

**REMEDIAL ACTION WORK PLAN**

**PHASE I SOIL CAPPING: PARCEL C-1  
FORMER GORHAM MANUFACTURING FACILITY  
333 ADELAIDE AVENUE  
PROVIDENCE, RHODE ISLAND**

**June 13, 2012**



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*Prepared for:*

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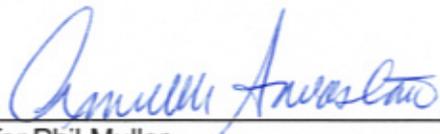
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**June 13, 2012**

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## ACRONYMS

ABB-ES	ABB Environmental Services
AMEC	AMEC Environment & Infrastructure, Inc.
COPC	Constituents of Potential Concern
1,2-DCE	1,2-dichloroethene
ELUR	Environmental Land Usage Restriction
HASP	Health and Safety Plan
HLA	Harding Lawson Associates
LOW	Limit of Work
MACTEC	MACTEC Engineering and Consulting, Inc.
µg/kg	Micrograms per Kilogram
mg/m <sup>3</sup>	Milligrams per Cubic Meter
NOI	Notice of Intent
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PAH	Polynuclear Aromatic Hydrocarbons
PCE	Tetrachloroethene
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PNOC	Particulates Not Otherwise Characterized
PRA	Providence Redevelopment Agency
RAWP	Remedial Action Work Plan
RDEC	Residential Direct Exposure Criteria
RIDEM	Rhode Island Department of Environmental Management
SI	Site Inspection
SMP	Soil Management Plan
SPLP	Synthetic Precipitation Leaching Procedure
SSIR	Supplemental Site Investigation Report
SVOCs	Semi-volatile Organic Compounds

TEXTRON, INC.  
FORMER GORHAM MANUFACTURING FACILITY, PROVIDENCE, RI  
REMEDIAL ACTION WORK PLAN – PHASE I SOIL CAPPING: PARCEL C-1

1,1,1-TCA	1,1,1-trichloroethane
TCE	Trichloroethene
TEQ	Toxic Equivalence
TEXTRON	Textron, Inc.
TPH	Total Petroleum Hydrocarbons
TSDf	Treatment Storage and/or Disposal Facility
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

## 1.0 INTRODUCTION

The Former Gorham Manufacturing Facility is located at 333 Adelaide Avenue, Providence, Rhode Island (Figures 1 and 2). The focus of this Remedial Action Work Plan (RAWP) is Phase I of Parcel C-1 (the Site) (Figure 3). This RAWP provides details for the preferred remedial alternative as specified in the State of Rhode Island Department of Environmental Management (RIDEM) Program Letter issued May 18, 2011 (RIDEM, 2011a), and Remedial Decision letter dated December 12, 2011 (RIDEM, 2011b) for Case No. 2005-059 for Phase I of Parcel C-1 (formerly known as Parcel D). This RAWP incorporates the approved response to comments generated from the public meeting held on July 12, 2011 and response to comments from RIDEM's review of the Draft RAWP, dated February 27, 2012. We have also incorporated the comments from the construction contractors bid walk held June 5, 2012.

Supplemental site investigation activities were conducted between December 2005 and February 2007 to support completion of a human health and ecological risk assessment for Parcel C-1, including Mashapaug Cove (MACTEC Engineering and Consulting, Inc. (MACTEC), 2006 and 2007). Based on the results of these sampling events, soils exhibiting contaminant concentrations exceeding RIDEM Residential Direct Exposure Criteria (RDEC) for metals, polynuclear aromatic hydrocarbons (PAHs), and dioxin require capping as detailed in this RAWP. This RAWP has been prepared pursuant to Section 9.0 (Remedial Action Work Plans) of the RIDEM *Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases*, as amended November 9, 2011 (hereafter referred to as the Remediation Regulations) on behalf of Textron, Inc. (Textron) by AMEC Environment & Infrastructure, Inc. (AMEC) (formerly known as MACTEC).

A phased approach to capping Parcel C-1 was developed such that the area along Mashapaug Pond and Cove west and north of the Alvarez High School (Figure 2) would be addressed first, followed by remaining areas of Parcel C-1, including Mashapaug Cove (Phase II) and the northern portion of Parcel C-1 (Phase III). This RAWP details the work to be performed for the Phase I Cap Construction. Phase II Mashapaug Cove sediment remediation and Phase III Soil Capping will be detailed under separate RAWPs. The Phase II response actions will include the cap and restoration of the delineated wetlands along the downgradient edge of the Phase I Cap to provide a smooth transition from the wetland buffer zone into the water and extension of the Phase I Cap at the former slag pile to the Mashapaug Inner Cove waterline.

### 1.1 Property and Site History

The Former Gorham Manufacturing Facility is a 37-acre parcel of land where Gorham Silver engaged in the manufacture of silverware, both sterling and plated, and bronze castings from approximately 1890 to 1985 (Figure 1). Operations included casting, rolling, polishing, lacquering, forging, plating, annealing, soldering, degreasing, machining, and melting. Vapor

degreasers reportedly used trichloroethene (TCE), tetrachloroethene (PCE), and 1,1,1-trichloroethane (1,1,1-TCA). More recent Site conditions are shown in the aerial photograph in Figure 2. In this figure, the Site is located immediately north of Adelaide Avenue and west of the Amtrak railroad tracks. The former manufacturing facility has been razed. A retail development has been completed on the southeastern portion (Parcel A). A public high school (Alvarez High School) has been constructed on a second parcel (Parcel B). A grassed lawn area/open space and parking lot is proposed for Parcel C by the City of Providence.

Parcel C-1 extends from the intersection of Adelaide Avenue and Crescent Street north and east along Mashapaug Pond/Inner Cove to the northeast corner of the property behind the Parcel A detention basin and Mashapaug Pond (Figure 2).

## 1.2 Physical Setting

The 333 Adelaide Avenue property is bordered to the east by Amtrak railroad tracks (Figure 2). Adelaide Avenue and a residential neighborhood bound the 333 Adelaide Avenue property to the south. To the north and west, the Site is bounded by Mashapaug Pond. Parcel C-1 constitutes the northern portions of the 333 Adelaide Avenue property. On the opposite (northern) shore of Mashapaug Pond is an industrially-zoned area.

Parcel C-1 has been divided into three areas moving from west to east for the purposes of physical description. Phase I capping will be conducted within the western and central areas. Phase III capping will address contamination in the third (eastern) area of Parcel C-1. Phase II remediation of Parcel C-1 will address Mashapaug Cove and shoreline/wetlands along Mashapaug Inner Cove.

The first of these areas is the portion of the parcel extending from the southwestern property boundary (Adelaide Avenue/Crescent Street) to the tip of the western peninsula that bends into Mashapaug Pond. This area is heavily wooded with moderate to steep slopes that descend to the Pond. Limited areas along the western shoreline contain industrial fill material (Figure 3). There is no historic information or current visual evidence that would suggest that the remaining portion of the parcel was subject to other industrial uses. There are structures present which based on historic maps, were used for water extraction purposes associated with the former facility's fire suppression system and/or process water.

The second (central) area is the portion that borders the southern shore of Mashapaug Cove. This area includes a steep wooded embankment that leads down to wooded lowland that is adjacent to the cove. A slag pile previously located in the central portion of this area was removed from the property by Textron in July 2006 (Figure 3). Post-excavation confirmatory soil sampling was conducted, indicating isolated exceedances of Remediation Regulation Direct Exposure Criteria. MACTEC submitted a September 2006 *Slag Removal Action Summary*

*Report to the Consent Order parties summarizing analytical results and the excavation activities completed to date (MACTEC, 2006).*

The embankments along the southern end of Mashapaug Cove are underlain by heterogeneous fill, consisting of granular reworked soils with varying amounts of casting sands and construction, demolition, and miscellaneous debris such as fire brick, old wood beams, and metal debris. The fill varies in thickness from one-foot at the northern edge of the former West Parking area (former facility area) to approximately 20-feet along the embankment north of the high school parking lot (Figures 3 and 4). Several historic groundwater well structures that were formerly used for industrial and/or fire suppression purposes are present near the southwestern shore of the cove.

The third portion of the parcel lies to the northeast. It borders the cove and pond and includes the eastern shore of Mashapaug Cove, a steep hill to the east, and a flat upland area that formerly housed an employee recreational building (known as the 'Casino') and associated parking lots. In addition, in the northeast corner of the Site is a plot of land that is in active use by the Amtrak railroad. Also a garage or carriage house was formerly located in the upland area in the northeast corner of the parcel. This structure burned down approximately two years ago. There is an approximately 30-foot difference in elevation between the former manufacturing facility upland parcel and the shoreline of Mashapaug Cove.

A large portion of Parcel C-1 is currently wooded and heavily vegetated. The Western Peninsula has variable elevation and is a wooded environment. The peninsula is accessible via one or more paths. The tip of the peninsula is relatively open compared to the wooded areas adjacent to it. The Cove shore area is a small, relatively flat area at the bottom of the embankment and is vegetated with brush and saplings. There is a very steep embankment between the developed portion of the property to the south of the Parcel C-1 and the shore of Mashapaug Cove. The Eastern Peninsula has trees and vegetation, but is generally more open and accessible than the areas immediately to the south of Mashapaug Cove. The uplands portion of the Site is currently enclosed by a chain-link fence.

### **1.3 Regulatory Background and Previous Investigations**

Environmental investigations have been carried out at the 333 Adelaide Avenue property beginning in 1985. RIDEM completed a United States Environmental Protection Agency (USEPA) Potential Hazardous Waste Site Identification Form in 1987 in response to a complaint by the Providence Police Department. This occurred after the facility ceased operations in 1986. RIDEM completed a Preliminary Assessment (PA) of the 333 Adelaide Avenue property in 1989 which designated the property as a Medium Priority for a Site Inspection (SI). A SI Report was prepared by Camp Dresser & McKee in 1993 under contract to RIDEM. The SI recommended further investigation of the property. ABB Environmental Services (ABB-ES),

subsequently, Harding Lawson Associates (HLA and Harding ESE), MACTEC (now AMEC) completed several environmental investigations on behalf of Textron since 1993.

In 1995, a Remedial Investigation Report (ABB-ES, 1995a) and a Supplemental Remedial Investigation Report (ABB-ES, 1995b) were prepared to assess site conditions, including portions of Parcel D (now known as Parcel C-1). The results of the earlier investigations (circa 1986 to 1995) were summarized in the Remedial Investigation Report.

A Supplemental Investigation Report (HLA, 1998) was prepared in 1998 for the Site. In 1999 a Site Investigation Summary Report and Risk Assessment (HLA, 1999) was prepared and submitted to RIDEM that addressed the entire 333 Adelaide Avenue property. This report was formally approved by RIDEM in a June 15, 2001 RIDEM Remedial Decision Letter. In April 2001, Harding ESE (now AMEC), prepared and submitted to RIDEM on Textron's behalf the *Remedial Action Work Plan, Former Gorham Manufacturing Facility, Providence, Rhode Island*.

In November 2002, MACTEC (now AMEC) submitted a Method 3 Risk Assessment Work Plan (MACTEC, 2002) to RIDEM to assess the proposed redevelopment of the undeveloped portion of the 333 Adelaide Avenue property (Parcel C-1, formerly known as Parcel D) as a park with walking trails. Following review comments from RIDEM in September 2003, MACTEC submitted the *Method 3 Human Health Risk Assessment – Park Parcel* (MACTEC, 2004) to RIDEM in August 2004. No comments were received on this submittal.

Soil conditions at selected locations within the Site, material from the slag pile, and sediment conditions at selected locations in Mashapaug Cove were investigated in December 2005 on RIDEM's behalf and are documented in a Site Investigation Report submitted by Fuss & O'Neill, Inc. to RIDEM in April 2006. Surface soil sampling was also conducted by MACTEC in 1994, 1998, 2001, 2002, 2006 and 2007, including both surface soils and surface sediment found in erosion channels along the bank that leads into the Cove. The 1998 surface soil analytical results for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), and metals are presented in the *Supplemental Site Investigation Report, Proposed Park Subdivision, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, Rhode Island* (HLA, 1998). Additional surface soil sampling was conducted along the bank of the Cove in 2001 and 2002 by MACTEC. This soil sampling program is summarized and results are presented in the *Method 3 Human Health Risk Assessment – Park Parcel* (MACTEC, 2004). Soil sampling for metals and dioxin along the western side of Parcel C-1 is summarized and results are presented in the Supplemental Site Investigation Report (SSIR) Addendum (MACTEC, 2006 and 2007).

The previous environmental investigations have demonstrated that soil at the 333 Adelaide Avenue Property, particularly the former manufacturing facility parcel, has been impacted by historical industrial operations. Constituents of potential concern (COPC) in soils at the Site include VOCs (principally the chlorinated hydrocarbons TCE, PCE, and 1,1,1-TCA and their

degradation products 1,2-dichloroethene [1,2-DCE] and vinyl chloride), SVOCs (principally PAHs), metals (primarily arsenic, copper, and lead), dioxin, and TPH. The south bank of the Inner Cove is an area of exposed fill material. Variable concentrations of VOCs, PAHs, metals and TPH were reported to be associated with these fill materials.

The available information indicates that limited manufacturing activities (other than withdrawal of groundwater for use in manufacturing operations and the operation of Building V) were conducted within the Parcel C-1 Phase I area. A portion of Building V, the former smelting building, was within Parcel C-1 and the former slag pile was associated with that building. The data suggest that impacted fill from the former manufacturing facility parcel impinges upon the westerly and southerly portions of Parcel C-1. That fill material generally contains metals and PAHs.

Constituents detected in sediments and surface soils adjacent to the Mashapaug Inner Cove include TPH, SVOCs, VOCs, metals, and dioxins. Sediment samples from drainage swales and erosion channels that serve as a pathway for the discharge into Mashapaug Inner Cove showed sporadic detections of SVOCs, TPH, and some metals. Surface soil samples from low lying areas adjacent to the Cove also showed some detections of metals. The contaminated soil found within these drainage swales were removed for off-site disposal in July 2006. Confirmatory soil sampling results were included in the January 2007 summary report (MACTEC, 2007a).

Based on discussions with RIDEM and comments received on earlier reports and Work Plans, MACTEC prepared a Supplemental SI Work Plan in June 2006. On July 31, 2006 MACTEC submitted a *Supplemental Site Investigation Report* to RIDEM. Section 6.0 of the 2006 SSIR proposed three remedial alternatives to address soil contamination. On June 28, 2007 MACTEC submitted an addendum to the SSIR to RIDEM (MACTEC, 2007b). The SSIR Addendum detailed compliance sampling performed in February 2007 and the analytical results. These results, together with a site walk by RIDEM and MACTEC in August 2010, and other soil sampling outside the proposed Phase I cap supported the regulatory compliance of the preferred remedial alternative (see Section 4.0). This RAWP details the approach for Phase I soil capping following applicable RIDEM regulations as specified in the Program Letter issued May 18, 2011 (RIDEM, 2011a), and Remedial Decision letter dated December 12, 2011 (RIDEM, 2011b).

#### **1.4 Phased Approach**

A phased remediation approach has been developed for the Parcel C-1 (Figure 3). Phase I will occur first and is scheduled to begin in the summer of 2012. It includes the portion of Parcel C-1 along Mashapaug Pond and Cove west and north of the Alvarez High School (Parcel B) and the proposed open space/fields (Parcel C). Work on the Phase I soil cap will proceed from west to east going away from the school. Phase II consists of Mashapaug Inner Cove and

wetland/shoreline of the Inner Cove, and Phase III consists of the open area north of the stormwater detention basin. This Phase III area will be used for the staging of materials and equipment necessary to complete Phase I and Phase II activities. This area will be referred to as the “lay down” area for the remainder of this document. Groundwater remediation is also being planned for the former Gorham Site concurrently with the Phase I construction.

Completion of the Phase II cove sediment and wetland remediation/replication work is planned for 2013. The Phase III soil cap will be performed following Phase II. As part of the Phase I remedial activities the existing chain-link fence within Parcel C-1 will be removed and a new fence will be installed along the Parcel C property line extending from the southwest corner near Adelaide Avenue and connect to the existing fence at the top of slope behind the high school. The chain-link fence following the upland (southern) portion of Parcel C-1 will be maintained through the completion of Phase III when all soils exceeding RIDEM RDEC have been addressed. Both Phase II and Phase III will be described in detail to RIDEM under separate RAWPs. The purpose of this RAWP is to address the Phase I area only.

## 2.0 LIMITED DESIGN INVESTIGATION

Additional soil test pits and analytical testing are proposed for the former slag pile (Figure 4). This will be used to determine if the proposed geotextile liner and soil cover needs to be extended to address the lead contamination. These activities are described in detail under section 3.1.2. This RAWP also includes Engineered Controls and Institutional Controls.

## **3.0 REMEDIAL OBJECTIVE AND REMEDY**

### **3.1 Supplemental Soil Excavation**

#### **3.1.1 Western Shoreline Soil Excavation**

Concentrations of PAHs, lead and dioxin exceeding RIDEM's applicable cleanup standards were detected in surface soils along the western shoreline of Parcel C-1. These isolated locations will be excavated and the soil moved to a nearby area proposed for soil cover as part of Phase I. These soil removal areas include the southwestern corner of Parcel C-1 at SS-210/SS-SI210 (PAHs and lead) within a stormwater drainage ditch (Appendix A, Drawing C-106) and two locations on the western peninsula near SS-206 (lead and dioxin), as shown on Appendix A, Drawing C-101.

Soil will be removed from these areas, approximately 10 feet x 10 feet to a depth of one foot below ground surface. The soil will be placed in a dump truck for immediate disposal under the soil cover system, or it will be placed in a roll-off container, covered, and disposed under the soil cover system later in the construction sequence. Confirmatory grab soil samples will be collected from the bottom and each sidewall of the excavation areas for comparison to Rhode Island RDEC (Appendix C) for PAHs (by USEPA analytical method 8270C), metals (by USEPA analytical method 6010/7000) and risk-based derived dioxin concentration of 0.0043 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) (July 2006 SSIR and June 2007 SSIR Addendum). The analytical method proposed for dioxin is 8290. Method detection limits (Appendix D) for the confirmation soil samples will be equal to or below the Rhode Island RDEC.

