	44.90	29.78	9.62	16.95	13.29
407	265.91	45.21	156.89	101.05	87.75	260.59	172.84	55.84	98.39	77.11
408	260.78	44.33	153.86	99.09	86.06	255.56	169.50	54.76	96.49	75.62
409	201.77	34.30	119.05	76.67	66.58	197.74	131.15	42.37	74.66	58.51
410	357.53	60.78	210.94	135.86	117.98	350.38	232.39	75.08	132.29	103.68
415	74.26	12.62	43.81	28.22	24.51	72.78	48.27	15.60	27.48	21.54
417	225.87	38.40	133.27	85.83	74.54	221.36	146.82	47.43	83.57	65.50
418	227.11	38.61	133.99	86.30	74.94	222.56	147.62	47.69	84.03	65.86
420	332.52	56.53	196.19	126.36	109.73	325.87	216.14	69.83	123.03	96.43
501	230.80	39.24	136.17	87.70	76.16	226.19	150.02	48.47	85.40	66.93
502	145.64	24.76	85.93	55.34	48.06	142.73	94.67	30.59	53.89	42.24

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		Clayey Sand			Silty Sand			Clayey Gravel		
		min	max	median	min	max	median	min	max	median
		0.17	0.59	0.38	0.33	0.98	0.65	0.21	0.37	0.29
503	10.28	1.75	6.07	3.91	3.39	10.08	6.68	2.16	3.80	2.98
510	311.51	52.96	183.79	118.37	102.80	305.28	202.48	65.42	115.26	90.34
511	307.51	52.28	181.43	116.86	101.48	301.36	199.88	64.58	113.78	89.18
512	121.32	20.62	71.58	46.10	40.04	118.89	78.86	25.48	44.89	35.18
525	288.34	49.02	170.12	109.57	95.15	282.58	187.42	60.55	106.69	83.62
623	56.64	9.63	33.42	21.52	18.69	55.51	36.82	11.89	20.96	16.43
103-T	26.48	4.50	15.63	10.06	8.74	25.95	17.21	5.56	9.80	7.68
104-T	215.46	36.63	127.12	81.87	71.10	211.15	140.05	45.25	79.72	62.48
106-T	79.34	13.49	46.81	30.15	26.18	77.75	51.57	16.66	29.36	23.01
107-T	50.18	8.53	29.61	19.07	16.56	49.18	32.62	10.54	18.57	14.55
108-T	35.02	5.95	20.66	13.31	11.56	34.32	22.76	7.35	12.96	10.16
109-T	47.91	8.14	28.27	18.21	15.81	46.95	31.14	10.06	17.73	13.89
110-T	118.00	20.06	69.62	44.84	38.94	115.64	76.70	24.78	43.66	34.22
114-T	2.04	0.35	1.20	0.77	0.67	1.99	1.32	0.43	0.75	0.59
115-T	1.69	0.29	1.00	0.64	0.56	1.66	1.10	0.36	0.63	0.49
116-T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
156-T	436.78	74.25	257.70	165.98	144.14	428.04	283.91	91.72	161.61	126.67
204-T	44.68	7.60	26.36	16.98	14.74	43.79	29.04	9.38	16.53	12.96
226-T	116.63	19.83	68.81	44.32	38.49	114.30	75.81	24.49	43.15	33.82
227-T	26.72	4.54	15.77	10.15	8.82	26.19	17.37	5.61	9.89	7.75
229-T	2.83	0.48	1.67	1.08	0.93	2.77	1.84	0.59	1.05	0.82
230-T	9.80	1.67	5.78	3.72	3.23	9.61	6.37	2.06	3.63	2.84
231-T	78.17	13.29	46.12	29.70	25.80	76.61	50.81	16.42	28.92	22.67
233-T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
234-T	0.38	0.06	0.22	0.14	0.12	0.37	0.24	0.08	0.14	0.11
235-T	82.46	14.02	48.65	31.34	27.21	80.81	53.60	17.32	30.51	23.91
306-T	110.65	18.81	65.28	42.05	36.51	108.44	71.92	23.24	40.94	32.09
307-T	23.50	3.99	13.86	8.93	7.75	23.03	15.27	4.93	8.69	6.81
311-T	335.39	57.02	197.88	127.45	110.68	328.68	218.00	70.43	124.09	97.26

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Excavated Soils and Sediment Dewatering Calculations
United States Army Corps of Engineers
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South Plainfield, New Jersey

Cell	V_s (cy)	V_v based on void ratio values (cy)								
		Clayey Sand			Silty Sand			Clayey Gravel		
		min	max	median	min	max	median	min	max	median
		0.17	0.59	0.38	0.33	0.98	0.65	0.21	0.37	0.29
312-T	95.88	16.30	56.57	36.43	31.64	93.96	62.32	20.14	35.48	27.81
W1	904.35	153.74	533.57	343.65	298.43	886.26	587.83	189.91	334.61	262.26
W2	238.82	40.60	140.91	90.75	78.81	234.05	155.23	50.15	88.36	69.26
W3	113.71	19.33	67.09	43.21	37.53	111.44	73.91	23.88	42.07	32.98
W4	55.32	9.40	32.64	21.02	18.26	54.22	35.96	11.62	20.47	16.04
X1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3	2.59	0.44	1.53	0.98	0.85	2.53	1.68	0.54	0.96	0.75
X4	36.57	6.22	21.58	13.90	12.07	35.84	23.77	7.68	13.53	10.61
X5	39.78	6.76	23.47	15.12	13.13	38.99	25.86	8.35	14.72	11.54
X6	31.49	5.35	18.58	11.97	10.39	30.86	20.47	6.61	11.65	9.13
Total Volume of Water (gallons)		473,518	1,643,387	1,058,452	919,182	2,729,693	1,810,511	584,934	1,030,598	807,766

Summary of Totals:

Average Maximum Volume	
1,801,226	gallons

Average Median Volume	
1,225,577	gallons

Average Minimum Volume	
659,212	gallons

Excavated Sediment Dewatering:

Cell	V_s (CY)
S1	1055.11
S10	229.93
S10-T	44.84
S11	393.12
S12	221.48
S2	669.55
S2-T	102.59
S3	90.05
S3-T	311.20
S4	158.86
S4-T	569.01
S5	191.26
S5-T	502.88
S6	132.83
S6-T	412.32
S7	230.74
S7-T	163.10
S8	115.87
S8-T	199.38
S9	311.68
S9-T	120.92

Total Volume of Sediment (CY)	Total Volume of Water (gallons)
6,227	249,070

Note:
1. Assumes 40 gallons of water per cubic yard of sediment

ATTACHMENT 2

CDE Site Precipitation Summary

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Site Precipitation from June 1st to September 30th:

Equations:

Equation (1) - Area of disturbance:

Average Cell Area (sf) x Production Rate (cells/day) = Area of Open Excavation (sf/day)

Average Cell Area = 2408 sf
Production Rate = 1.41 cells/day

2408 x 1.41= 3395 sf/day

Equation (2) - Volume of precipitation per day:

Area of Open Excavation (sf/day) x Daily Rainfall (ft) = Average Daily Volume of Rainfall into an Open Excavation (cf/day)

Example for June 4:

Average rainfall= 1.00E-02 inches

Equation (2): *0.01 inches x (1 ft/12 inches) x 3400 sf/day x (7.48 gallons/ 1 cf) = 21.19 gallons*

2010 Date	Rainfall (in)	2012 Date	Rainfall (in)	2013 Date	Rainfall (in)	2013 Date	Rainfall (in)	2016 Date	Rainfall (in)	2017 Date	Rainfall (in)	Average Daily Precipitation (gallons)	Cumulative Average (gallons)	Maximum Daily Precipitation (gallons)	Maximum Cumulative Average (gallons)
6/1/2010	0	6/1/2011	0	6/1/2012	0	6/1/2013	0	6/1/2016	0	6/1/2017	0.02	7.06	7.06	42.39	42.39
6/2/2010	0.41	6/2/2011	0	6/2/2012	0.49	6/2/2013	0	6/2/2016	0	6/2/2017	0		7.06		42.39
6/3/2010	0	6/3/2011	0	6/3/2012	0	6/3/2013	0.5	6/3/2016	0.02	6/3/2017	0.14		7.06		42.39
6/4/2010	0	6/4/2011	0	6/4/2012	0.04	6/4/2013	0	6/4/2016	0.02	6/4/2017	0	21.19	28.26	84.78	127.16
6/5/2010	0	6/5/2011	0	6/5/2012	0.28	6/5/2013	0	6/5/2016	0	6/5/2017	0.42	247.26	275.52	890.15	1017.32
6/6/2010	0	6/6/2011	0	6/6/2012	0.03	6/6/2013	0	6/6/2016	0.52	6/6/2017	0.16	250.80	526.32	1102.09	2119.41
6/7/2010	0	6/7/2011	0	6/7/2012	0	6/7/2013	1.1	6/7/2016	0	6/7/2017	0	388.56	914.88	2331.35	4450.75
6/8/2010	0	6/8/2011	0	6/8/2012	0	6/8/2013	2.4	6/8/2016	0.02	6/8/2017	0	854.83	1769.70	5086.58	9537.33
6/9/2010	0	6/9/2011	0	6/9/2012	0	6/9/2013	0	6/9/2016	0.57	6/9/2017	0		1769.70		9537.33
6/10/2010	0.98	6/10/2011	0.08	6/10/2012	0	6/10/2013	0	6/10/2016	`	6/10/2017	0		1769.70		9537.33
6/11/2010	0.05	6/11/2011	0.41	6/11/2012	0.61	6/11/2013	1.41	6/11/2016	0	6/11/2017	0	876.02	2645.73	2988.36	12525.69
6/12/2010	0	6/12/2011	0.31	6/12/2012	0	6/12/2013	0	6/12/2016	0	6/12/2017	0	109.50	2755.23	657.02	13182.71
6/13/2010	0	6/13/2011	0	6/13/2012	1.83	6/13/2013	0.05	6/13/2016	0	6/13/2017	0	664.08	3419.31	3878.51	17061.22
6/14/2010	0	6/14/2011	0	6/14/2012	0	6/14/2013	1.44	6/14/2016	0	6/14/2017	0.01	512.19	3931.50	3051.95	20113.17
6/15/2010	0	6/15/2011	0.59	6/15/2012	0	6/15/2013	0.1	6/15/2016	0	6/15/2017	0	243.73	4175.23	1250.45	21363.62
6/16/2010	0	6/16/2011	0	6/16/2012	0	6/16/2013	0	6/16/2016	0	6/16/2017	0		4175.23		21363.62
6/17/2010	0.19	6/17/2011	0.99	6/17/2012	0	6/17/2013	0	6/17/2016	0	6/17/2017	0.01		4175.23		21363.62

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United States Army Corps of Engineers, Kansas City District
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South Plainfield, New Jersey