If necessary, based on initial exceedances at confirmatory sample locations, additional material will be removed at the areas in question and subsequently re-sampled to confirm compliance with the applicable standards. This process will be repeated until compliant sample results are identified. Once these cleanup criteria are met, the three areas will be backfilled with clean material.

The excavated area at SS-210/SS-SI210 will be covered with geotextile fabric and backfilled with stone from the Former Slag Pile stockpile in order to secure this area within the stormwater drainage ditch. The two western peninsula locations will be backfilled with clean soil meeting Rhode Island RDEC criteria. Limited tree clearing will be conducted to access these locations and support the removal of soil and backfill with clean material.

#### **3.1.2 Former Slag Area Removal and Testing**

In response to prior RIDEM comments, soil will be excavated at two locations in the former slag pile area (Figure 4) and transported offsite for disposal to a licensed disposal facility. This soil will be directly loaded into dump trucks or roll-off containers, and covered, for transportation and

disposal. Following removal of soil from the two locations, ten test pits will be conducted along the perimeter of the former slag pile removal area and at locations within the former slag pile to determine if additional slag material is present. The proposed test pit locations are shown on Figure 4 and will be coordinated in the field with RIDEM. Confirmatory grab soil samples will be conducted at the excavations and test pits for total lead (by USEPA analytical method 6010) and Synthetic Precipitation Leaching Procedure (SPLP) for metals (by analytical method 1312). This data will be used to define the full extent of the liner and cap and to determine future soil management requirements, as necessary.

A geomembrane liner is proposed for the former slag pile area to be protective for the proposed future passive recreational use of Parcel C-1. The cap in this former slag area is described below in Section 3.3.

### **3.2 Remedial Objective for Soil**

The July 31, 2006 SSIR presented contaminant concentrations in surface soils, sediment, and surface water. As part of the phased-approach, this remedial action will focus solely on surface soil in the Phase I area of Parcel C-1 (Figure 3).

The remedial objectives for the Phase I area work consists of the following:

- contain/consolidate identified areas of solid waste
- prevent direct-contact human exposure to contaminated soil and waste exceeding RIDEM RDEC
- minimize leaching of metals from vadose zone soil to groundwater at the location of the former slag pile.

### **3.3 Preferred Remedial Alternative**

The Phase I remedial action will consist of installation of a soil cap(s) at the locations shown on Appendix A, Drawings C-102 through C-107. Cap construction within the former slag pile will be modified to result in a low-permeability cap (Appendix A, Drawings C-103 and C-104). The soil cap will prevent direct contact exposure, and restrict the potential migration of contaminants through the action of wind erosion and surface run-off into Mashapaug Pond. The low-permeability section of the cap above the former slag area will restrict water infiltration and reduce potential leaching of metals from vadose zone soil to groundwater.

The Phase I soil cap contains three distinct components. These components are color-coded on Figure 3 and include an upland fill area cap, a wetland buffer cap, and a former slag area cap. All components of these caps (imported soil) will be tested to meet RIDEM RDEC (Appendix C). Refer to Figure 5 and Drawing C-502 for cross sections of the cap across Phase

I, including grading of slopes that currently exceed a one-to-three slope. Figure 5 depicts the approximate location of the cross sections and Drawing C-502 depicts typical cross sections of the Phase I cap.

During the construction of the Phase I soil cap, soil thickness will be measured following final grading as a quality control (contractor) and quality assurance (Textron/RIDEM) measure to ensure the proper soil cap has been constructed. Stormwater management will be included with the construction of the cap to maintain its integrity and manage stormwater runoff into the buffer zone, wetlands, and Cove. Stormwater management is discussed further in Section 3.6 of this RAWP.

#### Fill Area Cap

The fill area extends along the top of the western slope and extends along the shoreline of the Mashapaug Inner Cove (Appendix A, Drawings C-103 through C-105). This fill material was historically characterized through soil borings and test pits and found to contain casting sands, concrete, rubble, and other debris. Soil excavated from SS-210/SS-SI210 (Appendix A, Drawing C-101) will be spread under the soil cap. Soil removed from the western peninsula will be spread under the fill area cap south of Mashapaug Inner Cove. The fill areas (blue area on Figure 3) will be covered with a marker fabric and capped with two feet of clean soil (18" cover soil and 6" topsoil). The finished surface will be seeded or stabilized with erosion control matting. The fill area cap located along Parcels B and C will match the existing grade at the high school and Parcel C boundaries. Note that the soil cap near the northwest corner of Parcel C has been extended to follow the grade and fill material further down slope to address elevated PAHs, lead and dioxin concentrations within the drainage swale (SS-SI-001) (Appendix A, Drawing C-102). The soil cap along the western shoreline has been extended south to the base of the 24-inch tree (co-located with SS-106) to encompass the historical lead exceedance found in this area (Appendix A, Drawing C-102).

#### Wetland Buffer Cap

As the Parcel C-1 cap abuts the shore of Mashapaug Cove, special considerations for wetlands have been included as part of Phase I. The wetland buffer area consists of the area within 50' of the delineated wetland along the Inner Cove shoreline. The wetland delineation was completed in May 2007 and reviewed in the field with RIDEM in August 2011.

The wetland boundary is shown on Drawings C-101, C-103 and C-104 in Appendix A. The delineated wetlands are typically located 5' to 10' upland from the shoreline. Thus, the limit of work (LOW) for Phase I will be along a 10' setback from the shoreline of Mashapaug Cove such that all of the remediation work within the freshwater wetlands will be conducted in the future as part of the Mashapaug Cove sediment remediation (Phase II Parcel C-1 remediation). This will allow for improved access to the wetland area for the capping and construction of a natural

transition zone from the wetlands into the Cove. The wetland buffer cap will include a geotextile fabric as a marker for the fill material surface and 12-inches of soil over the marker fabric (Appendix A, Drawing C-502). The wetland cap has been extended to include SD-002 (lead contaminated soil), as shown in Appendix A, Drawing C-103. In accordance with state regulations, some remediation activities in the wetland buffer may be exempt from the State wetland permitting requirements as this work is part of a remedial action under the RIDEM Remediation Regulations. These activities are being coordinated with RIDEM to assure compliance with all applicable regulations. However, future construction work within Parcel C-1 not conducted under the Remediation Regulations will need to comply with all state wetland permitting requirements and regulations.

Clearing and grubbing of the wetland buffer zone scrub material will be conducted, as necessary, to support the installation of the soil cap. One foot of soil at the toe of the LOW will be removed to allow the soil cap to key into the existing grade above the wetland boundary. The soil removed from the toe will be placed under the cap during the grading of the existing site soil.

The finished surface for the wetland buffer cap will be stabilized with erosion control matting, and wetland grasses will be planted (Appendix B, Specification 02921). This cap will restrict the contact with the subsurface soils.

#### Former Slag Area Cap

In response to RIDEM questions regarding the potential leaching from the soil in contact with the former slag pile, the cap design for the former slag area contains a drainage geocomposite layer over the membrane to limit infiltration and restrict contact with the underlying soils. Following the grading of the existing soil, the former slag area will be capped with 6" sand, 40-mil geomembrane, drainage composite layer, 12" clean cover soil, and 6" clean fill topsoil (Appendix A, Drawing C-502). The finished surface for the slag area will be seeded or stabilized with erosion control matting. The haul road access to the former slag area will be improved during construction and removed after construction is complete.

The former slag area cap will stop approximately 5 feet upgradient of the existing waterline where a temporary stone wall will be constructed to support the required grade of the Phase I Cap. The construction detail for this temporary wall is shown on Drawing C-503. Under the Phase II Cove remediation this temporary stone wall will be removed and the Slag Area Cap extended down to the waterline that existed prior to the July 2006 slag removal action.

### Wetland Restoration within the Phase I Cap

Parcel C-1 is located along the shoreline of Mashapaug Cove within Mashapaug Pond within the Pawtuxet River watershed. Existing vegetative communities include forested and scrub-shrub wetlands, mixed oak woodland and mid-successional woodland cover types.

Wetlands at Parcel C-1 occur as fringe features forming a narrow band along the cove shore. Tree species within the wetland areas include, red maple (*Acer rubrum*), silver maple (*A. saccharinum*), and black willow (*Salix nigra*). The shrub layer consists of sweet pepperbush (*Clethra alnifolia*), red osier dogwood (*Cornus stolonifera*), and buttonbush (*Cephalanthus occidentalis*). Sensitive fern (*Onoclea sensibilis*), blue flag iris (*Iris versicolor*), and poison ivy (*Toxicodendron radicans*) occur in the herbaceous understory.

The mixed oak woodland community occurs in the upland areas on the western shore of the cove (west of the former slag area). Tree species within this area include red oak (*Quercus rubra*), black oak (*Q. velutina*), and to a lesser extent white oak (*Q. alba*). Sweet birch (*Betula lenta*) and black cherry (*Prunus serotina*) are also present within this cover type. The understory includes a mix of low growing shrubs such as low bush blueberry (*Vaccinium angustifolium*), mountain laurel (*Kalmia latifolia*), and huckleberry (*Gaylussacia baccata*). There are few non native invasive species present within this habitat type. In addition, several signs of wildlife usage were observed including a fox den and a painted turtle shell.

The mid-successional community occurs in the perimeter wetland and upland areas along the eastern shore of the Inner Cove (east of the slag removal area). Tree species within this area include red maple, red oak, black oak, tree-of-heaven (*Ailanthus altissima*), and gray birch (*Betula populifolia*). The understory within this area is dominated by non native invasive plant species including, Asiatic bittersweet (*Celastrus orbiculatus*), Morrow's honeysuckle (*Lonicera morrowii*), Japanese honeysuckle (*L. japonica*), and Japanese knotweed (*Fallopia japonica*). The dominance of invasive species in this habitat is likely a result of previous disturbances which allowed these opportunistic species to colonize.

### ***Invasive Species Management***

As noted earlier, portions of Parcel C-1 are typical of disturbed sites in that they harbor numerous invasive plant species. If these populations are not addressed they will undoubtedly compromise the integrity of the restoration project. The aggressive nature and superior competitive ability of these plants in disturbed habitats (i.e., newly planted areas), will negatively affect botanical diversity and survivorship of restorative plantings.

Therefore, potential treatment options include chemical and mechanical approaches. Mechanical removal (i.e., cutting) of above ground plant parts can aid in the management of certain invasive species. Mechanical treatment alone will not control the revegetation of the invasive species. Foliar or cut stem, application of herbicidal chemicals (i.e., glyphosate

(Rodeo)) will transport the herbicide to belowground parts detrimentally affecting the vigor of the belowground root/rhizome system and effect plant death or vigor. These options will be coordinated with the construction schedule as part of the site clearing and restoration activities.

### ***Revegetation***

Following Phase I remedial construction, the wetland buffer cap surface will be revegetated to stabilize soils and provide structural integrity. The use of wetland grasses within the Buffer Zone Cap, as described in Specification 02921, will create a transition from the upland area to the wetlands along the shoreline of the Inner Cove. These activities will be conducted using best management practices and every effort to minimize impacts to the surrounding landscape will be taken. Remediation activities will strive to preserve mature trees and other desirable native vegetation when possible located outside the LOW.

### **3.4 Monitoring Wells**

Groundwater infiltration and flow from Parcel C-1 to Mashapaug Pond play a critical role in the Site conceptual model. The Site monitoring wells will provide information about groundwater flow and aid in developing and monitoring groundwater remedial actions. AMEC will install a new monitoring well on the east side of the former slag area cap (Drawing C-104) and maintain existing monitoring wells within the Phase I Cap. Former monitoring well GZA-5 is also required to be replaced in the similar location within the former slag area cap (Drawing C-103). Monitoring well GZA-5 was removed during the slag excavation activities in the summer of 2006. This replacement well is located within the existing Inner Cove water line. Under Phase II, the former slag area cap will be extended down to the original water line of July 2006 and the replacement well GZA-5 will be installed as part of this cap extension.

The number of existing monitoring wells maintained during the soil cap construction may be modified pending the design of the groundwater treatment system and monitoring network.

Existing monitoring wells within the cap (e.g., GZA-3) will be secured and maintained during the construction of the soil cap. Also, a new shallow monitoring well will be installed on the east side of the former slag area cap, outside the impermeable cap over the former slag pile and close to the edge of the Inner Cove. This new well, together with the reinstalled GZA-5 and existing MW-237S (located on the west side of the former slag area cap), will be included in a targeted monitoring program for potential leaching of metals from the former slag pile area. The future groundwater monitoring program for the Gorham Site will be developed in coordination with RIDEM as part of the groundwater RAWP. Monitoring wells will be installed consistent with Drawing C-503 and Specification 02522.

Note that two former water wells located on the western and eastern shoreline of the Inner Cove and within the wetland cap area (Drawings C-103 and C-104) will be abandoned in accordance

with Specification 02526. The concrete debris from the well housings will be broken up to six-inch minus pieces and placed under the former slag area cap.

### **3.5 Fencing**

The existing chain link fence will be relocated along the boundary between Parcels C and C-1, extending from Adelaide Avenue to the existing chain link fence in the northwest corner of the high school parking lot (Drawings C-102 and C-103). The chain link fence and access gate in the northwest corner of the retail property (intersection of Parcels A and B) will be replaced or reset and will extend east to the stormwater detention basin fencing (Drawing C-503).

This fence will remain in place until all three phases of remediation on Parcel C-1 have been completed or when the City of Providence has completed the installation of the planned walking path and fence/plantings along the water side of the path to restrict access to the steep slope down to the shoreline.

### **3.6 Stormwater Management**

The design and construction of the Phase I Cap has included stormwater management requirements to control surface water flow from Parcel C-1 into Mashapaug Pond and the Inner Cove. Stormwater from Parcels A and B are directed to the detention basin for infiltration and discharge into the Inner Cove through existing piping. Surface water runoff from Parcel C currently infiltrates on property and the future parking lot and grass field will be managed within that property.

Approximately two weeks prior to mobilization of construction equipment to the Site, a Notice of Intent (NOI) will be submitted to RIDEM for the Phase I Cap construction. This will reference a stormwater pollution prevention plan to support the construction activities. This plan will be maintained on site during the construction of the Phase I cap. Stormwater and erosion control measures to be used during the construction of the Phase I Cap are shown on Appendix A, Drawing C-501 and within Specification 02370. These measures include the installation and maintenance of hay bales and silt fence, stabilized construction entrances, erosion control matting on the cap surface and maintenance of the existing turbidity curtain in the Inner Cove.

## **4.0 POINTS OF COMPLIANCE & COMPLIANCE DETERMINATION**

### **4.1 Points of Compliance**

In accordance with Section 9.06 and 9.18 of the Remediation Regulations, AMEC has performed confirmatory sampling outside of the cap to determine that remedial objectives have been met. The points of compliance are sample locations outside of the Phase I cap that are detailed in Section 4.2 below.

### **4.2 Compliance Determination**

Textron has proposed a “Recreational Use” Cap that will bring Parcel C-1 into compliance, per the Remediation Regulations, with soil RDEC (Appendix C). The compliance demonstration is accomplished by using Method 1 and Method 2 (dioxin toxic equivalence (TEQ) and several other analytes) soil objectives approach. In the absence of any recreational land use criteria, the RDEC are health protective criteria for recreational land use. The exposure assumptions used to calculate the RDEC clearly overestimate likely recreational exposures and compliance with these criteria will create a health protective environment for use of Parcel C-1 for passive recreational purposes.

The soil cap has been designed to extend over those areas where surface soil exceeds the RDEC. There are three distinct areas outside of the cap (Appendix B Drawing C-101) that currently exceed the RDEC, but will be excavated and confirmatory soil sampling conducted to determine that the remaining soil is in compliance with the RDEC. The two excavation areas on the western peninsula will be backfilled with soil meeting the RDEC (Appendix C). The excavation area in the southwest corner of Parcel C-1 will be covered with geotextile and backfilled with stone from the currently stockpiled at the former slag area.

In addition, the cap will be constructed with material that also meets RDECs, so overall, the soils both inside and outside the footprint of the “Recreational Use” Cap will be in compliance with the health protective RDECs. Therefore, upon construction of the “Recreational Use” Cap, Parcel C-1 soils will represent a health protective condition for recreational use by the community.

Procedures for determining compliance with cap construction requirements and specification (e.g., materials, thicknesses, and construction methods) will be detailed in the construction drawings and specifications.

Other compliance procedures that will be incorporated into the construction of the Phase I Cap will include the following:

- Any portion of the geosynthetic liner (geomembrane, geocomposite, geotextile, etc.) that is damaged during excavation, maintenance and/or related activities will either be repaired or replaced in a timely manner with a section of new geosynthetic liner in accordance with the approved construction specifications.
- If the excavated soils can't be placed under the Phase I Cap or are already planned for off-site disposal (former slag area soils), samples of the excavated soils (either during excavation or from stockpiles) will be collected for laboratory analysis to support the off-site disposal. Site soils, which are to be disposed of off-site, will be sent to a licensed facility in accordance with all local, state, and federal laws. Copies of the material shipping records will be maintained by Textron and included in the Completion Report following the Phase I construction.
- All non-disposable equipment used during the soil disturbance activities will be properly decontaminated as appropriate prior to removal from the site. All disposable equipment used during the soil disturbance activities will be properly containerized and disposed of following completion of the work. All vehicles utilized during the work shall be properly decontaminated as appropriate prior to leaving the site.

## 5.0 PROPOSED SCHEDULE FOR REMEDIATION

The following schedule is proposed to minimize conflicts with the proposed redevelopment plans. This schedule is contingent upon the timing of approvals and subcontractor availability.

<u>Description</u>	<u>Completion Date</u>
Final RAWP to RIDEM	June 15, 2012
Submit NOI to RIDEM	July 9, 2012
Submit General Contractor Information to RIDEM	July 9, 2012
Distribute Public Notice Materials or RIDEM comment	Within four weeks of Final RAWP
Mobilization	July 15, 2012
Complete Construction	October 30, 2012

Schedules will be provided to the RIDEM as bids are accepted for the Phase I Parcel C-1 preparation and construction. Follow-up verification and monitoring will also be conducted in a phased approach. Schedules will be provided for the installation of monitoring wells.

## **6.0 CONTRACTORS AND/OR CONSULTANTS**

As part of this RAWP, Textron will subcontract the construction to a general contractor. The general contractor may subcontract some of the required services. All other services including environmental monitoring, construction management and survey services will be provided by AMEC. Laboratory services will be conducted by a subcontractor to AMEC.

The general contractor has yet to be determined. Potential bidders have been provided with the construction documents and scope of work of the project. Once the work has been awarded by Textron to the general contractor, Textron will provide RIDEM with a list of contractors and roles and responsibilities for the construction of the Phase I Cap.

## **7.0 DESIGN STANDARDS AND TECHNICAL SPECIFICATIONS**

Construction drawings and specifications (Division 0, 1 and 2) are included as Appendices A and B to this RAWP. The drawings presented in Appendix A provide supplemental design information including quantities of materials, limits of work, and construction components and dimensions. The specifications outline the required standards, products, and execution to implement the remedial action. In some cases, the construction is defined by performance based requirements as noted in the specifications and drawings. In other cases, products are specified by fabricator/vendor/manufacturer and model.

Actual material and products to be incorporated into the work will be based on the proposal of the general contractor. The general contractor will propose a material/product for the project and submit requisite product information and literature to AMEC for review and approval. If the submittal satisfactorily meets the requirements of the construction documents (specification and drawings), AMEC will approve the product/material.

## 8.0 SET UP PLANS

Set-up Plans as defined by the Rhode Island Remedial Regulations describe pre-operational staging or construction requirements that must be in place prior to implementation of the remedial action. A general contractor Work Plan is required by the general contractor selected to implement the remedial action. This Plan will include descriptions and information as outlined in Specification Section 01110 “Summary of Work” (Appendix B) and a Health and Safety Plan (HASP). The measures and controls required are shown on the Construction Drawings and are described in Specification Section 01500 “Temporary Facilities and Controls”. Information provided within this plan will support the preparation and submittal of the stormwater NOI to RIDEM. The purpose of these measures and controls include the following:

1. To maintain a healthy and safe work environment for remediation construction and oversight personnel;
2. To minimize erosion of soil and downgradient migration of sediment;
3. To minimize waste generation and migration outside of the Exclusion Zone; and
4. To provide proper collection and storage of generated wastes until characterization and off-site disposal can occur.

## 9.0 EFFLUENT DISPOSAL

Effluents as defined by the Rhode Island Remedial Regulations are any products or by-products from the proposed remedial action. Waste or waste by-products that will be produced as a result of the remedial action include the following:

1. Clearing and miscellaneous debris;
2. Grubbings and tree stumps;
3. Liquid waste (decontamination water, stormwater management water, etc.);
4. Site trash; and
5. Remediation waste (PPE, plastic sheeting, sampling equipment, etc.).

Waste handling and disposal will be in accordance with the requirements of Appendix B Specification Sections 02110 “Waste Excavation, Removal, and Handling” and 02120 “Off-Site Transportation and Disposal”. The general contractor is required to submit a Work Plan to Textron and AMEC for review and approval prior to commencing construction. The plan will contain project specific proposals for waste handling, transportation, and disposal. Characterization of the waste will occur in accordance with the requirements of the Treatment Storage and/or Disposal Facility (TSDF). AMEC will be responsible for characterizing waste materials for off-site disposal, not including clearing debris (wood), construction and demolition debris (e.g., concrete from the two water well structures), sanitary waste and site trash. Disposal will occur at licensed facilities approved by Textron.

## 10.0 CONTINGENCY PLAN/ HEALTH AND SAFETY PLAN

AMEC's Contingency Plans are documented within the AMEC HASP for Phase I Parcel C-1 Soil Capping found in Appendix E. This document contains the names and phone numbers of emergency coordinators and the emergency response procedures and arrangements for the Site. The HASP with contingency procedures will be available on site at all times during the implementation and operations of the Phase I remedial action.

Specification Section 01351 Safety, Health, and Emergency Response requires the selected remediation general contractor to prepare and follow a site-specific HASP for the work described and referred to in this RAWP. The contractor's HASP will cover their personnel and their subcontractors, will be maintained on the project site and will be made available to all site personnel.

A potential respiratory hazard associated with prolonged exposure to contaminants in soil exists for invasive activities, particularly those activities that will disturb soils and could generate dust (e.g., road grading, tree clearing/grubbing and excavation of the slag pile and contaminated soil). This hazard will be mitigated by the use of engineering controls such as water to suppress visible dust and dust that exceeds 0.29 milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ) in air. Dermal exposure should be suppressed by use of task-specific PPE. Although not likely based on investigation activities completed to date, inhalation of VOCs is possible from impacted soil and should be monitored to prevent respiratory exposure. Table 4-1 of AMEC's HASP (Appendix E) lists the potential contaminants of concern and the threshold limits to be used during the construction monitoring.

AMEC will conduct dust monitoring in the work zone and at the work area perimeter during activities that have the potential to disturb soil (grading, excavation, trenching, drilling) using hand held real-time continuous air monitoring instruments. Work area perimeter dust monitoring will be performed using the MIE DR4000 monitors or equivalent placed in cases weatherproof cases. These instruments measure aerosol dust and will be set to automatically store data (data logging) for subsequent retrieval. One perimeter dust monitor will be placed on each of the four points outside and within 30 feet of the soil capping activities (North, South, East, and West) to confirm that areas outside of the work zone are not impacted by the capping activities. Real-time dust monitoring will continue throughout the capping activities, unless a significant precipitation event occurs, at which time dust monitoring may be suspended per manufacturer specifications and standard industrial hygiene practices.

The sustained respirable dust meter action level is  $0.29 \text{ mg}/\text{m}^3$ . AMEC believes that this action level is protective of worker health under the Occupational Safety and Health Administration (OSHA) lead standard and given the known levels of contaminants in Site soils. If this level is exceeded, AMEC instructed the contractor to use water to suppress dust as an engineering

control. If this action level is sustained, AMEC will halt work and require upgrade to Level C PPE. It is important to note that the upgrade action level for (upgrading from Level D to Level C) was not exceeded at any time during the Slag Removal Action in July 2006.

Continuous visual monitoring of dust (particulate) levels will also be conducted and recorded in the Site field logbook. If visible dust conditions are sustained for more than one minute within the work zone, dust suppression methods (i.e., water spray) will be implemented to reduce airborne dust levels. Dust suppression will be performed throughout the capping activities as needed and will include spraying of fine mist of water over exposed soils to suppress dust as needed. A portable water tank containing municipal water or a nearby fire hydrant if approved by the City of Providence will be used as the water supply for dust suppression activities. If heavy precipitation (rain or snow) is adequate to suppress dust, additional water spray will not be applied. This real time monitoring of air quality will be summarized on a log sheet for each day and at the end of each week they will be scanned and emailed to RIDEM for uploading to the project website. Data from the fixed monitoring points will also be provided to RIDEM and uploaded to the website.

The general contractor is responsible for conducting personal exposure monitoring using direct reading instruments and with the collection of personal air samples. The general contractor will use appropriate sampling pumps and media to collect and document time-weighted average exposures to lead and other metals.

A photoionization detector (PID) will also be used at the Site for soil sampling and excavation tasks to monitor the breathing zone for VOCs. This information will be maintained in the field logbook and response actions will be taken based on the threshold values listed in Table 4-1 of the HASP (Appendix E).

## 11.0 OPERATING LOG

All on-site activities will be recorded in an operating logbook to document progress associated with remedial activities at the Phase I Parcel C-1 area. The logbook will include, at a minimum, detailed information on the following:

1. Personnel on-site and their time of arrival and departure.
2. Time of system (if applicable) operation, including startup time, time of shutdown due to equipment malfunction or failure, and time of completion for the remedial activity.
3. Records of materials transported off-site, and materials brought on-site.
4. Instances during remedial activities where a Contingency Plan may be implemented.
5. Records of any accidents or injuries incurred on the site.
6. Documentation of inspections and any instances where remedial activity procedures must be changed and/or equipment must be repaired or replaced. An inspection plan will be designed for all remedial activities to ensure that all equipment or activities are operating properly.
7. Details of the work stages and activities, as well as records of sampling and any field screening (e.g., dust monitoring) that is performed.
8. Perimeter air monitoring dust readings will be logged in the Site field logbook, making note of the time the readings were obtained, the concentrations observed, the weather conditions, the prevailing wind direction, and the general site conditions and activities. Time weighted averages of total dust concentrations from perimeter monitoring stations will be compared to the OSHA Permissible Exposure Limit (PEL) of particulates not otherwise regulated including aerosol dust (referred to as particulates not otherwise characterized or (PNOC)), which is 15 mg/m<sup>3</sup>.
9. Field monitoring of air/dust by the mini-RAM and VOCs by the PID will be logged in the field logbook. This data will be summarized on daily log sheets and scanned weekly for submittal to RIDEM.

In addition to documentation of field activities, quality assurance procedures for cap construction as described in Specifications Sections 02072, 02073, and 02300 will be recorded in the operating log.

The operating log will be readily available at the site during all activities outlined in this RAWP.

## 12.0 SECURITY PROCEDURES

Access to the Phase I work area will be at three locations. One access point is the existing Parcel C gate in the southwestern corner of Parcel B. In addition, an access road will be constructed in the northwestern corner of the Parcel C down to the western end of the Phase I cap (near Mashapaug Cove). The other two access points will be the existing gate at the former slag area and at the laydown area in the northeast of the site (behind the detention basin on Parcel A).

An 8' high security fence and gate will be installed along the LOW at the north end of the Parcel C, as shown on Drawing C-103, and it will tie into the existing fence at the school property for vehicular access to the western end of the cap near Mashapaug Cove. It is assumed that plantings along the new fence will not be required with the installation of the fence around Alvarez High School restricting access to Parcel C-1 and planned remedial activities in support of a recreational use. This fence will be maintained through the completion of the Phase III remediation.

Only authorized personnel (e.g., engineer, construction personnel, and approved visitors) will be permitted to access the work zone. All visitors are required to check in with the Site Superintendent upon entering.

Fencing and gates will be secured at the close of each working day. Areas where fencing is removed will be gated and/or properly secured with temporary fencing and signage. Signage will be in English and Spanish and will include a site contact phone number and other pertinent information. The signs will be installed approximately every 200 feet along the new fence following installation by the general contractor.

### **13.0 SHUT-DOWN, CLOSURE AND POST-CLOSURE REQUIREMENTS**

Shutdown will consist of final cleanup, removal of temporary facilities and controls, and equipment demobilization from the site. Points of compliance and compliance determination for capping activities are discussed in Section 4.0. Security and siltation fencing will not be removed before construction is complete, specified erosion control measures (e.g., rock dams, erosion control mats, etc.) have been installed, and specified erosion control vegetation is established. Also, a Remedial Action Closure Report will be prepared and submitted to the Department documenting the work performed and including, at a minimum, the following items:

- a) A post remediation survey of the entire Phase I Park Parcel Site with as-built plans demarcating the exact location (e.g., vertical and horizontal extent and type) of the installed engineered controls, including: geotextile material, clean fill, and as applicable any utilities, structures, basins, swales, storm water management features, and current groundwater monitoring locations.
- b) Analytical results and summary of all air and dust monitoring and/or sampling performed throughout the project.
- c) All original laboratory analytical data results from the remedial activities, compliance and confirmation sampling, as applicable.
- d) Documentation that excess regulated soil, solid waste, and remediation waste was properly disposed of off-site at an appropriately licensed facility in accordance with applicable laws.

## **14.0 INSTITUTIONAL CONTROLS AND NOTICES**

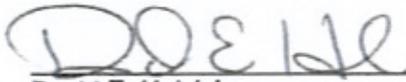
An Environmental Land Usage Restriction (ELUR), in accordance with Rule 8.09 of the Remediation Regulations, has been developed with the City of Providence or Providence Redevelopment Agency (PRA) as property owner and RIDEM and will be formerly recorded with the property deed at the conclusion of Parcel C-1 remediation activities. A Soil Management Plan (SMP) which outlines the procedures for managing the soils on site should disturbances below the cap be required, will be recorded with the ELUR. This ELUR will address all three phases of Parcel C-1 (upland and Mashapaug Cove). A draft ELUR and SMP has been included in Appendix F for review. Textron will maintain and monitor the completed engineered soil cap in the Phase I area until the responsibility is taken over by the City of Providence or PRA at the time the ELUR is recorded.

## 15.0 CERTIFICATION REQUIREMENTS

The following certifications are provided pursuant to Rule 9.19 of the Remediation Regulations.

The undersigned hereby certifies that to the best of their knowledge the information contained in this report is complete and accurate based on the information available at the time of its preparation. Furthermore, the undersigned certifies that to the best of their knowledge the report is as complete and accurate of a representation of the Site and the release based on the available information, and contains the known facts surrounding the release.

**AMEC Environment & Infrastructure, Inc.**

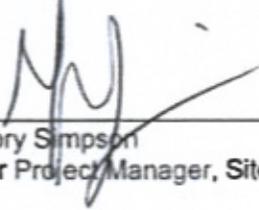


David E. Heislein  
Principal Project Manager

June 14, 2012

Date

**Textron, Inc.**



Gregory Simpson  
Senior Project Manager, Site Remediation

June 14, 2012

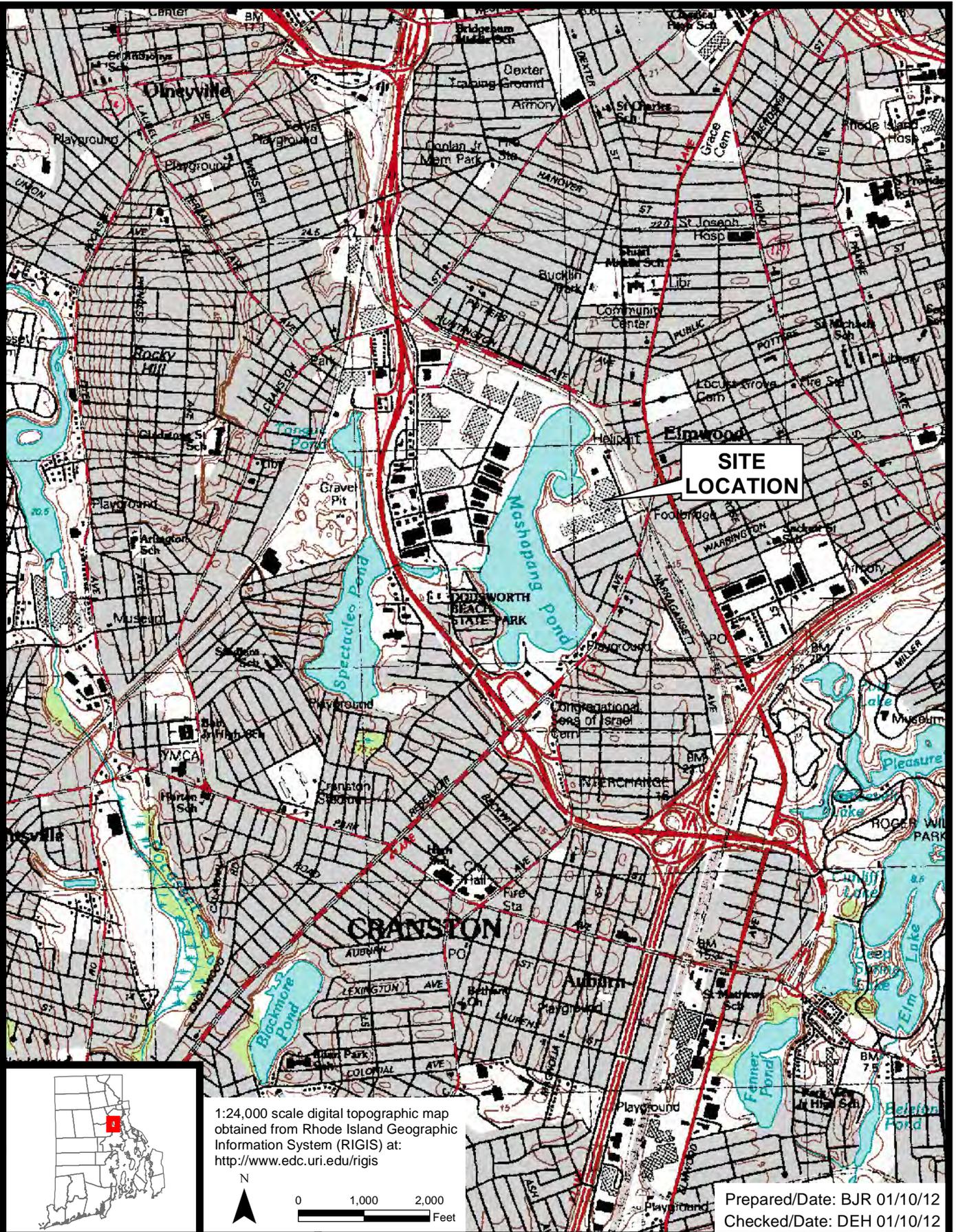
Date

## 16.0 REFERENCES

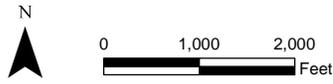
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- Rhode Island Department of Environmental Management (RIDEM), 2011a. *Approval of Site Investigation Summary Report and Risk Assessment, Program Letter*. May 18.
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TEXTRON, INC.  
FORMER GORHAM MANUFACTURING FACILITY, PROVIDENCE, RI  
REMEDIAL ACTION WORK PLAN – PHASE I SOIL CAPPING: PARCEL C-1

## **FIGURES**



1:24,000 scale digital topographic map obtained from Rhode Island Geographic Information System (RIGIS) at: <http://www.edc.uri.edu/rigis>



Prepared/Date: BJR 01/10/12  
Checked/Date: DEH 01/10/12

Remedial Action Work Plan  
Phase I Parcel C-1  
333 Adelaide Avenue  
Providence, RI



Site Location Map  
Former Gorham Manufacturing Site  
Project 3650-11-0213 Figure 1

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- Legend
-  Former Slag Area
  -  Approximate Site Boundary