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6/18/2010	0	6/18/2011	0	6/18/2012	0	6/18/2013	0.02	6/18/2016	0	6/18/2017	0.97	349.70	4524.93	2055.82	23419.44
6/19/2010	0	6/19/2011	0	6/19/2012	0	6/19/2013	0.17	6/19/2016	0	6/19/2017	0.04	74.18	4599.11	360.30	23779.74
6/20/2010	0	6/20/2011	0	6/20/2012	0	6/20/2013	0	6/20/2016	0	6/20/2017	1.8	635.82	5234.93	3814.93	27594.67
6/21/2010	0	6/21/2011	0	6/21/2012	0	6/21/2013	0	6/21/2016	0.02	6/21/2017	0	7.06	5242.00	42.39	27637.06
6/22/2010	0	6/22/2011	0	6/22/2012	0	6/22/2013	0	6/22/2016	0	6/22/2017	0	0.00	5242.00	0.00	27637.06
6/23/2010	0.48	6/23/2011	0	6/23/2012	0.53	6/23/2013	0	6/23/2016	0	6/23/2017	0		5242.00		27637.06
6/24/2010	0	6/24/2011	0.21	6/24/2012	0	6/24/2013	0.29	6/24/2016	0.06	6/24/2017	2.12		5242.00		27637.06
6/25/2010	0	6/25/2011	0	6/25/2012	0.24	6/25/2013	0.02	6/25/2016	0	6/25/2017	0	91.84	5333.84	508.66	28145.72
6/26/2010	0	6/26/2011	0	6/26/2012	0.28	6/26/2013	0.35	6/26/2016	0	6/26/2017	0	222.54	5556.38	741.79	28887.51
6/27/2010	0	6/27/2011	0	6/27/2012	0	6/27/2013	0.08	6/27/2016	0	6/27/2017	0.11	67.11	5623.49	233.13	29120.65
6/28/2010	0	6/28/2011	0	6/28/2012	0	6/28/2013	1.09	6/28/2016	0.25	6/28/2017	0	473.33	6096.83	2310.15	31430.80
6/29/2010	0	6/29/2011	0	6/29/2012	0	6/29/2013	0	6/29/2016	0.55	6/29/2017	0	194.28	6291.11	1165.67	32596.47
6/30/2010	0	6/30/2011	0	6/30/2012	0	6/30/2013	0	6/30/2016	0	6/30/2017	0		6291.11		32596.47
7/1/2010	0	7/1/2011	0	7/1/2012	0	7/1/2013	0.08	7/1/2016	0	7/1/2017	0		6291.11		32596.47
7/2/2010	0	7/2/2011	0	7/2/2012	0	7/2/2013	0.98	7/2/2016	0.34	7/2/2017	0.11	505.13	6796.23	2077.02	34673.49
7/3/2010	0	7/3/2011	0	7/3/2012	0	7/3/2013	0.03	7/3/2016	0	7/3/2017	0	10.60	6806.83	63.58	34737.08
7/4/2010	0	7/4/2011	0	7/4/2012	0.04	7/4/2013	0.07	7/4/2016	0	7/4/2017	0.01	42.39	6849.22	148.36	34885.43
7/5/2010	0	7/5/2011	0	7/5/2012	0.05	7/5/2013	0	7/5/2016	0.73	7/5/2017	0	275.52	7124.74	1547.17	36432.60
7/6/2010	0	7/6/2011	0	7/6/2012	0	7/6/2013	0	7/6/2016	0	7/6/2017	0	0.00	7124.74	0.00	36432.60
7/7/2010	0	7/7/2011	0	7/7/2012	0	7/7/2013	0	7/7/2016	0	7/7/2017	0		7124.74		36432.60
7/8/2010	0	7/8/2011	0	7/8/2012	0	7/8/2013	0	7/8/2016	0	7/8/2017	1.07		7124.74		36432.60
7/9/2010	0	7/9/2011	0.63	7/9/2012	0	7/9/2013	0	7/9/2016	0.19	7/9/2017	0.07	314.38	7439.12	1335.23	37767.83
7/10/2010	0.17	7/10/2011	0	7/10/2012	0	7/10/2013	0.15	7/10/2016	0.09	7/10/2017	0	144.83	7583.94	360.30	38128.13
7/11/2010	0	7/11/2011	0	7/11/2012	0	7/11/2013	0.02	7/11/2016	0	7/11/2017	0	7.06	7591.01	42.39	38170.51
7/12/2010	0	7/12/2011	0	7/12/2012	0	7/12/2013	0.01	7/12/2016	0	7/12/2017	0.12	45.92	7636.93	254.33	38424.84
7/13/2010	0.08	7/13/2011	0	7/13/2012	0	7/13/2013	0.47	7/13/2016	0	7/13/2017	0	194.28	7831.21	996.12	39420.96
7/14/2010	0.31	7/14/2011	0	7/14/2012	0	7/14/2013	0.12	7/14/2016	0	7/14/2017	0.19		7831.21		39420.96
7/15/2010	0.06	7/15/2011	0	7/15/2012	0	7/15/2013	0	7/15/2016	0	7/15/2017	0		7831.21		39420.96
7/16/2010	0	7/16/2011	0	7/16/2012	0.47	7/16/2013	0	7/16/2016	0	7/16/2017	0	166.02	7997.23	996.12	40417.09
7/17/2010	0	7/17/2011	0	7/17/2012	0	7/17/2013	0	7/17/2016	0.13	7/17/2017	0	45.92	8043.15	275.52	40692.61
7/18/2010	0	7/18/2011	0	7/18/2012	0	7/18/2013	0	7/18/2016	0	7/18/2017	0	0.00	8043.15	0.00	40692.61
7/19/2010	0	7/19/2011	0.07	7/19/2012	0.16	7/19/2013	0	7/19/2016	1	7/19/2017	0	434.48	8477.63	2119.41	42812.01
7/20/2010	0.06	7/20/2011	0	7/20/2012	0.64	7/20/2013	0.05	7/20/2016	0	7/20/2017	0	264.93	8742.55	1356.42	44168.43
7/21/2010	0	7/21/2011	0	7/21/2012	0.38	7/21/2013	0.51	7/21/2016	0	7/21/2017	0.27		8742.55		44168.43
7/22/2010	0.12	7/22/2011	0	7/22/2012	0	7/22/2013	0	7/22/2016	0	7/22/2017	0		8742.55		44168.43
7/23/2010	0	7/23/2011	0	7/23/2012	0	7/23/2013	0.64	7/23/2016	0	7/23/2017	0.57	427.41	9169.97	1356.42	45524.86
7/24/2010	0	7/24/2011	0	7/24/2012	0.07	7/24/2013	0.03	7/24/2016	0	7/24/2017	0	35.32	9205.29	148.36	45673.21
7/25/2010	0	7/25/2011	0	7/25/2012	0	7/25/2013	0	7/25/2016	0	7/25/2017	0	0.00	9205.29	0.00	45673.21
7/26/2010	0.23	7/26/2011	0	7/26/2012	0	7/26/2013	0	7/26/2016	1.08	7/26/2017	0	462.74	9668.03	2288.96	47962.17

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South Plainfield, New Jersey

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7/27/2010	0	7/27/2011	0	7/27/2012	0.59	7/27/2013	0	7/27/2016	0	7/27/2017	0	208.41	9876.44	1250.45	49212.62
7/28/2010	0	7/28/2011	0	7/28/2012	0	7/28/2013	0	7/28/2016	0	7/28/2017	0		9876.44		49212.62
7/29/2010	0.12	7/29/2011	0	7/29/2012	0.3	7/29/2013	0.56	7/29/2016	0.5	7/29/2017	0.02		9876.44		49212.62
7/30/2010	0.11	7/30/2011	0	7/30/2012	0.38	7/30/2013	0	7/30/2016	0.48	7/30/2017	0	342.64	10219.07	1017.32	50229.94
7/31/2010	0	7/31/2011	0	7/31/2012	0	7/31/2013	0	7/31/2016	0.78	7/31/2017	0	275.52	10494.60	1653.14	51883.08
8/1/2010	0.02	8/1/2011	0	8/1/2012	0.02	8/1/2013	0	8/1/2016	1.03	8/1/2017	0	377.96	10872.56	2182.99	54066.06
8/2/2010	0	8/2/2011	0	8/2/2012	0.38	8/2/2013	1.05	8/2/2016	0	8/2/2017	0	505.13	11377.68	2225.38	56291.44
8/3/2010	0	8/3/2011	0	8/3/2012	0	8/3/2013	0	8/3/2016	0	8/3/2017	0.37	130.70	11508.38	784.18	57075.62
8/4/2010	0	8/4/2011	0.48	8/4/2012	0	8/4/2013	0.05	8/4/2016	0	8/4/2017	0.48		11508.38		57075.62
8/5/2010	0	8/5/2011	0	8/5/2012	0.36	8/5/2013	0	8/5/2016	0	8/5/2017	1.34		11508.38		57075.62
8/6/2010	0	8/6/2011	0	8/6/2012	0.54	8/6/2013	0	8/6/2016	0	8/6/2017	0	190.75	11699.12	1144.48	58220.10
8/7/2010	0	8/7/2011	0.21	8/7/2012	0	8/7/2013	0	8/7/2016	0	8/7/2017	0.09	105.97	11805.10	445.08	58665.18
8/8/2010	0	8/8/2011	0	8/8/2012	0	8/8/2013	0.18	8/8/2016	0	8/8/2017	0.84	360.30	12165.39	1780.30	60445.48
8/9/2010	0	8/9/2011	0	8/9/2012	0	8/9/2013	1.2	8/9/2016	0	8/9/2017	0	423.88	12589.28	2543.29	62988.77
8/10/2010	0	8/10/2011	0	8/10/2012	0.04	8/10/2013	0.06	8/10/2016	0	8/10/2017	0	35.32	12624.60	127.16	63115.93
8/11/2010	0	8/11/2011	0	8/11/2012	1	8/11/2013	0	8/11/2016	0.06	8/11/2017	0		12624.60		63115.93
8/12/2010	0	8/12/2011	0	8/12/2012	0.08	8/12/2013	0.21	8/12/2016	0.12	8/12/2017	0.1		12624.60		63115.93
8/13/2010	0.09	8/13/2011	0	8/13/2012	0	8/13/2013	0.25	8/13/2016	0	8/13/2017	0	120.10	12744.70	529.85	63645.78
8/14/2010	0	8/14/2011	0	8/14/2012	0	8/14/2013	0.59	8/14/2016	0	8/14/2017	0	208.41	12953.11	1250.45	64896.23
8/15/2010	0	8/15/2011	0	8/15/2012	0.08	8/15/2013	0	8/15/2016	0	8/15/2017	0	28.26	12981.37	169.55	65065.78
8/16/2010	0.18	8/16/2011	0	8/16/2012	0.9	8/16/2013	0	8/16/2016	0	8/16/2017	0	381.49	13362.86	1907.47	66973.25
8/17/2010	0	8/17/2011	0	8/17/2012	0	8/17/2013	0	8/17/2016	0.39	8/17/2017	0	137.76	13500.62	826.57	67799.82
8/18/2010	0	8/18/2011	0	8/18/2012	0.58	8/18/2013	0	8/18/2016	0.06	8/18/2017	0		13500.62		67799.82
8/19/2010	0	8/19/2011	0	8/19/2012	0.04	8/19/2013	0.02	8/19/2016	0	8/19/2017	0.23		13500.62		67799.82
8/20/2010	0	8/20/2011	0	8/20/2012	0	8/20/2013	0.03	8/20/2016	0	8/20/2017	0	10.60	13511.22	63.58	67863.40
8/21/2010	0	8/21/2011	0	8/21/2012	0	8/21/2013	0	8/21/2016	0	8/21/2017	0	0.00	13511.22	0.00	67863.40
8/22/2010	0.03	8/22/2011	0.51	8/22/2012	0	8/22/2013	0.12	8/22/2016	0.14	8/22/2017	0	282.59	13793.81	1080.90	68944.30
8/23/2010	0	8/23/2011	0	8/23/2012	0	8/23/2013	0.86	8/23/2016	0	8/23/2017	0	303.78	14097.59	1822.69	70766.99
8/24/2010	0	8/24/2011	0	8/24/2012	0	8/24/2013	0	8/24/2016	0	8/24/2017	0	0.00	14097.59	0.00	70766.99
8/25/2010	0	8/25/2011	0	8/25/2012	0	8/25/2013	0	8/25/2016	0	8/25/2017	0		14097.59		70766.99
8/26/2010	0	8/26/2011	0.23	8/26/2012	0	8/26/2013	0	8/26/2016	0	8/26/2017	0		14097.59		70766.99
8/27/2010	0	8/27/2011	0	8/27/2012	0	8/27/2013	0.1	8/27/2016	0	8/27/2017	0	35.32	14132.91	211.94	70978.93
8/28/2010	0	8/28/2011	8.61	8/28/2012	1.06	8/28/2013	0	8/28/2016	0	8/28/2017	0	3415.78	17548.69	18248.09	89227.02
8/29/2010	0	8/29/2011	0.42	8/29/2012	0.03	8/29/2013	0.08	8/29/2016	0	8/29/2017	0	187.21	17735.90	890.15	90117.17
8/30/2010	0	8/30/2011	0	8/30/2012	0	8/30/2013	0.01	8/30/2016	0	8/30/2017	0.3	109.50	17845.40	635.82	90752.99
8/31/2010	0	8/31/2011	0	8/31/2012	0	8/31/2013	0	8/31/2016	0	8/31/2017	0	0.00	17845.40	0.00	90752.99
9/1/2010	0	9/1/2011	0	9/1/2012	0	9/1/2013	0.04	9/1/2016	0	9/1/2017	0		17845.40		90752.99
9/2/2010	0	9/2/2011	0	9/2/2012	0	9/2/2013	0.39	9/2/2016	0	9/2/2017	0		17845.40		90752.99
9/3/2010	0	9/3/2011	0	9/3/2012	0.21	9/3/2013	0.19	9/3/2016	0	9/3/2017	0.83	434.48	18279.88	1759.11	92512.10