Note: 2011 Ortho photo obtained from Rhode Island Geographic Information System (RIGIS)

Prepared/Date: BJR 06/13/12  
Checked/Date: DEH 06/13/12

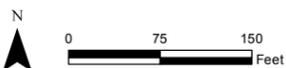
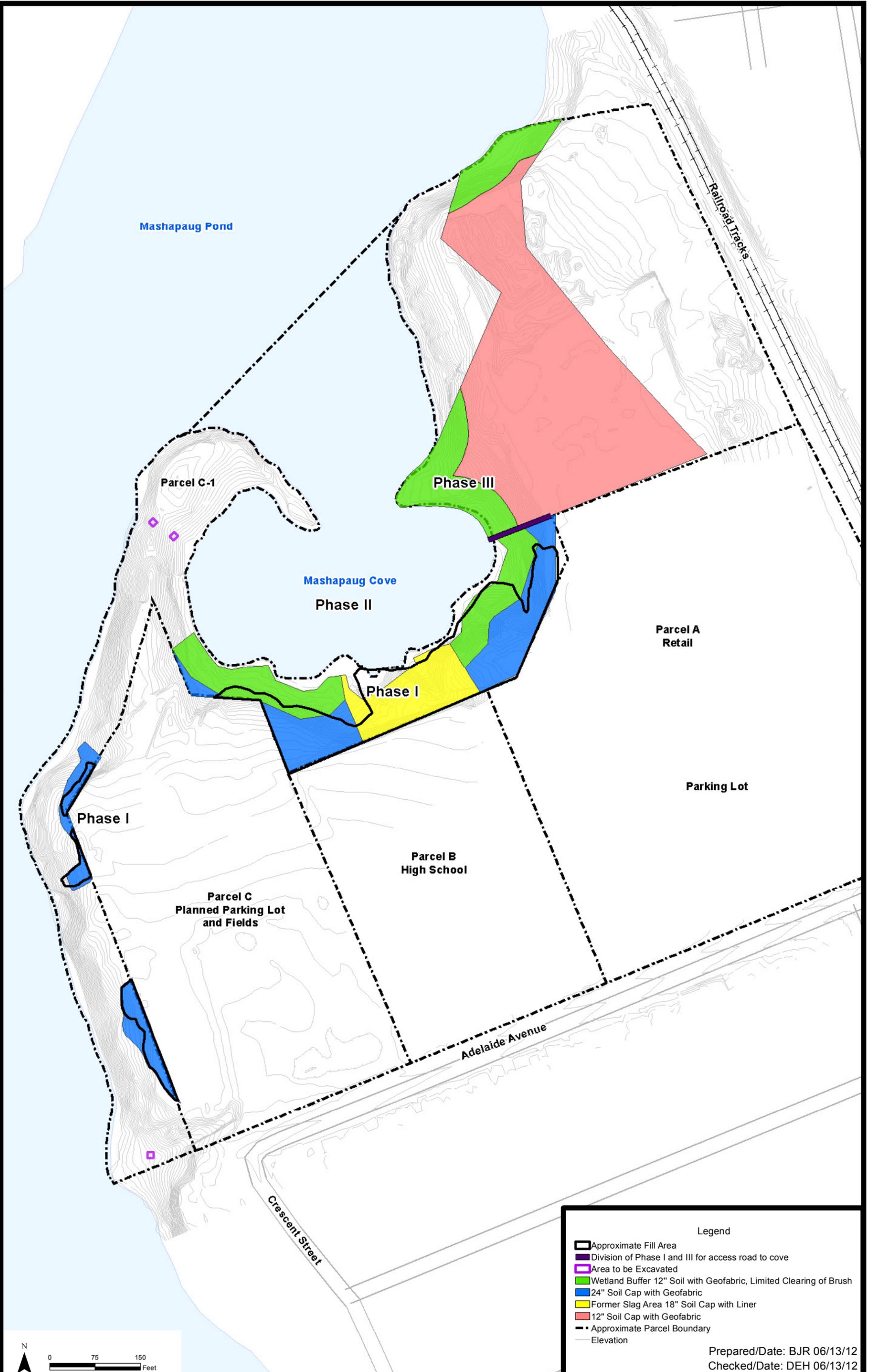
Remedial Action Work Plan  
Parcel C-1  
333 Adelaide Avenue  
Providence, RI



Site Plan  
Former Gorham Manufacturing Site  
Project 3650-11-0213

Figure 2

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**Legend**

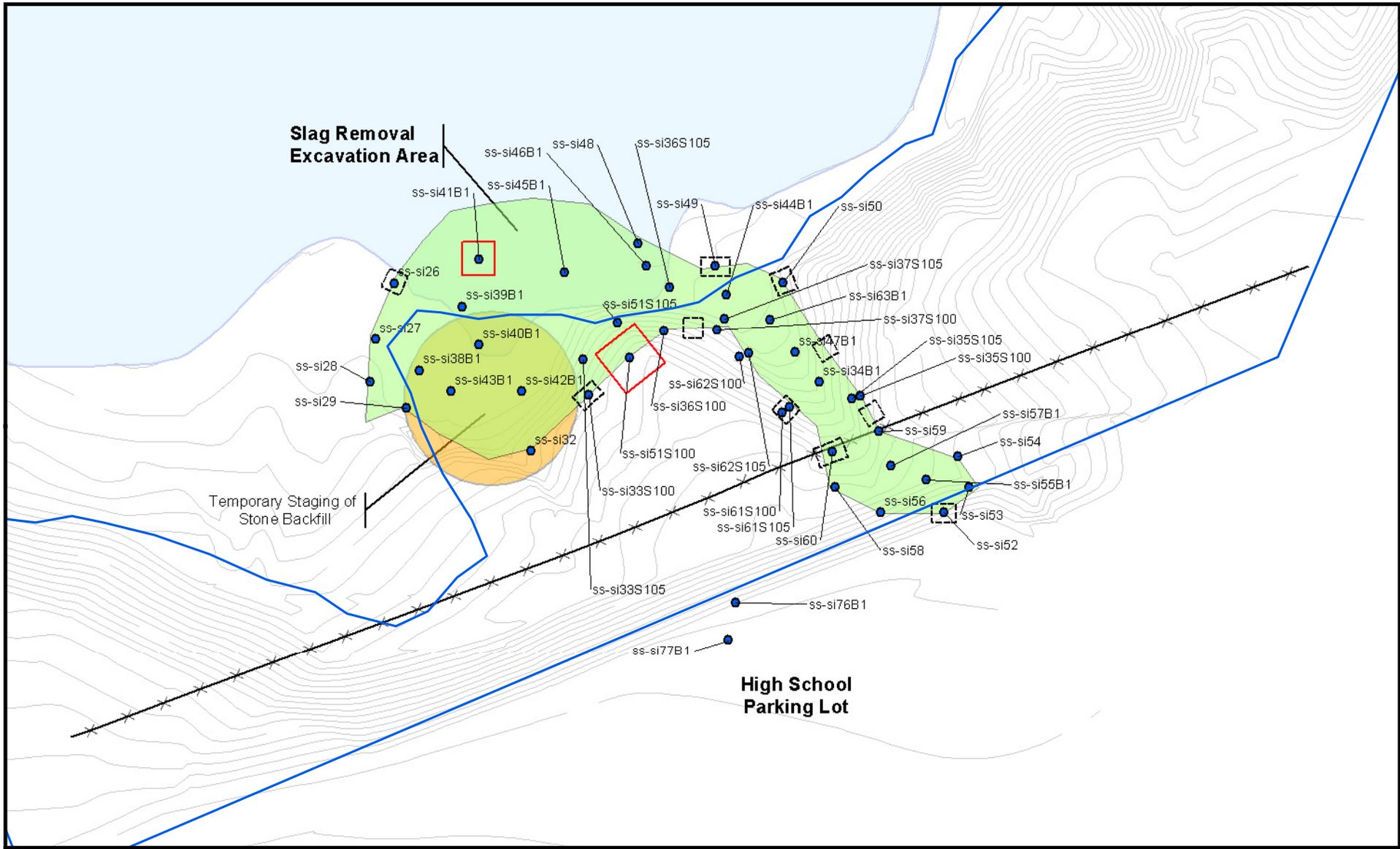
- Approximate Fill Area
- Division of Phase I and III for access road to cove
- Area to be Excavated
- Wetland Buffer 12" Soil with Geofabric, Limited Clearing of Brush
- 24" Soil Cap with Geofabric
- Former Slag Area 18" Soil Cap with Liner
- 12" Soil Cap with Geofabric
- Approximate Parcel Boundary
- Elevation

Prepared/Date: BJR 06/13/12  
Checked/Date: DEH 06/13/12

Remedial Action Work Plan  
Parcel C-1  
333 Adelaide Avenue  
Providence, RI



Parcel C-1 Three Phased Remediation  
Former Gorham Manufacturing Site  
Project 3650-11-0213 Figure 3



**Legend**

- Approximate Fill Area
- Additional Removal Areas
- Test Pit (Final Locations To Be Determined In Field)
- Previous Sample Locations
- Initially Excavated Area
- Fence
- Mashapaug Cove
- Elevation

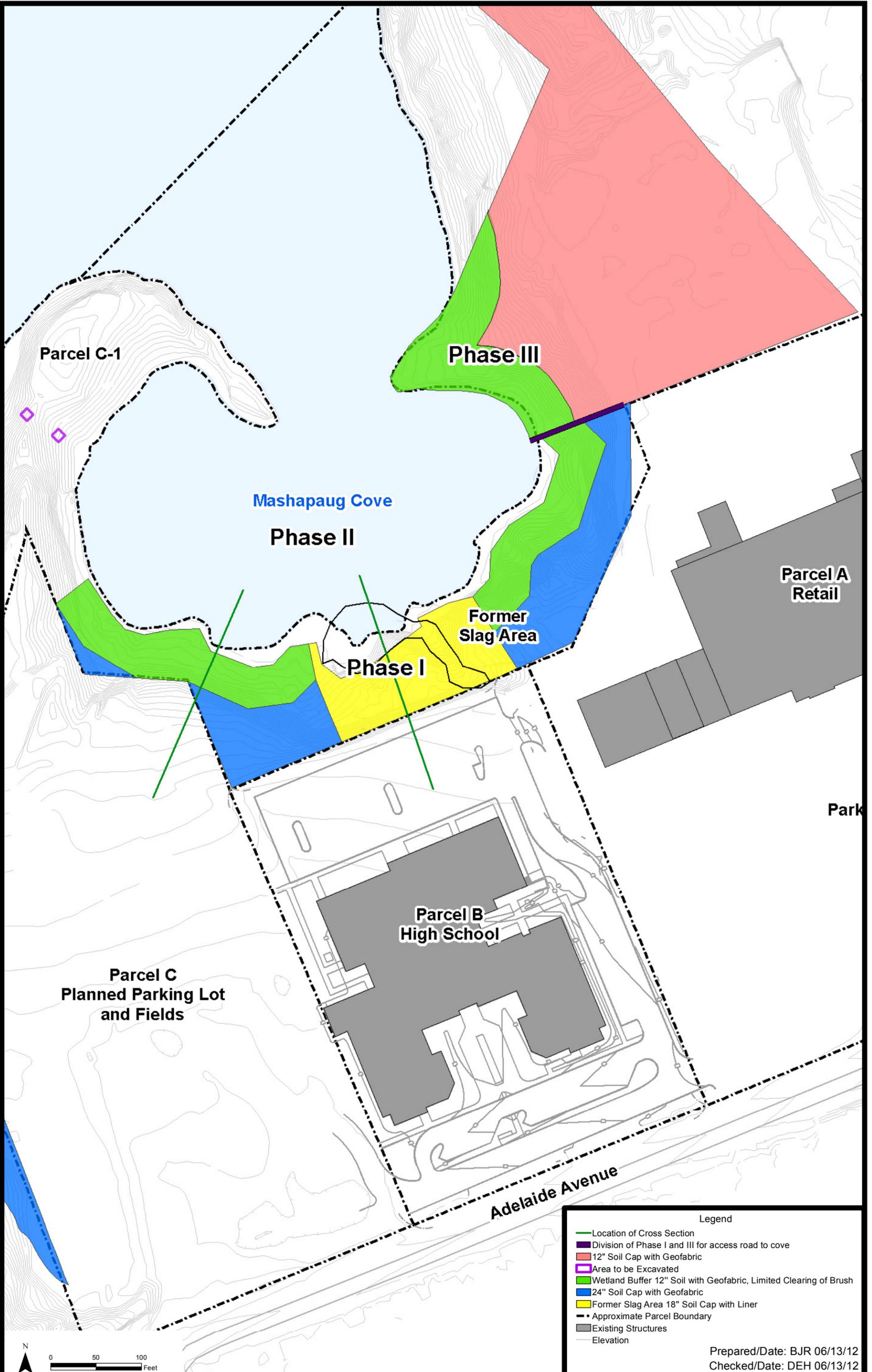


Prepared/Date: BJR 06/13/12

Checked/Date: DEH 06/13/12

Figure 4  
 Former Slag Pile Area  
 Former Gorham Manufacturing Site  
 Remedial Action Work Plan  
 Phase I Parcel C-1  
 333 Adelaide Avenue  
 Providence, RI

Document: P:\TEXT\TRIGORHAM\GIS\MapDocuments\RAWP - Phase I\RAWP\_11x17\_P.mxd PDF: P:\old\Wakefield\_Data\projects\3650110213 - Texton - Draft & Final RAWP\4.0 Project Deliverables\4.2 Work Plans\FIGURE5 - Approximate Location of Cap Cross Section Details.pdf



Remedial Action Work Plan  
Parcel C-1  
333 Adelaide Avenue  
Providence, RI



Approximate Location of Cap Cross Section Details  
Former Gorham Manufacturing Site  
Project 3650-11-0213  
Figure 5

Prepared/Date: BJR 06/13/12  
Checked/Date: DEH 06/13/12

TEXTRON, INC.  
FORMER GORHAM MANUFACTURING FACILITY, PROVIDENCE, RI  
REMEDIAL ACTION WORK PLAN – PHASE I SOIL CAPPING: PARCEL C-1

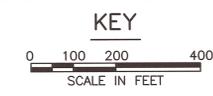
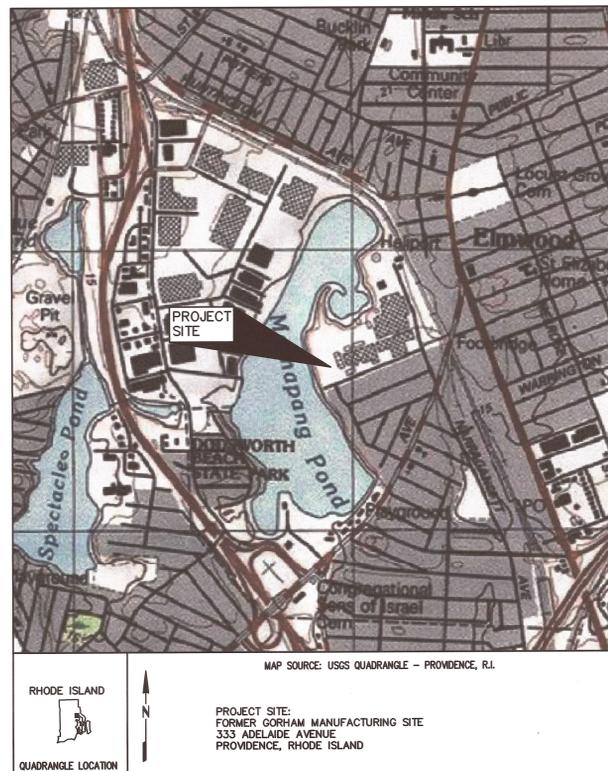
## **APPENDIX A**

### **DRAWINGS**

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# PARCEL C-1 PHASE I CAP FORMER GORHAM MANUFACTURING SITE PROVIDENCE, RHODE ISLAND MAY 24, 2012 ISSUED FOR BID

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MAP SOURCE: GIS COLOR ORTHO IMAGE OF PROVIDENCE COUNTY R.I.  
FILE: 3426 AND 3428

### DRAWING INDEX

SHEET NUMBER	DRAWING TITLE	DISCIPLINE NUMBER
1	COVER SHEET	G-001
2	GENERAL NOTES, ABBREVIATIONS, AND LEGEND	G-002
3	OVERALL SITE PLAN	C-101
4	DEMOLITION, EROSION CONTROL, AND SUBGRADE GRADING PLAN 1	C-102
5	DEMOLITION, EROSION CONTROL, AND SUBGRADE GRADING PLAN 2	C-103
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10	RESTORATION PLAN 1	C-108
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13	DETAILS 1	C-501
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15	DETAILS 3	C-503

ISSUED BY	DATE	REVISION	ISSUE / REVISION DESCRIPTION
DAE	06/13/12	1	ADDED/AM 1
DAE	06/24/12	0	ISSUED FOR BID
DAE	05/09/12	A	ISSUED FOR CLIENT REVIEW

PROJECT: **PARCEL C-1 PHASE 1 CAP  
TEXTRON, INC.  
FORMER GORHAM MANUFACTURING SITE  
333 ADELAIDE AVENUE, PROVIDENCE, RI**

TITLE: **COVER SHEET**



SEAL: **ROBERT J. BUKOWSKI**  
No. 9217  
REGISTERED PROFESSIONAL ENGINEER  
6/13/12

DESIGNED BY: DAA  
DRAWN BY: DED  
CHECKED BY: JPM  
DATE: 09 MAY 2012  
SCALE: AS SHOWN  
REVISION: 1

PROJECT NUMBER: 3850110213  
DRAWING NUMBER: **G-001**  
SHEET NUMBER: **1 OF 15**

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GENERAL NOTES:

- 1. PLANS HAVE BEEN COMPILED FROM ON-SITE INVESTIGATIONS, GIS, LIDAR AND SURVEY. SEE PLAN REFERENCES FOR FURTHER INFORMATION.
2. HORIZONTAL AND VERTICAL LAYOUT BASED UPON THE CONTROL DATUM SHOWN ON C-101.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REVIEW OF ALL DRAWINGS PRIOR TO ANY CONSTRUCTION. ANY DISCREPANCY SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER AND ENGINEER, INCLUDING DISCREPANCIES TO ANY CODE/REGULATORY REQUIREMENT, PRIOR TO START OF CONSTRUCTION. IF ANY DISCREPANCIES OR PROBLEMS ARE ENCOUNTERED DURING CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
4. ALL ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL, STATE, AND FEDERAL JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. THE WORK SHALL ALSO CONFORM TO ALL APPLICABLE TEXTRON REQUIREMENTS.
5. CONTRACTOR SHALL INCLUDE FURNISHING ALL MATERIALS, EQUIPMENT, AND LABOR NECESSARY TO COMPLETE THE WORK.
6. THE CONTRACTOR SHALL OBTAIN AUTHORIZATION TO PROCEED WITH CONSTRUCTION PRIOR TO STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED BY THE CONTRACT DOCUMENTS.
7. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE OWNER, ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.
9. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH, AND EQUIPMENT AS SPECIFIED. CONTRACTOR SHALL CLEAN AND SUPPLY A ROLL-OFF CONTAINER OR DUMPSTER TO BE EMPTIED AS NEEDED. CLEANING SHALL BE IN COMPLIANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS. AT PROJECT COMPLETION, PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.
10. DISPOSAL OF ALL MATERIALS SHALL BE COMPLETED IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS AND SHALL BE THE CONTRACTOR'S RESPONSIBILITY. EXCESS IMPACTED MATERIAL SHALL BE STOCKPILED IN THE NORTHEAST STAGING AREA AND DISPOSAL SHALL BE COORDINATED WITH TEXTRON.
11. THE CONTRACTOR SHALL COMPLY WITH ALL OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) REQUIREMENTS AS THEY APPLY TO THIS PROJECT. ANY PERSONNEL THAT HAVE THE POTENTIAL TO BE EXPOSED TO HAZARDOUS OR POTENTIALLY HAZARDOUS MATERIALS, SHALL BE TRAINED AND PERFORM ALL WORK IN COMPLIANCE WITH 29 CFR 1910.120, HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE (HAZWOPER).
12. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, AND EXISTING FEATURES. PRIOR TO THE START OF ANY WORK, ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER. CONTRACTOR SHALL VERIFY ACTUAL FIELD CONDITIONS PRIOR TO CONSTRUCTION.
13. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL UTILITIES AND SERVICES THROUGHOUT THE DURATION OF THE PROJECT. THE CONTRACTOR SHALL PROTECT ALL UTILITY LINES THROUGHOUT ALL PHASES OF WORK.
14. UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND MAY NOT INCLUDE ALL UTILITIES WITHIN THE PROJECT SITE.
15. THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF ALL UNDERGROUND PIPING AND STRUCTURES PRIOR TO ANY EXCAVATION ACTIVITIES BY CONTACTING RHODE ISLAND DIG-SAFE (1-800-DIG-SAFE) (72) HOURS BEFORE STARTING CONSTRUCTION ACTIVITIES FOR FIELD MARKING UNDERGROUND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING UNDERGROUND UTILITIES THAT MAY NOT BE MARKED BY THE UTILITY COMPANIES. SUBSURFACE CONDITIONS ARE NOT GUARANTEED. THE CONTRACTOR SHALL REPAIR CONTRACTOR-CAUSED DAMAGE ACCORDING TO LOCAL STANDARDS AT CONTRACTOR'S EXPENSE.
16. UNLESS OTHERWISE NOTED, ALL EXISTING FEATURES DESIGNATED ON THE PLANS ARE TO REMAIN, INCLUDING, BUT NOT LIMITED TO, TREES, SIGNS, AND SIGN POSTS. FEATURES SHALL BE VERIFIED, LOCATED AND PROTECTED DURING ALL PHASES OF CONSTRUCTION.
17. THE SITE IS ADJACENT TO AN ACTIVE NEIGHBORHOOD, HIGH SCHOOL, AND RETAIL CENTER WHICH WILL BE OPERATIONAL DURING CONSTRUCTION. ALL CONSTRUCTION ACTIVITIES MUST BE COMPLETED WITH RESPECT TO THE ONGOING ACTIVITIES OF THE SURROUNDING AREAS. ACCESS ROADWAYS SHALL REMAIN OPEN AND FREE OF DEBRIS AT ALL TIMES.
18. ALL ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH THE RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT SOIL EROSION AND SEDIMENT CONTROL PLAN, RHODE ISLAND STORMWATER DESIGN AND INSTALLATION STANDARDS MANUAL, THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP), AND THE RHODE ISLAND POLLUTION DISCHARGE ELIMINATION SYSTEM (RIDDES), CONSTRUCTION GENERAL PERMIT.
19. CONTRACTOR SHALL LIMIT ALL CONSTRUCTION ACTIVITIES TO LIMITS OF DISTURBANCE. AS SHOWN AND REQUIRED TO REACH ALL SOIL REMOVAL AREAS SHOWN ON SHEET C-101.
20. PLACING OF TOPSOIL AND HYDROSEEDING SHALL NOT OCCUR UNTIL AUTHORIZED BY THE ENGINEER.
21. BACKFILL MATERIALS AND COMPACTION REQUIREMENTS SHALL BE PERFORMED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
22. ALL ROADWAYS AND BUILDINGS SHALL BE MAINTAINED AND PROTECTED AS DESCRIBED IN THE SPECIFICATIONS. DAMAGED AND REMOVED SECTIONS OF ROADWAY SHALL BE REPLACED IN KIND, AND AT CONTRACTOR'S EXPENSE IF NOT PART OF THE WORK.
23. DISTURBED AREAS SHALL BE SEEDED AS SPECIFIED IN THE CONTRACT DOCUMENTS.
24. THE CONTRACTOR SHALL REPORT TO THE CLIENT OR THE ENGINEER ALL SPILLS AND LEAKS OF OIL OR OTHER HAZARDOUS SUBSTANCES (E.G., OIL, ANTIFREEZE, CHEMICALS, ETC.) OCCURRING DURING THE PERFORMANCE OF THIS CONTRACT IMMEDIATELY UPON DISCOVERY, REGARDLESS OF THE QUANTITY.
25. THE CONTRACTOR SHALL PREVENT DEBRIS FROM ENTERING ALL SWALES, INLETS, AND BASINS. PROVIDE AND MAINTAIN INLET PROTECTION FOR THE DURATION OF THE WORK. CLEAN ALL STRUCTURES AT THE COMPLETION OF THE WORK.
26. CONTRACTOR SHALL PROVIDE A FULL SET OF AS-BUILT DRAWINGS TO THE OWNER AT THE COMPLETION OF THE PROJECT IN CONFORMANCE WITH THE CONTRACT DOCUMENTS.
27. ELEVATED CONCENTRATIONS OF PAHs AND METALS EXIST IN SURFACE SOILS WITHIN THE PROPOSED CONSTRUCTION LAYDOWN/STAGING/DECONTAMINATION AREAS. CONTRACTOR SHALL PERFORM DECONTAMINATION ACTIVITIES IN ACCORDANCE WITH THE SPECIFICATIONS. ALL MATERIAL STAGED WITHIN THIS AREA MUST BE SEGREGATED SUCH THAT THERE IS NO CROSS CONTAMINATION.

28. CONTRACTOR TO PROVIDE DEWATERING AND SHORING DESIGN TO THE ENGINEER FOR APPROVAL FOR THE INSTALLATION OF THE FORMER SLAG AREA CAP.

GRADING, DRAINAGE, AND EROSION CONTROL NOTES:

- 1. NO VEGETATION SHALL BE DISTURBED EXCEPT AS NOTED HEREON OR AS NECESSARY FOR GRADING PURPOSES AND ONLY AS APPROVED BY THE ENGINEER. NO HEAVY EQUIPMENT SHALL BE OPERATED OR STORED AND NO MATERIALS SHALL BE HANDLED OR STORED WITHIN THE DRIP LINES OF UNDISTURBED TREES OR WITHIN 50 FEET FROM THE LIMIT OF WETLANDS AND/OR MASHAPAUG POND.
2. ALL DISTURBED AREAS WHICH ARE FINISH GRADED WITH NO FURTHER CONSTRUCTION TO TAKE PLACE SHALL BE STABILIZED WITH SEED AND MULCH WITHIN 7 CALENDAR DAYS AFTER GRADING IS COMPLETE. AREAS WHICH ARE NOT TO FINAL GRADE BUT WILL NOT BE REWORKED FOR 21 DAYS MUST BE TEMPORARILY SEEDED AND MULCHED WITHIN 14 CALENDAR DAYS.
3. CONSTRUCT TEMPORARY EROSION CONTROL AS SHOWN ON THE DRAWINGS PRIOR TO STARTING WORK. THE SMALLEST PRACTICAL AREA OF LAND SHOULD BE EXPOSED AT ANY ONE TIME DURING CONSTRUCTION. WHEN LAND IS EXPOSED DURING CONSTRUCTION, THE EXPOSURE SHOULD BE KEPT TO THE SHORTEST PRACTICAL PERIOD OF TIME. LAND SHOULD NOT BE LEFT EXPOSED DURING THE WINTER MONTHS.
4. ALL DRAINAGE STRUCTURES (INCLUDING SWALES) IMPACTED BY THE CONTRACTOR'S ACTIVITIES SHALL BE INSPECTED WEEKLY AND DAILY DURING STORM EVENTS. INLET PROTECTION DEVICES SHOULD BE CLEANED OR REMOVED AND REPLACED BEFORE SIX INCHES OF SEDIMENT CAN ACCUMULATE.
5. SILT FENCE AND AUGMENTED SILT FENCE SHALL BE INSTALLED AND MAINTAINED WHERE SHOWN. ADDITIONAL PERIMETER CONTROLS SHALL BE ADDED AS REQUIRED BY THE ENGINEER PRIOR TO ANY ON SITE DISTURBANCE OF EXISTING SURFACE MATERIAL. SILT FENCE SHALL BE MAINTAINED DURING AND AFTER CONSTRUCTION TO REMOVE SEDIMENT FROM RUNOFF WATER AND FROM LAND UNDERGOING CONSTRUCTION. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN ITS DEPTH REACHES 50% OF THE HEIGHT OF THE FENCE. WHERE POSSIBLE, NATURAL DRAINAGE WAYS SHOULD BE UTILIZED AND LEFT OPEN TO REMOVE CLEAN EXCESS SURFACE WATER.
6. ALL LOCATIONS OF TEMPORARY EROSION CONTROL DEVICES SHALL BE SUBJECT TO ADJUSTMENT AS REQUIRED BY THE ENGINEER, AND SHALL BE REPLACED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
7. TEMPORARY EROSION AND SEDIMENT CONTROL BMPs (INCLUDING ALL CONSTRUCTION ENTRANCES) SHALL BE REMOVED WITHIN 30 CALENDAR DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMPs ARE NO LONGER NEEDED AS DETERMINED BY THE ENGINEER. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON SITE. DISTURBED SOIL RESULTING FROM REMOVAL OF BMPs OR VEGETATION SHALL BE PERMANENTLY STABILIZED (80% VEGETATION DENSITY).
8. REPLACE DAMAGED SILT BARRIERS AS REQUIRED BY THE ENGINEER AND IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
9. CONTRACTOR SHALL VERIFY EXISTING ELEVATIONS AND INVERTS PRIOR TO BEGINNING WORK.
10. EXISTING CONTOUR LINES AND SPOT ELEVATIONS ARE THE RESULT OF FIELD SURVEY, GIS AND LIDAR DATA. SHOULD THE CONTRACTOR HAVE ANY QUESTIONS OF THEIR INTENT OR ANY PROBLEMS WITH CONTINUITY OF GRADES, THE ENGINEER SHALL BE CONTACTED PRIOR TO BEGINNING WORK.
11. STABILIZE ALL STOCKPILES AND ALL OTHER AREAS OF THE SITE THAT SHALL REMAIN UNDISTURBED FOR 15 CALENDAR DAYS OR MORE.
12. CONTRACTOR SHALL NOT LEAVE ANY OPEN HOLES WITH A DROP GREATER THAN 12" OVERNIGHT.
13. STORMWATER DRAINAGE SHALL BE CONTROLLED ONSITE, SUCH THAT THERE IS NO CHANNELIZED FLOW OF RUNOFF TOWARDS THE POND BANK.
14. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AS SHOWN ON THE DRAWINGS AND WHEREVER CONSTRUCTION TRAFFIC ENTERS AND LEAVES THE SITE.
15. THE EROSION CONTROL DEVICES SHOWN ON THE DRAWINGS AND AS SPECIFIED IN THE CONTRACT DOCUMENTS REPRESENT THE MINIMUM REQUIRED FOR EROSION CONTROL. THE CONTRACTOR SHALL ADD TO THESE DEVICES ANY AND ALL MEASURES AS REQUIRED BY THE ENGINEER TO EFFECTIVELY PREVENT EROSION AND MIGRATION OF SEDIMENT FROM THE WORK AREA.
16. ALL EXCAVATION AND FILL ACTIVITIES WITHIN THE FORMER SLAG AREA TO BE COORDINATED SUCH THAT NO SLAG MATERIAL IS REMOVED FROM WITHIN THE FORMER SLAG AREA CAP. EXCESS SURFICIAL FILL MATERIAL MAY BE BROUGHT INTO THE FORMER SLAG AREA CAP TO COMPLETE THE SUBGRADE GRADING.
17. ALL SURFICIAL FILL MATERIALS TO BE CONSOLIDATED SHALL ONLY BE STOCKPILED WITHIN THE PROPOSED LIMITS OF CAPPING. NO IMPACTED MATERIALS SHALL BE STOCKPILED OUTSIDE THE PROPOSED LIMITS OF CAP.
18. ALL INTERNAL HAUL TRUCKS CONSOLIDATING IMPACTED MATERIAL SHALL BE DECONTAMINATED PRIOR TO ACCESSING CLEAN AREAS WITHIN THE SITE.

PLAN REFERENCES:

- 1. PLAN PREPARED BY THE U.S. ARMY CORPS OF ENGINEERS, ENTITLED 'SEWER SYSTEM' DATED SEPTEMBER 1943 AND REVISED OCTOBER 1943 (AS-BUILT) ORIGINAL SCALE: 1" = 100'
2. SELECTED SITE FEATURES DIGITIZED FROM DIVERSIFIED TECHNOLOGY CONSULTANTS' FIGURE 7 TITLED 'BATTERY HAMILTON AND BORINGS/SAMPLING LOCATIONS' DATED AUGUST 8, 1999 FROM THE 'RESEARCH AND ASSESSMENT STUDY' DATED OCTOBER 2000.
3. WETLAND DELINEATION COMPLETED BY EA ENGINEERING ON MAY 23, 2007.
4. WETLAND DELINEATION REVIEWED IN THE FIELD BY RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT, AUGUST 2011.
5. TOPOGRAPHIC (1-FOOT CONTOURS) AND LOCATION SURVEY COMPLETED BY CABCO CONSULT TITLED 'TOPOGRAPHIC PLAN OF LAND' DATED MAY 24, 2007.
6. PARCEL B TOPOGRAPHY AND FIELD SURVEY COMPLETED BY EDWARD ROWSE ARCHITECTS TITLED 'PROVIDENCE HIGH SCHOOL, GORHAM MILLS, PROVIDENCE RHODE ISLAND, SITE PLAN DATED 2007.
7. PARCEL A TOPOGRAPHY AND FIELD SURVEY COMPLETED BY VANASSE HANGEN BRUSTLIN, INC. (VHB) TITLED 'RETAIL DEVELOPMENT SITE PLAN' DATED 2001.

SUGGESTED CONSTRUCTION SEQUENCE:

- 1. ESTABLISH VERTICAL AND HORIZONTAL CONTROL.
2. SITE PREPARATION. CONTRACTOR SHALL INSTALL EROSION CONTROLS, TURBIDITY CURTAIN AND OTHER ENVIRONMENTAL PROTECTIONS PRIOR TO STARTING OTHER WORK.
3. ESTABLISH THE CONSTRUCTION LAYDOWN/STAGING/DECONTAMINATION AREAS. INSTALL ALL TEMPORARY FACILITIES AND CONTROLS.
5. CONSTRUCT TEMPORARY ACCESS ROADS TO THE WORK AREAS FOR ACCESSIBILITY.
6. CLEAR AND GRUB TO THE LIMITS SHOWN ON THE PLAN.
7. DEMOLITION AND ABANDONMENT.
8. REMOVE/RELOCATE EXISTING FENCE.
9. HOT SPOT REMOVAL AND TEST PIT (TYP 10) TO BE PERFORMED IN FORMER SLAG CAP AREA WITH ENGINEER CONFIRMATORY SAMPLING.
10. INSTALL SHORING AND DEWATERING.
11. REGRADE THE FILL MATERIAL SUCH THAT SUBGRADE ELEVATIONS ARE ACHIEVED.
12. RAISE LOWER MONITORING WELLS TO COINCIDE WITH PROPOSED CAPPING SYSTEM ELEVATIONS.
13. INSTALL THE CAPPING SYSTEMS.
14. SEED ALL CAPPING SYSTEM AREAS.
15. FINE GRADE ALL REMAINING AREAS AND SEED AS APPROPRIATE.
16. INSTALL ALL EROSION CONTROL MATTING AND ANY OTHER EROSION CONTROL MEASURES NECESSARY TO STABILIZE DISTURBED AREAS UNTIL FINAL VEGETATIVE COVER IS ESTABLISHED.
17. SITE CLEAN UP.
18. REMOVE TEMPORARY EROSION AND SEDIMENTATION CONTROLS WITHIN 30 DAYS OF FINAL SITE STABILIZATION (ALL SOIL DISTURBING CONSTRUCTION ACTIVITIES ON SITE ARE COMPLETE AND THE PERMANENT VEGETATIVE COVER HAS ACHIEVED A 80% DENSITY OR GREATER).

ABBREVIATIONS:

Table with 2 columns: Abbreviation and Description. Includes entries for APPROX, BLDG, CB, CI, CENTER LINE, CONC, DIA, Ø, E, ELEV, FEET, GPM, HDPE, ID, INCHES, LF, MAX, MH, MIN, MW, N, NE, NTS, NW, OD, OZ, PPM, PVC, RC, S, SB, SE, SF, SW, TYP.