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9/4/2010	0	9/4/2011	0	9/4/2012	0.56	9/4/2013	0.02	9/4/2016	0	9/4/2017	0	204.88	18484.76	1186.87	93698.97
9/5/2010	0	9/5/2011	0	9/5/2012	0.19	9/5/2013	0	9/5/2016	0	9/5/2017	0	67.11	18551.87	402.69	94101.66
9/6/2010	0	9/6/2011	0	9/6/2012	0.32	9/6/2013	0	9/6/2016	0	9/6/2017	0.18	176.62	18728.49	678.21	94779.87
9/7/2010	0	9/7/2011	0	9/7/2012	0	9/7/2013	0	9/7/2016	0	9/7/2017	0.37	130.70	18859.19	784.18	95564.05
9/8/2010	0	9/8/2011	1.17	9/8/2012	0	9/8/2013	0	9/8/2016	0	9/8/2017	0		18859.19		95564.05
9/9/2010	0	9/9/2011	0	9/9/2012	0.23	9/9/2013	0	9/9/2016	0	9/9/2017	0		18859.19		95564.05
9/10/2010	0	9/10/2011	0	9/10/2012	0	9/10/2013	0	9/10/2016	0	9/10/2017	0	0.00	18859.19	0.00	95564.05
9/11/2010	0	9/11/2011	0	9/11/2012	0	9/11/2013	0	9/11/2016	0	9/11/2017	0	0.00	18859.19	0.00	95564.05
9/12/2010	0	9/12/2011	0.03	9/12/2012	0	9/12/2013	0	9/12/2016	0	9/12/2017	0	10.60	18869.78	63.58	95627.63
9/13/2010	0.19	9/13/2011	0	9/13/2012	0	9/13/2013	0.37	9/13/2016	0	9/13/2017	0	197.81	19067.60	784.18	96411.81
9/14/2010	0.21	9/14/2011	0	9/14/2012	0	9/14/2013	0	9/14/2016	0	9/14/2017	0.23	155.42	19223.02	487.46	96899.27
9/15/2010	0	9/15/2011	0	9/15/2012	0	9/15/2013	0	9/15/2016	0	9/15/2017	0		19223.02		96899.27
9/16/2010	0	9/16/2011	0.09	9/16/2012	0	9/16/2013	0	9/16/2016	0	9/16/2017	0		19223.02		96899.27
9/17/2010	0.95	9/17/2011	0	9/17/2012	0	9/17/2013	0.07	9/17/2016	0	9/17/2017	0	360.30	19583.32	2013.44	98912.71
9/18/2010	0	9/18/2011	0	9/18/2012	0.12	9/18/2013	0	9/18/2016	0	9/18/2017	0	42.39	19625.71	254.33	99167.04
9/19/2010	0	9/19/2011	0	9/19/2012	1.22	9/19/2013	0	9/19/2016	1.54	9/19/2017	0	974.93	20600.63	3263.89	102430.92
9/20/2010	0	9/20/2011	0	9/20/2012	0	9/20/2013	0	9/20/2016	0	9/20/2017	0.03	10.60	20611.23	63.58	102494.51
9/21/2010	0	9/21/2011	0.08	9/21/2012	0.03	9/21/2013	0	9/21/2016	0	9/21/2017	0	38.86	20650.09	169.55	102664.06
9/22/2010	0	9/22/2011	0.07	9/22/2012	0	9/22/2013	0.76	9/22/2016	0	9/22/2017	0		20650.09		102664.06
9/23/2010	0.58	9/23/2011	0	9/23/2012	0.49	9/23/2013	0	9/23/2016	0	9/23/2017	0		20650.09		102664.06
9/24/2010	0	9/24/2011	1.1	9/24/2012	0	9/24/2013	0	9/24/2016	0.05	9/24/2017	0	406.22	21056.31	2331.35	104995.41
9/25/2010	0	9/25/2011	0	9/25/2012	0	9/25/2013	0	9/25/2016	0	9/25/2017	0	0.00	21056.31	0.00	104995.41
9/26/2010	0	9/26/2011	0	9/26/2012	0	9/26/2013	0	9/26/2016	0	9/26/2017	0	0.00	21056.31	0.00	104995.41
9/27/2010	0.04	9/27/2011	0	9/27/2012	0.59	9/27/2013	0	9/27/2016	0.12	9/27/2017	0	264.93	21321.23	1250.45	106245.86
9/28/2010	0.63	9/28/2011	0.1	9/28/2012	0.4	9/28/2013	0	9/28/2016	0	9/28/2017	0	399.15	21720.39	1335.23	107581.08
9/29/2010	0.06	9/29/2011	0	9/29/2012	0	9/29/2013	0	9/29/2016	0	9/29/2017	0		21720.39		107581.08
9/30/2010	1.85	9/30/2011	0	9/30/2012	0	9/30/2013	0	9/30/2016	0.24	9/30/2017	0		21720.39		107581.08

Note:
1. Weekends were excluded when calclulating precipitation volumes.
2. The cumulative average does not account for any other off-days. Additional off days would increase the minimum required production rate.
3. Precipitation volume within an open excavation was estimated based on recorded precipitation data from June 1st to September 30th in 2010, 2011, 2012, 2013, 2016 and 2017. All precipitation data was obtained from Data Source(s): NOAA (National Oceanic and Atomospheric Administration), Climate Data Online. Daily Summaries: Station GHCND:US1NJMD0071,SOUTH PLAINFIELD 1.8 NE NJ US; Station GHCND:US1NJMD0023,SOUTH PLAINFIELD 0.8 ENE NJ US; Station GHCND:US1NJMD0033,SOUTH PLAINFIELD 0.9 NW NJ US; Station GHCND:US1NJMD0044, SOUTH PLAINFIELD 0.7 NNW NJ US; Station GHCND:US1NJMD0066, SOUTH PLAINFIELD 0.7 NNE NJ US.

Attachment 3
CDE Site Precipitation Summary
United States Army Corps of Engineers, Kansas City District
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4
South Plainfield, New Jersey

Summary:

Total Area (sf)	Average Cell Area (sf)	Production Rate (cells/day)	Area of Disturbance per day (sf/day)	Precipitation	
				Average Cumulative Volume (gallons)	Maximum Cumulative Volume (gallons)
289,010	2,408	1.41	3,400	21,720	107,581

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ATTACHMENT 3

Staging Area Precipitation

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Staging Area Precipitation:

Year	2010	2011	2012	2013	2016	2017	Average
Seasonal Precipitation (inches)	8.2	16.39	16.88	19.39	11.1	13.62	14.26

Staging Area (sf)	Staging Time (days)	Precipitation Rate		Precipitation in Staging Area	
		in/day	ft/day	cf	gallons
43,560	122	0.12	0.01	53,143	397,500

Note:

1. Precipitation rate calculated based on average annual precipitation and a 122 day construction period.
2. Precipitation in the staging area was estimated based on recorded precipitation data from June 1st to September 30th in 2010, 2011, 2012, 2013, 2016 and 2017. All precipitation data was obtained from Data Source(s): NOAA (National Oceanic and Atomospheric Administration), Climate Data Online. Daily Summaries: Station GHCND:US1NJMD0071,SOUTH PLAINFIELD 1.8 NE NJ US; Station GHCND:US1NJMD0023,SOUTH PLAINFIELD 0.8 ENE NJ US; Station GHCND:US1NJMD0033,SOUTH PLAINFIELD 0.9 NW NJ US; Station GHCND:US1NJMD0044, SOUTH PLAINFIELD 0.7 NNW NJ US; Station GHCND:US1NJMD0066, SOUTH PLAINFIELD 0.7 NNE NJ US.

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ATTACHMENT 4

Groundwater Infiltration Calculations

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Attachment 4
Groundwater Infiltration Calculations
United States Army Corps of Engineers, Kansas City District
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4
South Plainfield, New Jersey

ARCADIS Design & Consultancy for natural and built assets

Infiltration calculations:

Darcy's Law: Q=k*i*A

Q= Flowrate in CF/s

k= hydraulic conductivity

i= hydraulic gradient

A= Cross-sectional area

note: typical values were obtained from Geotechnical Engineering Principles and Practices, Second Edition, Donald P. Coduto, 2011. Page 272

note: measured distance between water elevations of the given cells; based on elevations shown in Figure 1

note: based on removal depths of a given cell and the cross-sectional excavation area of that cell, normal to the hydraulic gradient.