GENERAL LEGEND:

Table with 2 columns: Symbol and Description. Includes symbols for 1FT EXISTING CONTOUR, EXISTING LIMIT OF TREE, LARGE DIAMETER TREE WITH NUMERICAL DESIGNATION, LIMIT OF WETLAND, EDGE OF WATER, APPROXIMATE PARCEL BOUNDARY, EXISTING PROPERTY LINE, EXISTING PAVEMENT, EXISTING LIMIT OF SURFICIAL FILL, EXISTING TURBIDITY CURTAIN, PROPOSED TURBIDITY CURTAIN NO LONGER IN SCOPE OF WORK, EXISTING DRAIN LINE, EXISTING STRUCTURE, EXISTING MONITORING WELL, PROPOSED 1FT CONTOUR, PROPOSED 5FT CONTOUR, PROPOSED LIMIT OF TREE, TREE LINE TO BE REMOVED, PROPOSED LIMIT OF DISTURBANCE, EXISTING FENCE TO BE SALVAGED OR REMOVED, PROPOSED SILT FENCE, PROPOSED AUGMENTED SILT FENCE, PROPOSED GRAVEL ACCESS, PROPOSED EDGE OF GRAVEL, PROPOSED LIMIT OF CAPPING SYSTEM, EXISTING FENCE, PROPOSED RELOCATED FENCE, PROPOSED MONITORING WELL.

amec ENVIRONMENT & INFRASTRUCTURE 2 ROBBINS ROAD WESTFORD, MASSACHUSETTS 01886 TELEPHONE: (978) 692-9090 FAX: (978) 692-9030 WEB: WWW.AMEC.COM

Revision table with columns: NO., DATE, REVISION, ISSUED BY, APPROVED BY. Includes entries for ADDENDUM 1, ISSUED FOR BID, ISSUED FOR CLIENT REVIEW.

PROJECT: PARCEL C-1 PHASE 1 CAP TEXTRON, INC. FORMER GORHAM MANUFACTURING SITE 333 ADELAIDE AVENUE, PROVIDENCE, RI TITLE: GENERAL NOTES, ABBREVIATIONS, AND LEGEND

CLIENT: TEXTRON

Professional Engineer seal for ROBERT J. BUKOWSKI, No. 9217, REGISTERED PROFESSIONAL ENGINEER.

Design and drawing information table with fields: DESIGNED BY (DAA), DRAWN BY (DED), CHECKED BY (JPM), DATE (09 MAY 2012), SCALE (AS SHOWN), REVISION (1), PROJECT NUMBER (3650110213), DRAWING NUMBER (G-002), SHEET NUMBER (2 OF 15).

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REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED BY	APPROVED
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A	05/09/12	ISSUED FOR CLIENT REVIEW		

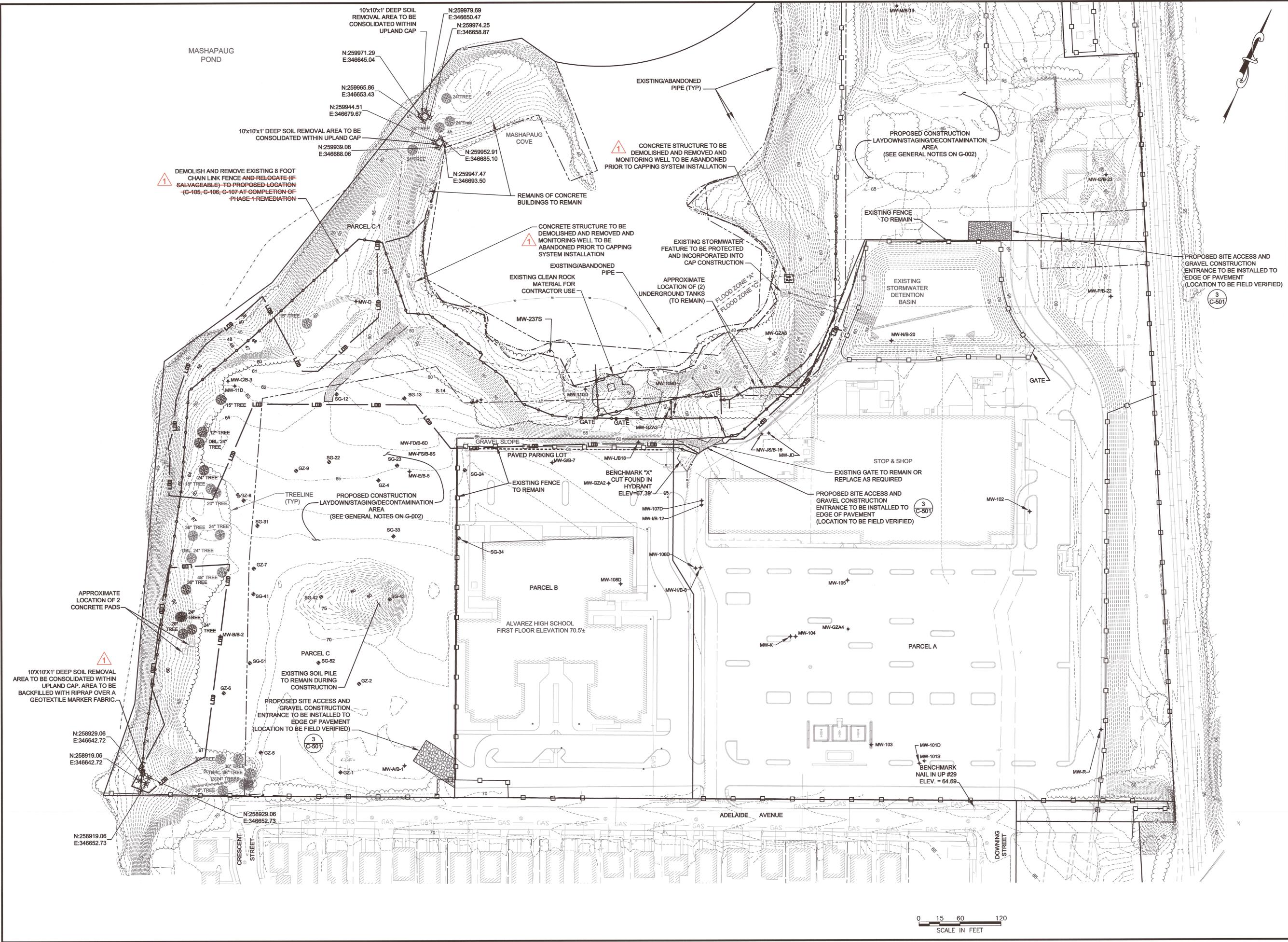
PROJECT: **PARCEL C-1 PHASE 1 CAP**  
**TEXTRON, INC.**  
 FORMER GORHAM MANUFACTURING SITE  
 333 ADELAIDE AVENUE, PROVIDENCE, RI  
 TITLE: **OVERALL SITE PLAN**



CLIENT: ROBERT J. BUKOWSKI  
 No. 9217  
 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY: DAA  
 CHECKED BY: JPM  
 SCALE: AS SHOWN  
 DRAWN BY: DED  
 DATE: 09 MAY 2012  
 REVISION: 1

PROJECT NUMBER: 3650110213  
 DRAWING NUMBER: **C-101**  
 SHEET NUMBER: **3 OF 15**



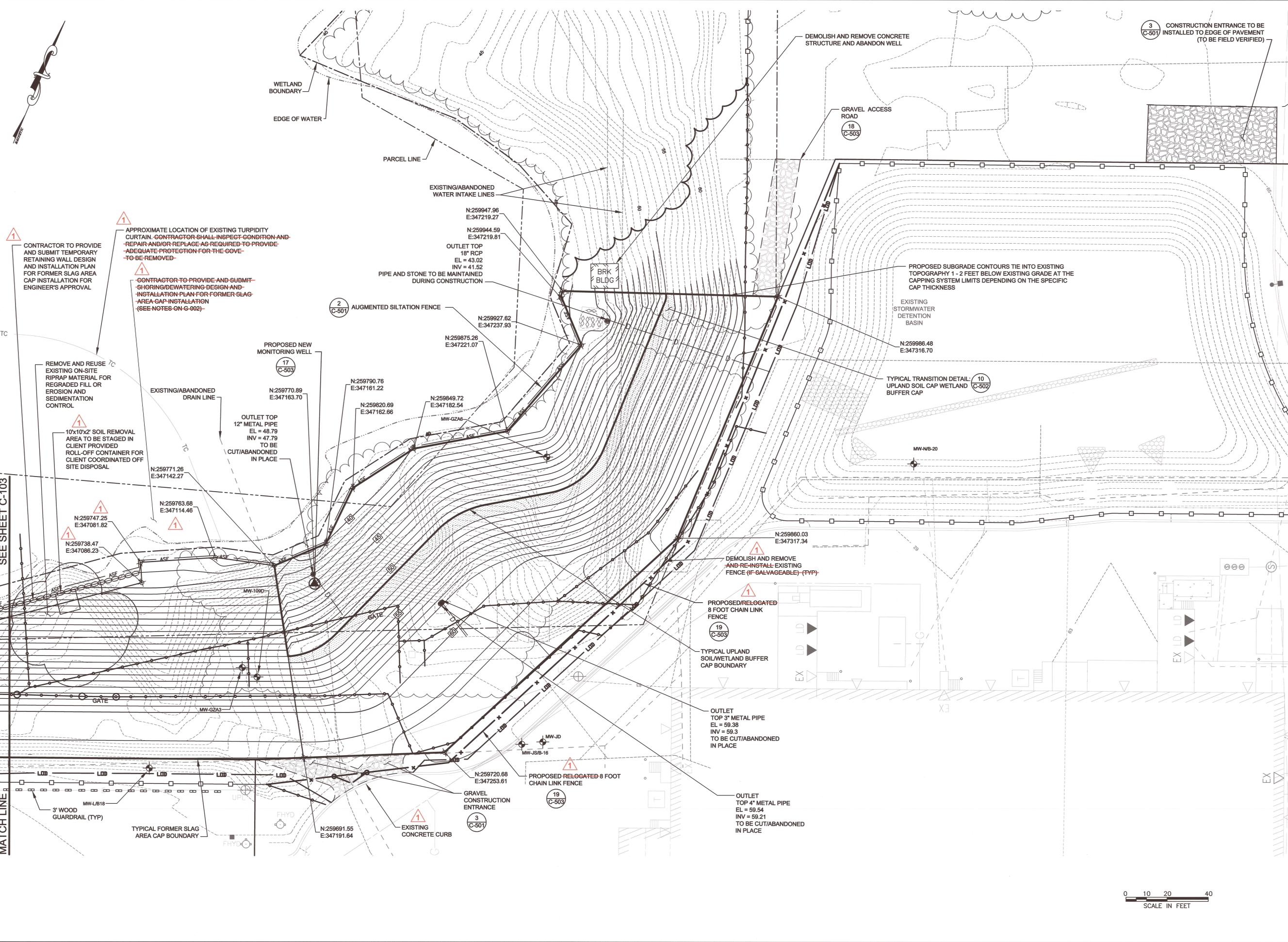
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ISSUED BY	DATE	REVISION	ISSUE / REVISION DESCRIPTION
RUB		1	ADDITION 1
RUB	06/13/12	0	ISSUED FOR BID
RUB	05/24/12	A	ISSUED FOR CLIENT REVIEW
RUB	05/09/12		

PROJECT: **PARCEL C-1 PHASE 1 CAP**  
**TEXTRON, INC.**  
 FORMER GORHAM MANUFACTURING SITE  
 333 ADELAIDE AVENUE, PROVIDENCE, RI  
 TITLE: **DEMOLITION, EROSION CONTROL, AND SUBGRADE GRADING PLAN 3**



CLIENT: **TEXTRON**

DESIGNED BY: DAA  
 CHECKED BY: JPM  
 SCALE: AS SHOWN

DRAWN BY: DED  
 DATE: 09 MAY 2012  
 REVISION: 1

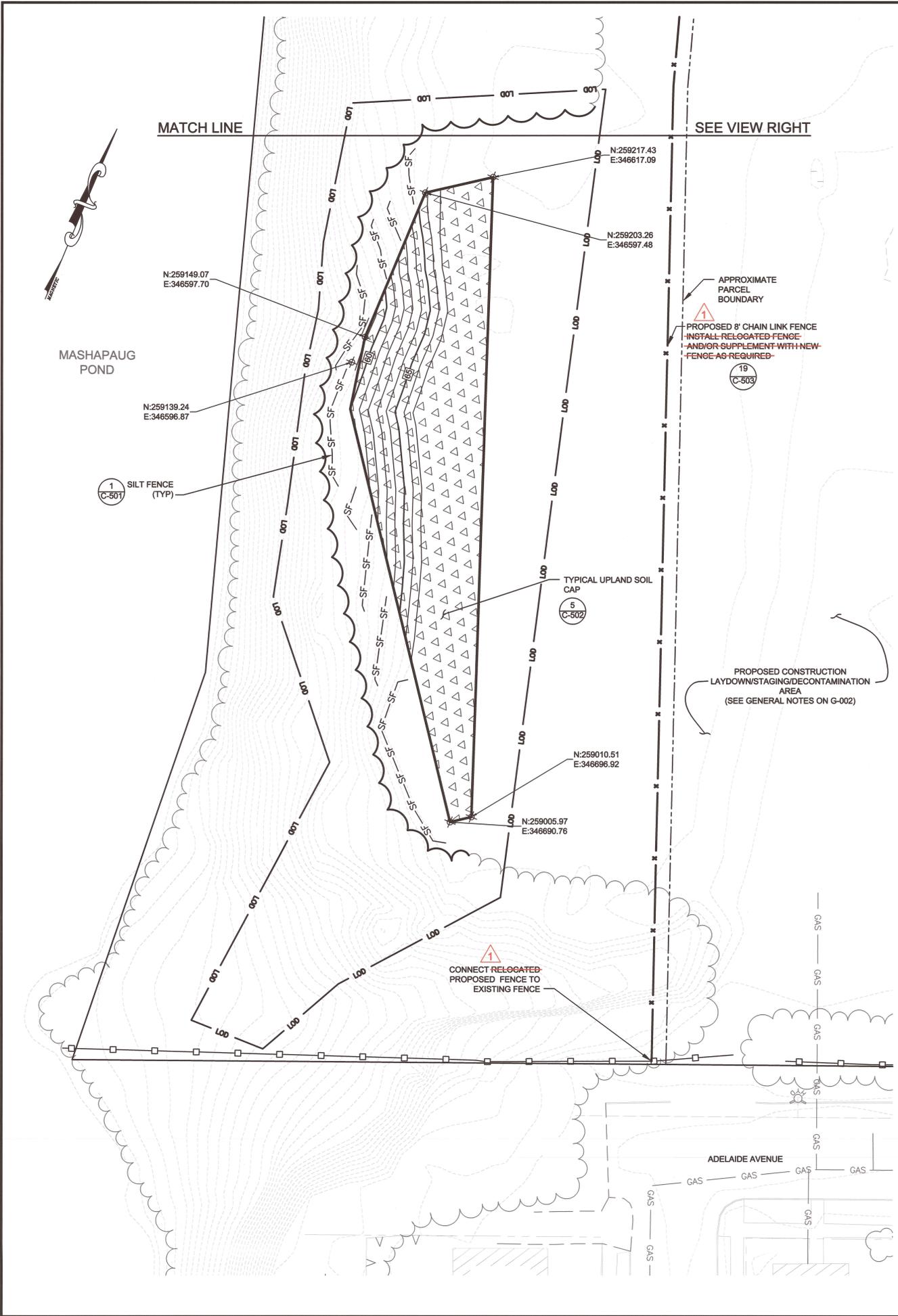
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 DRAWING NUMBER: **C-104**  
 SHEET NUMBER: **6 OF 15**

REGISTERED PROFESSIONAL ENGINEER  
 ROBERT J. BUKOWSKI  
 No. 9217

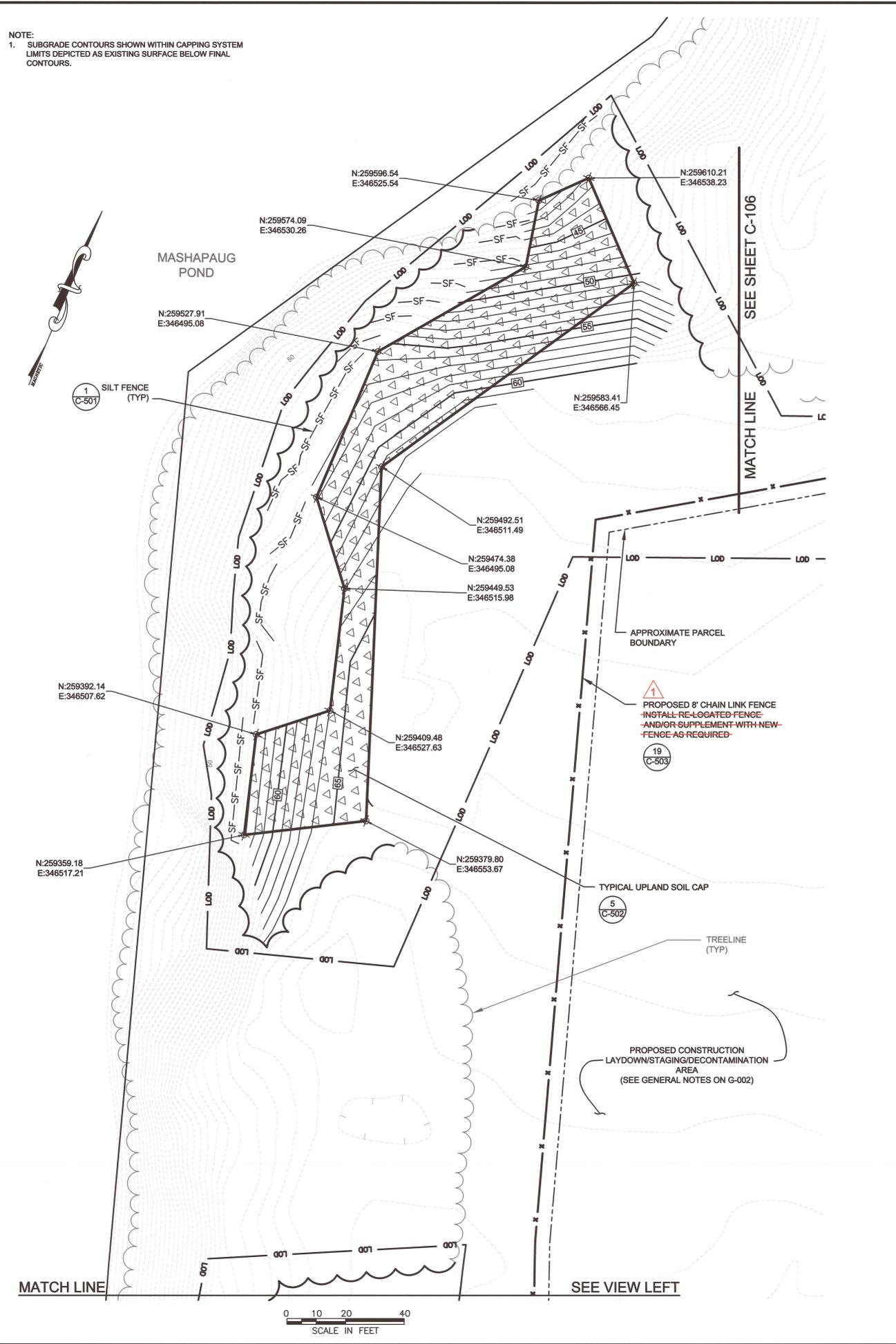
U:\DEPT-ENR\Textron\Gorham - Providence RI\CAD\Sheets\3650110213 - C-104.dwg - C-104 - Jun. 13, 2012 12:17pm - diana.dempsey



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NOTE:  
1. SUBGRADE CONTOURS SHOWN WITHIN CAPPING SYSTEM LIMITS DEPICTED AS EXISTING SURFACE BELOW FINAL CONTOURS.



REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED BY	APPROVED
1	06/13/12	ADDENDUM 1	DAA	RAB
0	06/24/12	ISSUED FOR BID	DAA	RAB
A	05/09/12	ISSUED FOR CLIENT REVIEW	DAA	RAB

PROJECT: **PARCEL C-1 PHASE 1 CAP**  
**TEXTRON, INC.**  
FORMER GORHAM MANUFACTURING SITE  
333 ADELAIDE AVENUE, PROVIDENCE, RI  
TITLE: **FINAL GRADING PLAN 1**



CLIENT: **ROBERT J. BUKOWSKI**  
No. **9217**  
REGISTERED PROFESSIONAL ENGINEER  
CIVIL  
DESIGNED BY: DAA  
DRAWN BY: DED  
CHECKED BY: JPM  
DATE: 09 MAY 2012  
SCALE: AS SHOWN  
REVISION: 1  
PROJECT NUMBER: 3650110213  
DRAWING NUMBER: **C-105**  
SHEET NUMBER: **7 OF 15**

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1	09/13/12	DAA	ADDENDUM 1	RUB
0	05/24/12	JPM	ISSUED FOR BID	RUB
A	05/08/12	JPM	ISSUED FOR CLIENT REVIEW	RUB

PROJECT: **PARCEL C-1 PHASE 1 CAP**  
 CLIENT: **TEXTRON, INC.**  
 TITLE: **FORMER GORHAM MANUFACTURING SITE**  
**333 ADELAIDE AVENUE, PROVIDENCE, RI**

**FINAL GRADING PLAN 2**

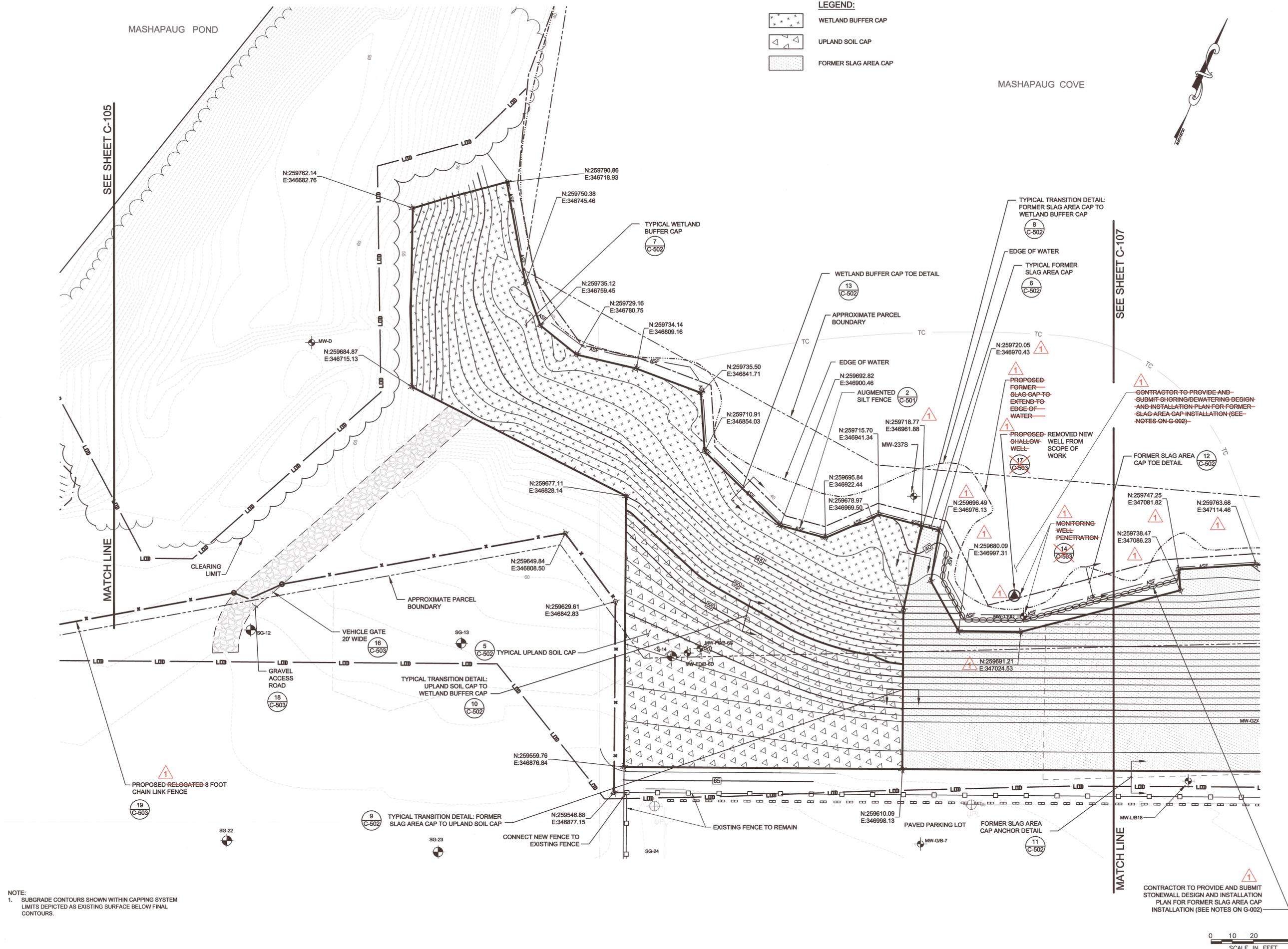
**TEXTRON**

CLIENT: **ROBERT J. BUKOWSKI**  
 No. **9217**  
 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY: DAA  
 CHECKED BY: JPM  
 SCALE: AS SHOWN

DRAWN BY: DED  
 DATE: 09 MAY 2012  
 REVISION: 1

PROJECT NUMBER: 3650110213  
 DRAWING NUMBER: **C-106**  
 SHEET NUMBER: **8 OF 15**

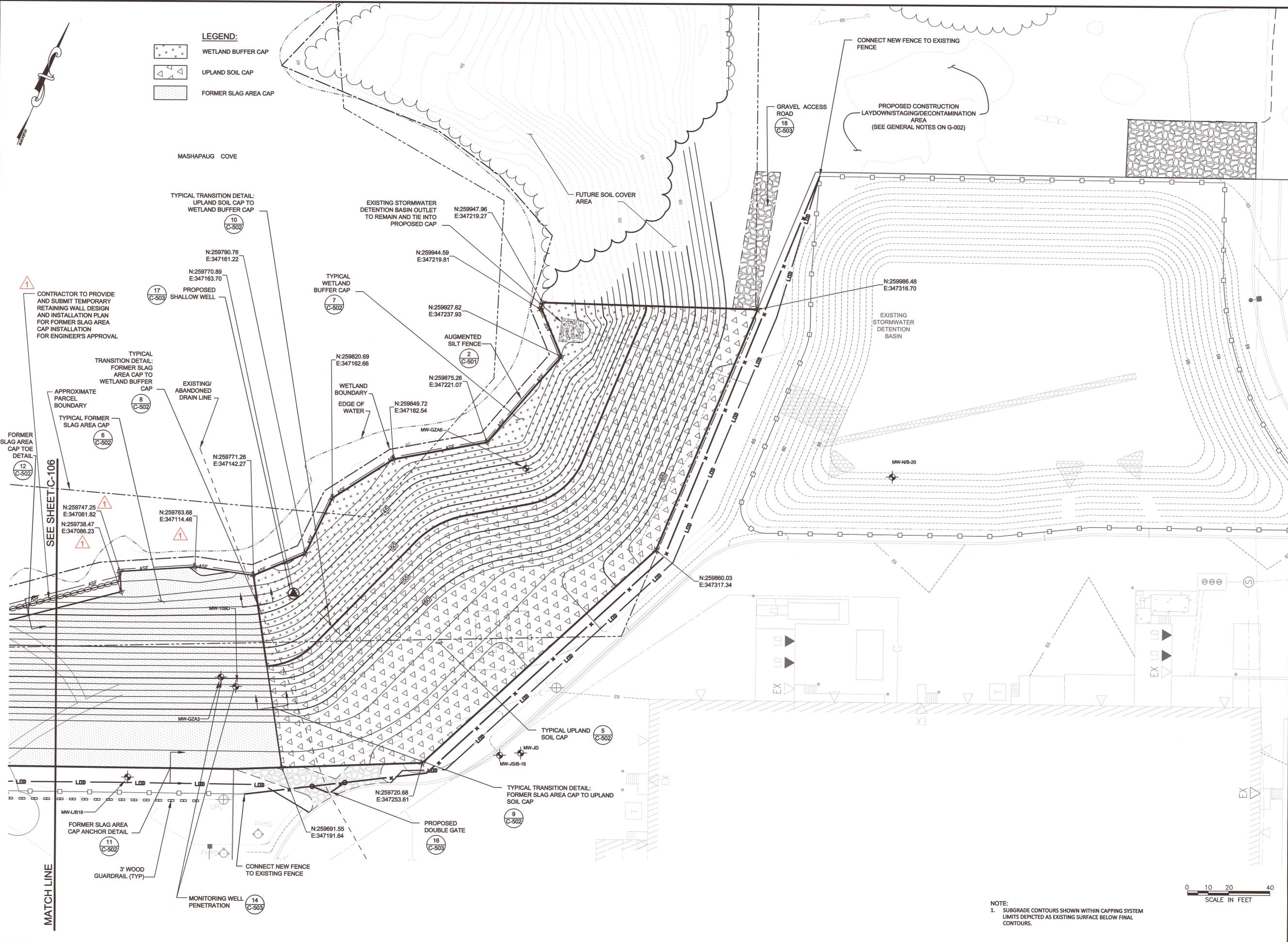


0 10 20 40  
 SCALE IN FEET

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**LEGEND:**

	WETLAND BUFFER CAP
	UPLAND SOIL CAP
	FORMER SLAG AREA CAP



REVISION	DATE	ISSUED BY	APPROVED
1	08/13/12	DAA	
0	05/24/12	DAA	
A	05/09/12	DAA	

PROJECT: **PARCEL C-1 PHASE 1 CAP**  
**TEXTRON, INC.**  
 FORMER GORHAM MANUFACTURING SITE  
 333 ADELAIDE AVENUE, PROVIDENCE, RI  
 TITLE: **FINAL GRADING PLAN 3**



CLIENT: **TEXTRON, INC.**

SEAL: **ROBERT J. BUKOWSKI**  
 No. 9217  
 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY: DAA	DRAWN BY: DED
CHECKED BY: JPM	DATE: 09 MAY 2012
SCALE: AS SHOWN	REVISION: 1

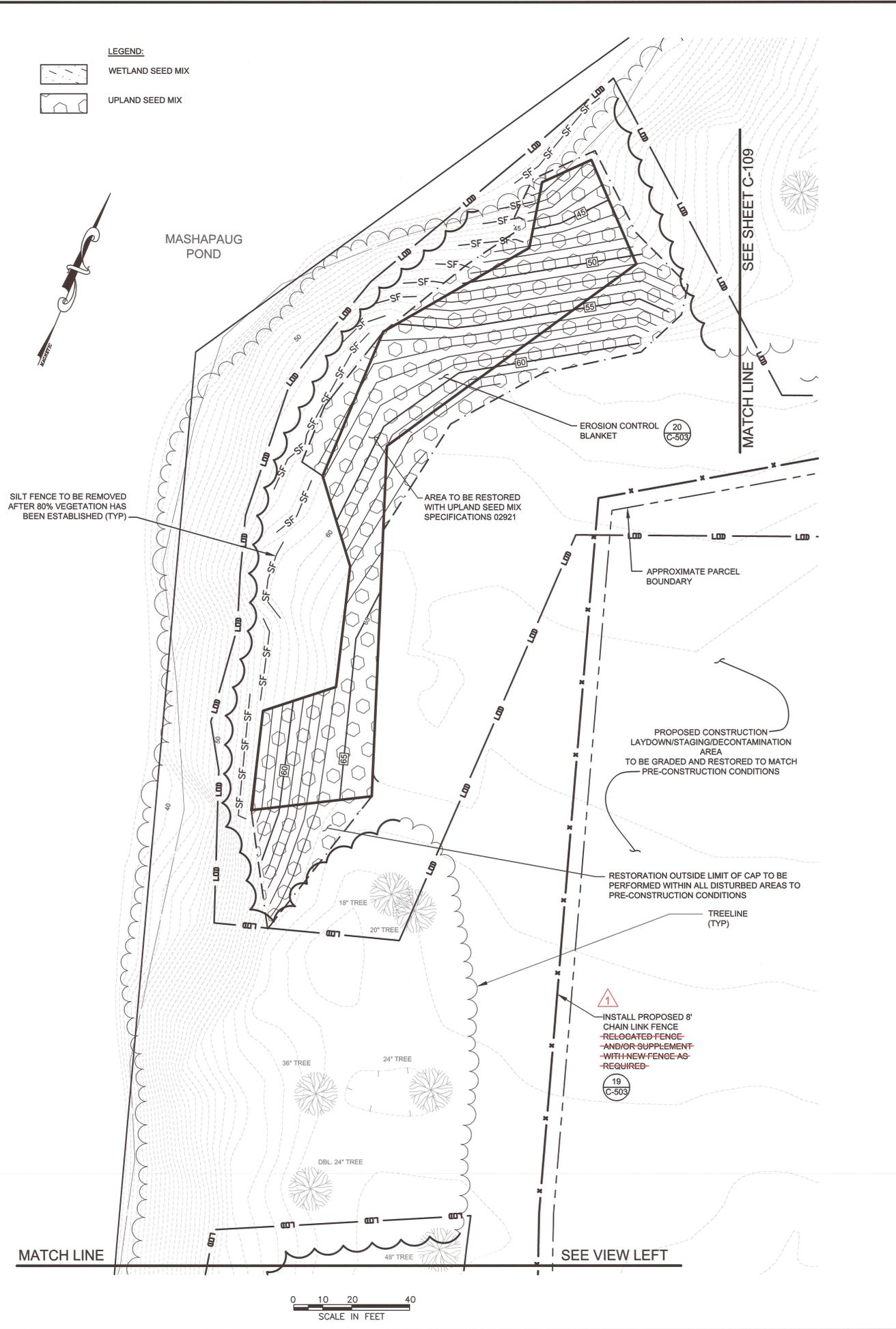
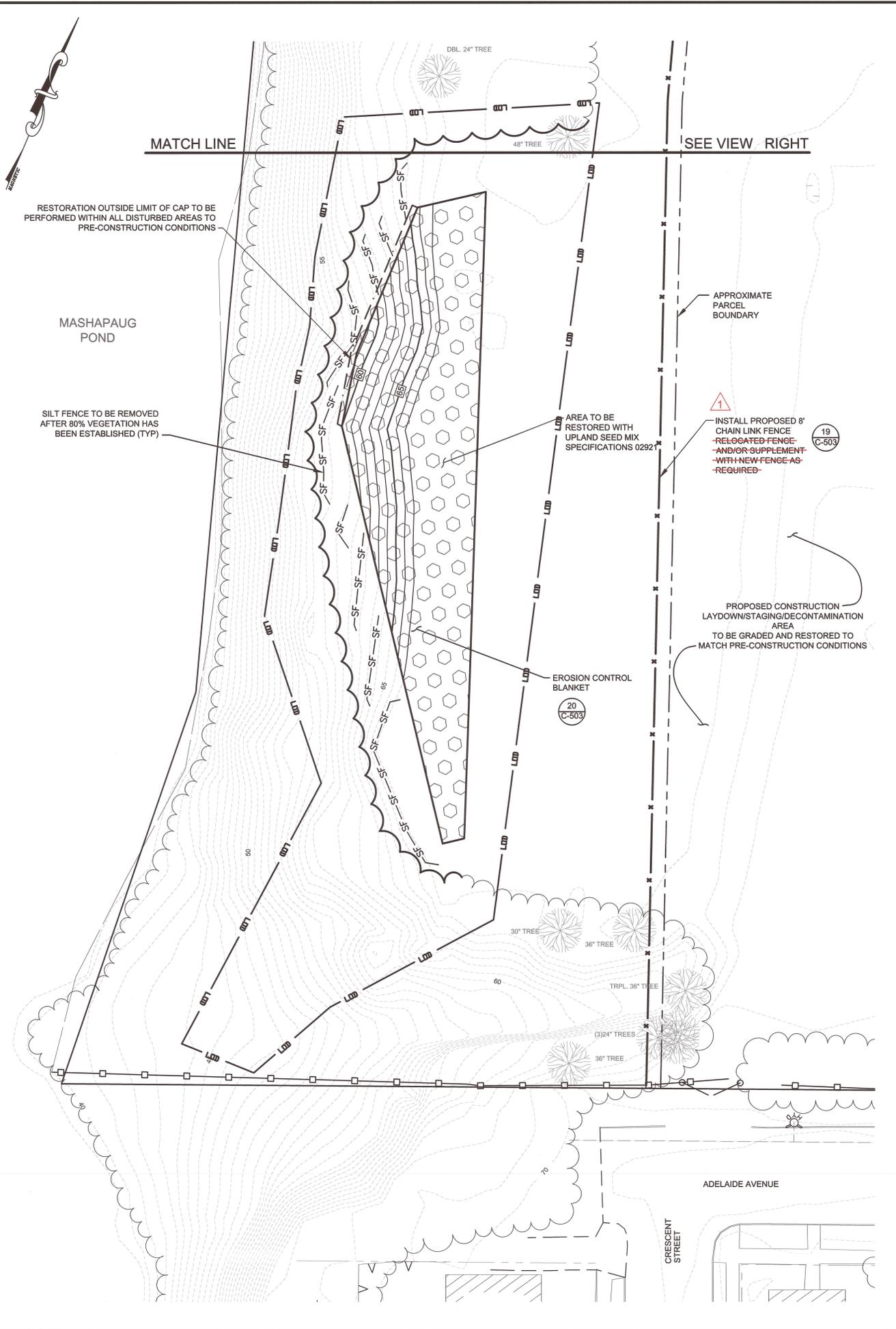
PROJECT NUMBER: 9550110213  
 DRAWING NUMBER: **C-107**  
 SHEET NUMBER: **9 OF 15**

NOTE:  
 1. SUBGRADE CONTOURS SHOWN WITHIN CAPPING SYSTEM LIMITS DEPICTED AS EXISTING SURFACE BELOW FINAL CONTOURS.