Typical Hydraulic Conductivity, K values by soil type (ft/s)

	Min	Max
Silty Sand	3.00E-05	3.00E-04
Clayey Sand	3.00E-06	3.00E-04
Clayey Gravel	1.64E-08	1.64E-05
Average	1.10E-05	2.05E-04

Hydraulic Gradient, i:

i=h/L

Where:

h= Change in head over a given distance, L

L= Distance between two water elevations

Attachment 4
Groundwater Infiltration Calculations
United States Army Corps of Engineers, Kansas City District
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4
South Plainfield, New Jersey

Cell Number		Length (ft)	H (feet)	A (ft2)	Hydraulic Gradient	Q max (gal/day)	Q min (gal/day)
Water From	Entering to						
417	W4	31.64	0.26	147.93	8.22E-03	161.4	8.65
623	W3	45.35	0.28	68.47	6.17E-03	56.1	3.01
213	W3	48.05	0.22	227.40	4.58E-03	138.3	7.41
232	W2	93.51	1	233.93	1.07E-02	332.2	17.79
227	W2	42.48	0.17	311.39	4.00E-03	165.5	8.86
222	W2	107.66	0	106.64	0.00E+00	0.0	0.00
211	W1	43.31	0.05	231.41	1.15E-03	35.5	1.90
236	235-T	61.77	0.28	205.94	4.53E-03	124.0	6.64
235-T	234-T	67	0.54	48.73	8.06E-03	52.2	2.79
234	234-T	30.04	0.01	195.71	3.33E-04	8.7	0.46
X2	233-T	48.07	0.11	175.30	2.29E-03	53.3	2.85
234	233-T	35.46	0.19	109.11	5.36E-03	77.6	4.16
234-T	233-T	47.82	0.18	87.63	3.76E-03	43.8	2.35
231	231-T	29.78	0.2	347.94	6.72E-03	310.3	16.62
235-T	231-T	39.26	0.46	177.34	1.17E-02	275.9	14.78
234-T	230-T	44	0.16	243.41	3.64E-03	117.5	6.30
231-T	230-T	45.36	0.24	248.14	5.29E-03	174.4	9.34
116-T	229-T	50.73	0.05	55.30	9.86E-04	7.2	0.39
233-T	229-T	68.36	0.13	67.87	1.90E-03	17.1	0.92
230-T	229-T	44	0.15	177.54	3.41E-03	80.4	4.31
227-T	226-T	46.06	0.08	149.57	1.74E-03	34.5	1.85
231-T	227-T	46.7	0.37	152.98	7.92E-03	161.0	8.62
230-T	226-T	50.1	0.21	311.60	4.19E-03	173.4	9.29
226-T	225	56.21	0.08	93.24	1.42E-03	17.6	0.94
110-T	204	28.43	0.03	165.30	1.06E-03	23.2	1.24
209	204	67.74	0.26	86.83	3.84E-03	44.3	2.37
205	204	52.22	0.09	224.26	1.72E-03	51.3	2.75
233-T	116-T	29.68	0.08	159.85	2.70E-03	57.2	3.06
229-T	115-T	87.3	0.07	102.92	8.02E-04	11.0	0.59
116-T	115-T	68.62	0.12	49.19	1.75E-03	11.4	0.61

Attachment 4
Groundwater Infiltration Calculations
United States Army Corps of Engineers, Kansas City District
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4
South Plainfield, New Jersey

Cell Number		Length (ft)	H (feet)	A (ft2)	Hydraulic Gradient	Q max (gal/day)	Q min (gal/day)
Water From	Entering to						
116	115-T	44.67	0.07	53.22	1.57E-03	11.1	0.59
115-T	114-T	46.91	0.07	134.40	1.49E-03	26.6	1.43
167	110-T	43.73	0.21	273.36	4.80E-03	174.3	9.34
209	110-T	58.98	0.23	110.83	3.90E-03	57.4	3.07
208	623	43.51	0.04	167.20	9.19E-04	20.4	1.09
X5	525	39.93	0.28	283.00	7.01E-03	263.5	14.12
237	420	38.28	0.3	391.04	7.84E-03	407.0	21.80
420	418	123.19	0.97	252.39	7.87E-03	263.9	14.14
525	417	54.83	0.15	285.58	2.74E-03	103.8	5.56
418	417	51.44	0.53	259.63	1.03E-02	355.2	19.03
W3	415	54.82	0.26	170.25	4.74E-03	107.2	5.74
234	287	50.76	0.15	39.83	2.96E-03	15.6	0.84
236	237	33.72	0.09	217.97	2.67E-03	77.3	4.14
236	232	58.2	0.41	125.33	7.04E-03	117.2	6.28
232	231	53.14	0.13	347.88	2.45E-03	113.0	6.05
235-T	231	49.42	0.26	162.58	5.26E-03	113.6	6.08
227-T	227	28.24	0.13	199.54	4.60E-03	122.0	6.53
231	227	63.03	0.7	148.45	1.11E-02	218.9	11.73
227	226	64.3	0.06	157.56	9.33E-04	19.5	1.05
225	226	56.21	0.03	152.65	5.34E-04	10.8	0.58
226-T	226	30.19	0.11	302.83	3.64E-03	146.5	7.85
229-T	225	59.19	0.14	119.52	2.37E-03	37.5	2.01
115-T	225	49.04	0.07	61.27	1.43E-03	11.6	0.62
223	224	56.85	0.37	114.38	6.51E-03	98.9	5.29
W2	224	60.94	0.6	194.40	9.85E-03	254.2	13.61
222	223	62.95	0.23	96.41	3.65E-03	46.8	2.51
W2	223	55.5	0.23	196.54	4.14E-03	108.2	5.79
221	222	58.88	0.08	204.62	1.36E-03	36.9	1.98
226	222	46.7	0.11	204.62	2.36E-03	64.0	3.43
222	217	57.53	0.05	155.64	8.69E-04	18.0	0.96
220	221	49.7	0.07	143.77	1.41E-03	26.9	1.44
221	216	58.91	0.01	71.89	1.70E-04	1.6	0.09

Attachment 4
Groundwater Infiltration Calculations
United States Army Corps of Engineers, Kansas City District
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4
South Plainfield, New Jersey

Cell Number		Length (ft)	H (feet)	A (ft2)	Hydraulic Gradient	Q max (gal/day)	Q min (gal/day)
Water From	Entering to						
221	W1	111	0.06	112.88	5.41E-04	8.1	0.43
113	220	35.53	0.05	162.33	1.41E-03	30.3	1.62
215	220	51.43	0.02	148.70	3.89E-04	7.7	0.41
218	219	55.5	0.47	206.92	8.47E-03	232.7	12.46
224	219	41.29	0.15	172.76	3.63E-03	83.3	4.46
W3	219	59.56	0.39	122.67	6.55E-03	106.7	5.71
217	218	54.82	0.23	167.64	4.20E-03	93.4	5.00
213	218	62.27	0.14	164.91	2.25E-03	49.2	2.64
223	218	102.88	0.05	168.96	4.86E-04	10.9	0.58
W1	217	69.52	0.07	176.28	1.01E-03	23.6	1.26
216	W1	67.68	0.05	231.41	7.39E-04	22.7	1.22
215	216	43.31	0.1	133.98	2.31E-03	41.1	2.20
112	215	58.41	0.15	76.84	2.57E-03	26.2	1.40
212	213	46.26	0.09	167.12	1.95E-03	43.2	2.31
208	213	57.67	0.1	170.41	1.73E-03	39.2	2.10
W1	212	49.44	0.07	196.75	1.42E-03	37.0	1.98
207	212	65.77	0.01	94.60	1.52E-04	1.9	0.10
209	210	50.77	0.04	146.81	7.88E-04	15.4	0.82
215	210	58.22	0.11	148.37	1.89E-03	37.2	1.99
211	210	61.06	0.01	149.72	1.64E-04	3.3	0.17
112	209	64.97	0.22	145.38	3.39E-03	65.4	3.50
111	209	36.1	0.08	107.45	2.22E-03	31.6	1.69
215	209	69.87	0.07	146.63	1.00E-03	19.5	1.04
W1	207	81.12	0.06	170.76	7.40E-04	16.8	0.90
208	207	51.79	0	246.20	0.00E+00	0.0	0.00
W1	206	76.07	0.05	125.80	6.57E-04	11.0	0.59
211	206	64.29	0.1	88.92	1.56E-03	18.4	0.98
206	207	121.14	0.01	121.89	8.25E-05	1.3	0.07
206	205	53.67	0.04	161.53	7.45E-04	16.0	0.86
210	205	62.94	0.13	161.72	2.07E-03	44.4	2.38
207	203	37.9	0.02	227.42	5.28E-04	15.9	0.85
208	203	43.8	0.02	48.12	4.57E-04	2.9	0.16

Attachment 4
Groundwater Infiltration Calculations
United States Army Corps of Engineers, Kansas City District
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4
South Plainfield, New Jersey

Cell Number		Length (ft)	H (feet)	A (ft2)	Hydraulic Gradient	Q max (gal/day)	Q min (gal/day)
Water From	Entering to						
111	167	33	0.1	219.80	3.03E-03	88.5	4.74
116-T	116	26.8	0.05	97.61	1.87E-03	24.2	1.30
113	114	43.59	0.06	122.25	1.38E-03	22.3	1.20
220	114	47.4	0.01	99.26	2.11E-04	2.8	0.15
112	113	61.44	0.12	96.62	1.95E-03	25.1	1.34
112	111	45.1	0.14	151.28	3.10E-03	62.4	3.34
S5	401	53.43	0.03	99.52	5.61E-04	7.4	0.40
S5	402	63.52	0.01	176.65	1.57E-04	3.7	0.20
402	401	49.51	0.02	54.12	4.04E-04	2.9	0.16
502	501	57.39	0.1	170.01	1.74E-03	39.3	2.11
402	501	59.37	0.06	106.26	1.01E-03	14.3	0.76
503	502	57.91	0.15	195.81	2.59E-03	67.4	3.61
511	503	56.91	0.03	331.86	5.27E-04	23.2	1.24
S4	404	63.82	0.08	193.45	1.25E-03	32.2	1.72
S3	404	80.17	0.12	108.23	1.50E-03	21.5	1.15
501	404	56.89	0.1	206.39	1.76E-03	48.2	2.58
510	404	45.04	0.17	298.75	3.77E-03	149.7	8.02
406	404	45.4	0.13	109.09	2.86E-03	41.5	2.22
502	510	60.86	0.03	496.12	4.93E-04	32.5	1.74
511	510	58.9	0.21	496.12	3.57E-03	234.9	12.58
407	510	55.9	0.1	496.12	1.79E-03	117.9	6.31
408	511	51.95	0.07	365.87	1.35E-03	65.5	3.51
512	511	61.85	0.16	369.82	2.59E-03	127.0	6.80
409	512	48.52	0.06	148.09	1.24E-03	24.3	1.30
410	409	63.81	0.11	177.54	1.72E-03	40.6	2.18
409	408	61.84	0.15	138.94	2.43E-03	44.8	2.40
408	407	60.85	0.18	217.00	2.96E-03	85.2	4.57
407	406	38.6	0.14	348.94	3.63E-03	168.1	9.00
204	S2	73.09	0.3	84.53	4.10E-03	46.1	2.47
205	S1	71.83	0.11	147.49	1.53E-03	29.99	1.61
206	S1	62.48	0.15	150.51	2.40E-03	47.98	2.57
204	204-T	34.2	0.17	83.59	4.97E-03	55.2	2.96

Attachment 4
Groundwater Infiltration Calculations
United States Army Corps of Engineers, Kansas City District
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4
South Plainfield, New Jersey

Cell Number		Length (ft)	H (feet)	A (ft2)	Hydraulic Gradient	Q max (gal/day)	Q min (gal/day)
Water From	Entering to						
203	S1	84.69	0.12	68.42	1.42E-03	12.87	0.69
204	204-T	37.34	0.17	83.59	4.55E-03	50.54	2.71
110-T	109-T	53.54	0.26	118.69	4.86E-03	76.54	4.10
109-T	S2-T	59.29	0.13	118.19	2.19E-03	34.41	1.84
204-T	S2-T	40.8	0.19	55.77	4.66E-03	34.49	1.85
S1	S2	112.72	0.28	113.37	2.48E-03	37.40	2.00
S2	S2-T	49.34	0.06	166.80	1.22E-03	26.94	1.44
108-T	S2-T	96.98	0.06	26.28	6.19E-04	2.16	0.12
109-T	108-T	57.58	0.07	168.19	1.22E-03	27.15	1.45
108-T	S3-T	49.3	0.26	303.39	5.27E-03	212.48	11.38
S2-T	S3-T	63.07	0.2	223.61	3.17E-03	94.16	5.04
107	S3-T	65.71	0.24	164.84	3.65E-03	79.95	4.28
S4-T	S3-T	56.15	0.02	689.61	3.56E-04	32.62	1.75
S3	S3-T	37.26	0.01	525.05	2.68E-04	18.71	1.00
S2	S3	64.68	0.25	361.12	3.87E-03	185.36	9.93
406	S3	27.79	0.01	300.86	3.60E-04	14.38	0.77
107	107-T	23.95	0.08	188.07	3.34E-03	83.42	4.47
107-T	S4-T	66.27	0.14	69.19	2.11E-03	19.41	1.04
107	S4-T	81.51	0.22	22.63	2.70E-03	8.11	0.43
S5-T	S4-T	55.49	0.07	233.22	1.26E-03	39.07	2.09
S5	S4	48.19	0.09	76.03	1.87E-03	18.86	1.01
S4-T	S4	53.35	0.05	125.49	9.37E-04	15.62	0.84
501	S4	44.94	0.02	48.63	4.45E-04	2.87	0.15
402	S4	43.86	0.08	49.79	1.82E-03	12.06	0.65
312-T	S5-T	44.26	0.03	140.57	6.78E-04	12.65	0.68
S5-T	S5	47.59	0.03	116.17	6.30E-04	9.72	0.52
107	107-T	33.24	0.08	253.90	2.41E-03	81.15	4.35
107-T	312-T	23	0.04	238.59	1.74E-03	55.10	2.95
107	106	43.83	0.14	130.68	3.19E-03	55.43	2.97
106	106-T	20.45	0.04	546.24	1.96E-03	141.89	7.60
107-T	106-T	44.38	0.1	202.72	2.25E-03	60.66	3.25
312-T	311-T	47.49	0.07	139.02	1.47E-03	27.21	1.46

Attachment 4
Groundwater Infiltration Calculations
United States Army Corps of Engineers, Kansas City District
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4
South Plainfield, New Jersey

Cell Number		Length (ft)	H (feet)	A (ft2)	Hydraulic Gradient	Q max (gal/day)	Q min (gal/day)
Water From	Entering to						
106-T	311-T	37.96	0.01	335.22	2.63E-04	11.73	0.63
S6-T	311-T	47.76	0.03	393.53	6.28E-04	32.83	1.76
S6-T	307-T	30.06	0.03	106.04	9.98E-04	14.05	0.75
309	306-T	68.81	0.02	50.71	2.91E-04	1.96	0.10
307-T	306-T	46.75	0.05	48.09	1.07E-03	6.83	0.37
309	310	61.32	0.05	224.53	8.15E-04	24.31	1.30
311-T	310	57.86	0.08	207.59	1.38E-03	38.12	2.04
314	105	57.91	0.16	242.19	2.76E-03	88.86	4.76
106-T	105	69.59	0.17	149.23	2.44E-03	48.41	2.59
310	105	49.17	0.08	410.11	1.63E-03	88.61	4.75
106	X1	46.13	0.21	279.14	4.55E-03	168.75	9.04
310	X1	61.81	0.08	387.94	1.29E-03	66.68	3.57
313	314	67.76	0.2	260.04	2.95E-03	101.93	5.46
314	309	50.22	0.03	170.06	5.97E-04	13.49	0.72
313	308	49.88	0.24	85.70	4.81E-03	54.76	2.93
309	308	44.98	0.01	142.81	2.22E-04	4.22	0.23
156-T	308	39.13	0.02	117.12	5.11E-04	7.95	0.43
313	156-T	44.39	0.22	317.24	4.96E-03	208.79	11.18
313	104-T	82.03	0.4	143.53	4.88E-03	92.94	4.98
156-T	104-T	54.92	0.18	439.55	3.28E-03	191.31	10.25
104-T	103-T	58.82	0.73	294.60	1.24E-02	485.53	26.01
S10-T	103-T	20.05	0.19	419.36	9.48E-03	527.73	28.27
S11	103-T	67.1	0.36	189.79	5.37E-03	135.22	7.24
S5	S6	69.3	0.06	24.28	8.66E-04	2.79	0.15
401	S6	50.52	0.03	53.81	5.94E-04	4.24	0.23
S6-T	S6	40.46	0.08	116.21	1.98E-03	30.51	1.63
S6	S7	68.13	0.06	44.29	8.81E-04	5.18	0.28
S7-T	S7	33.78	0.02	96.51	5.92E-04	7.59	0.41
306-T	S7-T	20.92	0.04	160.67	1.91E-03	40.80	2.19
S6-T	S7-T	87.11	0.12	50.71	1.38E-03	9.28	0.50
S7	S8	79.81	0.08	82.45	1.00E-03	10.98	0.59
S8-T	S8	38.93	0.07	156.40	1.80E-03	37.35	2.00

Attachment 4
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United States Army Corps of Engineers, Kansas City District
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4
South Plainfield, New Jersey

Cell Number		Length (ft)	H (feet)	A (ft2)	Hydraulic Gradient	Q max (gal/day)	Q min (gal/day)
Water From	Entering to						
309	S8-T	47.45	0.09	54.09	1.90E-03	13.62	0.73
308	S8-T	49.21	0.08	36.55	1.63E-03	7.89	0.42
S7-T	S8-T	63.3	0.03	75.70	4.74E-04	4.76	0.26
S8	S9	57.44	0.16	222.71	2.79E-03	82.38	4.41
S9-T	S9	55.47	0.16	189.38	2.88E-03	72.54	3.89
156-T	S9-T	26.8	0.17	189.17	6.34E-03	159.35	8.54
S8-T	S9-T	61.89	0.07	78.79	1.13E-03	11.83	0.63
S9	S10	59.08	0.34	170.88	5.75E-03	130.59	6.99
104-T	S10-T	76.82	0.54	253.81	7.03E-03	236.93	12.69
S10	S10-T	38.93	0.05	380.72	1.28E-03	64.93	3.48
S9-T	S10-T	62.49	0.55	61.74	8.80E-03	72.16	3.87
S11	S10	80	0.12	94.36	1.50E-03	18.80	1.01
S11	S12	73.59	0.1	281.84	1.36E-03	50.86	2.72
S11	S10	80	0.12	94.36	1.50E-03	18.80	1.01
S11	S12	73.59	0.1	281.84	1.36E-03	50.86	2.72

Attachment 4
Groundwater Infiltration Calculations
United States Army Corps of Engineers, Kansas City District
Cornell-Dubilier Electronics Superfund Site, Operable Unit 4
South Plainfield, New Jersey

Summary:

Flow Rate (gallons/day)				Excavation Operations (days)	Volume of Water (gallons)			
Minimum	Maximum	Minimum Average	Maximum Average		Minimum	Maximum	Minimum Average	Maximum Average
0	528	4	70	85	0	44,857	319	5,955

Note:
1. Number of days for excavation operations was estimated based on a production rate of 1.41 cells per day.