0 10 20 40  
 SCALE IN FEET

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**LEGEND:**

WETLAND SEED MIX

UPLAND SEED MIX

0 10 20 40  
SCALE IN FEET

**amec**  
ENVIRONMENT & INFRASTRUCTURE  
2 ROBBINS ROAD  
WESTFORD, MASSACHUSETTS 01886  
TELEPHONE: (978) 692-9090  
FAX: (978) 692-9553  
WEB: WWW.AMEC.COM

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1	06/13/12	ADDENDUM 1	DIA	RJB
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A	05/09/12	ISSUED FOR CLIENT REVIEW	DIA	RJB

**PROJECT:** PARCEL C-1 PHASE 1 CAP  
TEXTRON, INC.  
FORMER GORHAM MANUFACTURING SITE  
333 ADELAIDE AVENUE, PROVIDENCE, RI

**TITLE:** RESTORATION PLAN 1

**CLIENT:** TEXTRON

**SEAL:**

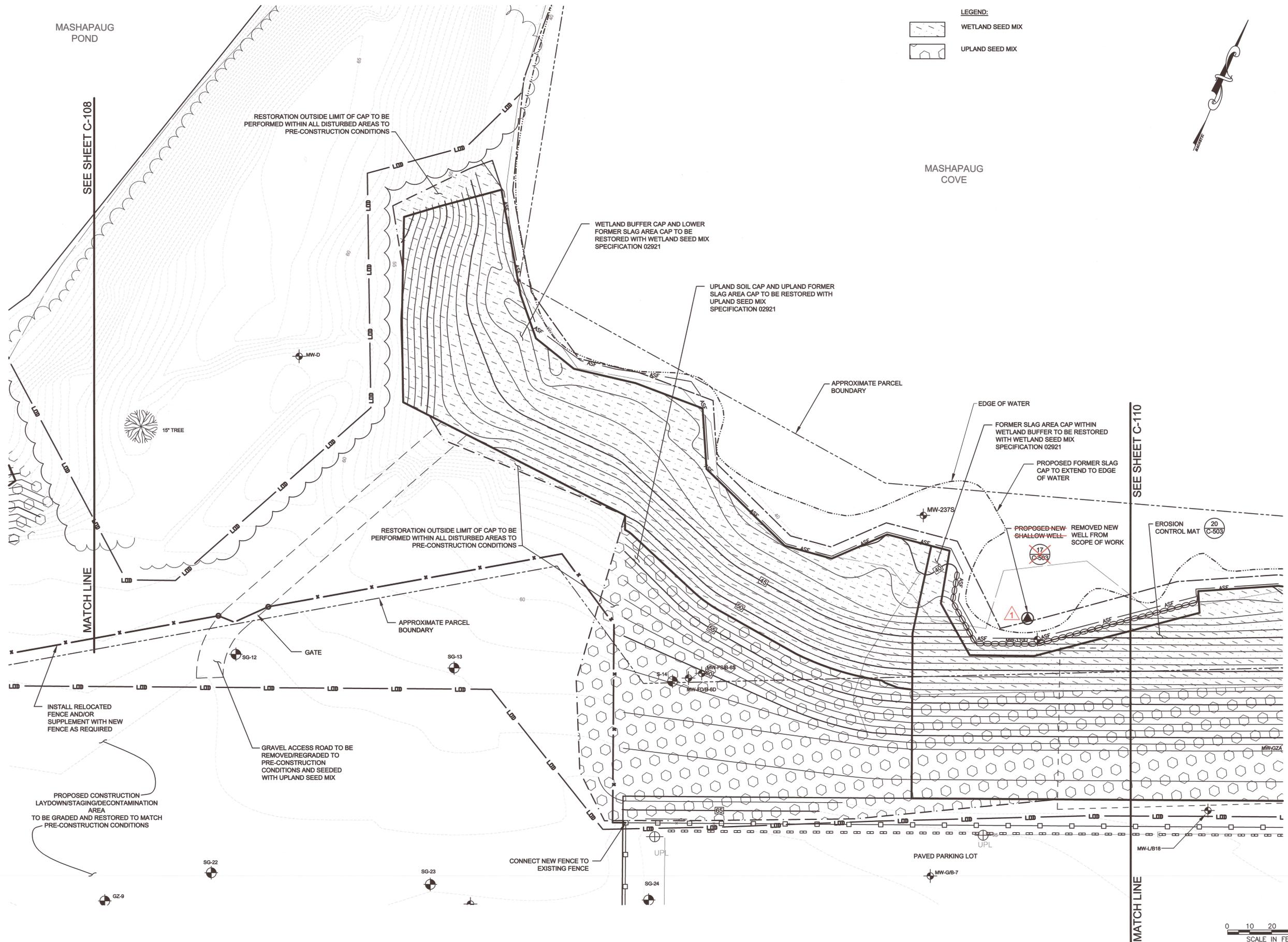
ROBERT J. BUKOWSKI  
No. 9217  
REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY: DAA  
DRAWN BY: DED  
CHECKED BY: JPM  
DATE: 09 MAY 2012  
SCALE: AS SHOWN  
REVISION: 1

PROJECT NUMBER: 3650110213  
DRAWING NUMBER: C-108  
SHEET NUMBER: 10 OF 15

C:\Users\dampay\Documents\Textron\Gorham - Providence R\CAD\Sheets\3650110213 - C-108.dwg - Jun. 12, 2012 11:58pm - dana.dampay

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**LEGEND:**  
 WETLAND SEED MIX  
 UPLAND SEED MIX



**amec**  
 ENVIRONMENT & INFRASTRUCTURE  
 2 ROBBINS ROAD  
 WESTFORD, MASSACHUSETTS 01886  
 TELEPHONE: (978) 852-9090  
 FAX: (978) 852-9033  
 WEB: WWW.AMEC.COM

REVISION	DATE	ISSUED BY	APPROVED
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0	05/24/12	DAA	RJB
A	05/09/12	DAA	RJB

PROJECT: **PARCEL C-1 PHASE 1 CAP**  
 CLIENT: **TEXTRON, INC.**  
 SITE: **FORMER GORHAM MANUFACTURING SITE**  
 ADDRESS: **333 ADELAIDE AVENUE, PROVIDENCE, RI**  
 TITLE: **PLANTING AND RESTORATION PLAN 2**

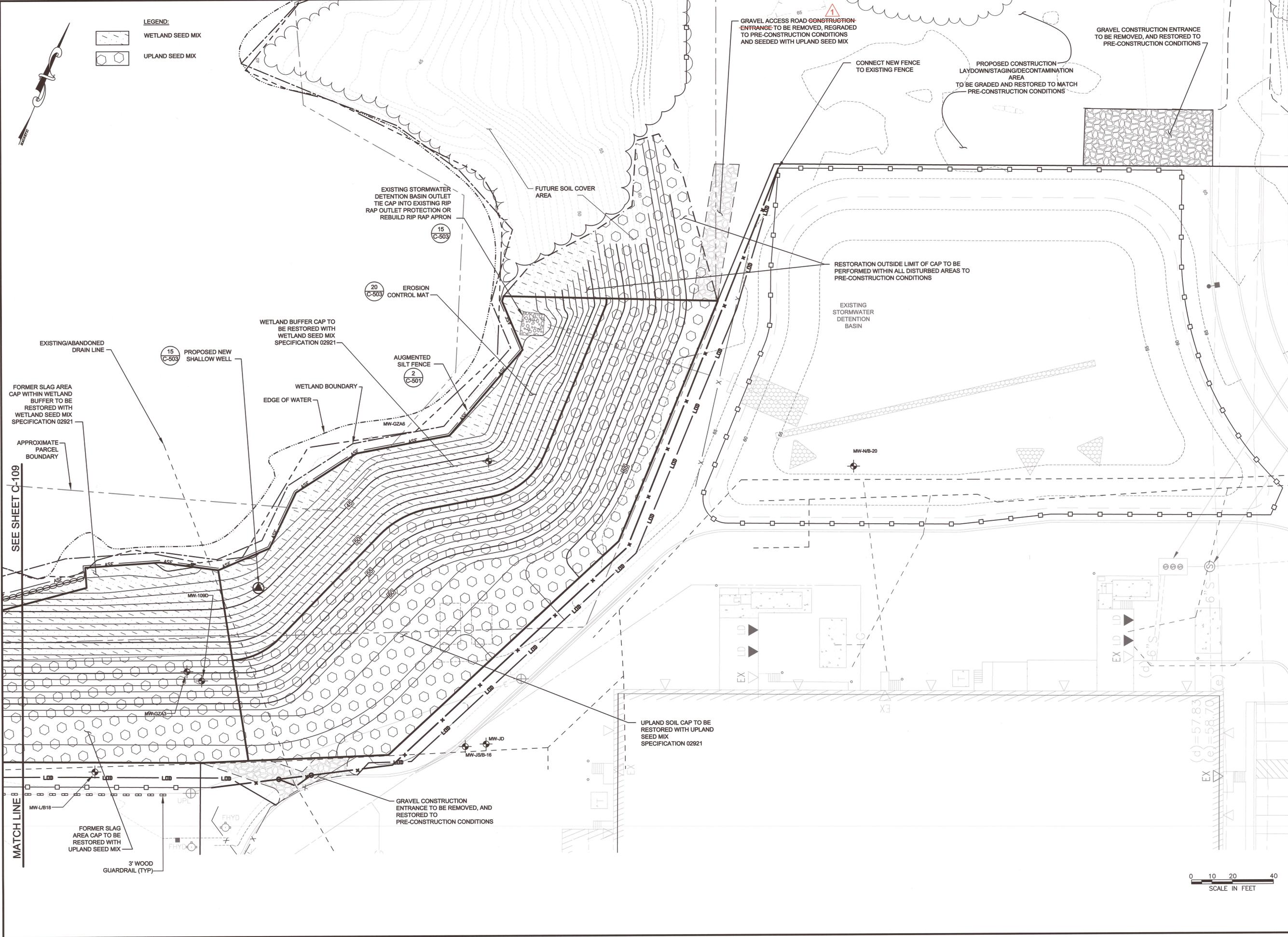
CLIENT: **TEXTRON**

DESIGNED BY: **ROBERT J. BUKOWSKI**  
 No. **9217**  
 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY: DAA  
 DRAWN BY: DED  
 CHECKED BY: JPM  
 DATE: 09 MAY 2012  
 SCALE: AS SHOWN  
 REVISION: 1  
 PROJECT NUMBER: 3650110213  
 DRAWING NUMBER: **C-109**  
 SHEET NUMBER: **11 OF 15**

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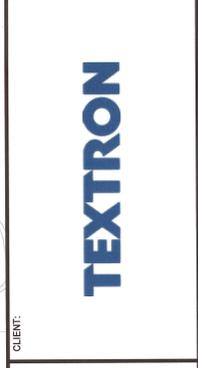


LEGEND:  
WETLAND SEED MIX  
UPLAND SEED MIX

**amec**  
ENVIRONMENT & INFRASTRUCTURE  
2 ROBINS ROAD  
WESTFORD, MASSACHUSETTS 01886  
TELEPHONE: (978) 692-9090  
FAX: (978) 692-6633  
WEB: WWW.AMEC.COM

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1	06/13/12	ADDENDUM 1	DAA	RJB
0	05/24/12	ISSUED FOR BID	DAA	RJB
A	05/09/12	ISSUED FOR CLIENT REVIEW	DAA	RJB

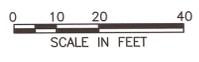
PROJECT: **PARCEL C-1 PHASE 1 CAP**  
**TEXTRON, INC.**  
FORMER GORHAM MANUFACTURING SITE  
333 ADELAIDE AVENUE, PROVIDENCE, RI  
TITLE: **PLANTING AND RESTORATION PLAN 3**



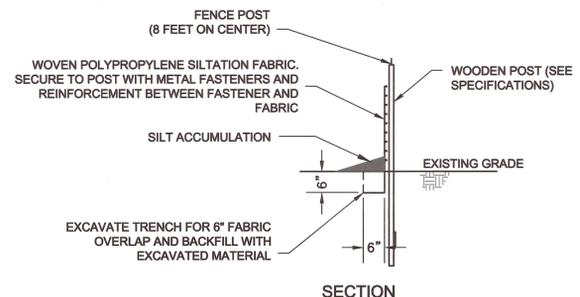
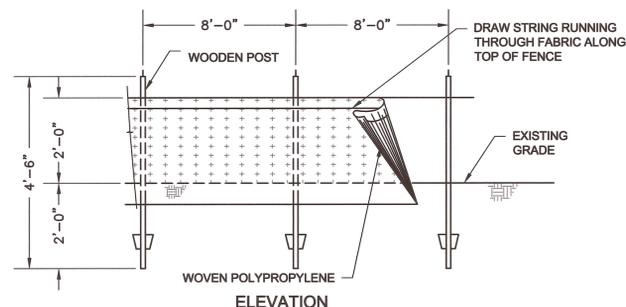
CLIENT: ROBERT J. BUKOWSKI  
No. 9217  
REGISTERED PROFESSIONAL ENGINEER  
DESIGNED BY: DAA  
CHECKED BY: JPM  
SCALE: AS SHOWN  
PROJECT NUMBER: 3550110213  
DRAWING NUMBER: **C-110**  
SHEET NUMBER: **12 OF 15**

DATE: 09 MAY 2012  
REVISION: 1

DESIGNED BY: DAA  
DRAWN BY: DED  
DATE: 09 MAY 2012  
REVISION: 1

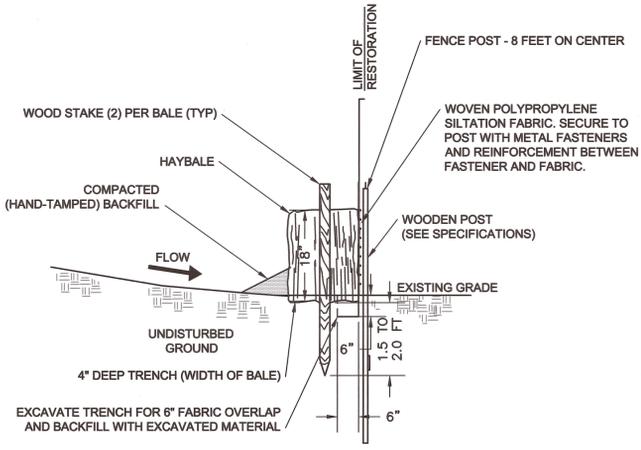


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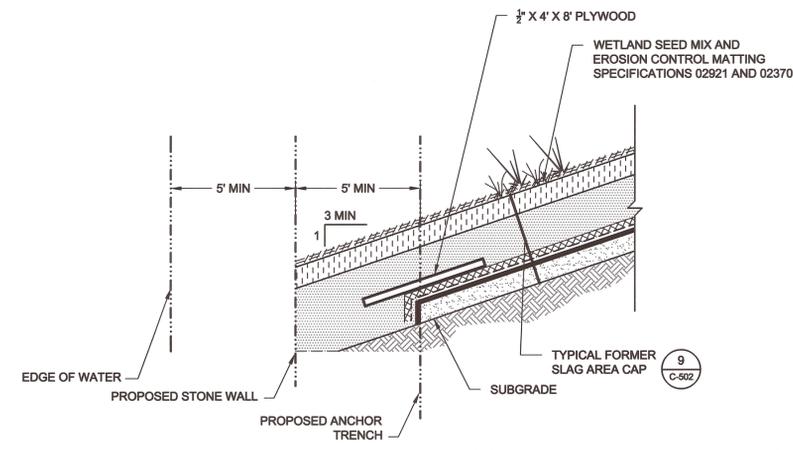
NOTE:  
 WHERE REQUIRED AS SHOWN ON THE DRAWINGS.  
 SILTATION FENCE REINFORCED WITH HOG OR CHICKEN WIRE OR INTEGRAL PLASTIC MESH REINFORCING MAY BE USED.

**SILT FENCE**  
 NTS

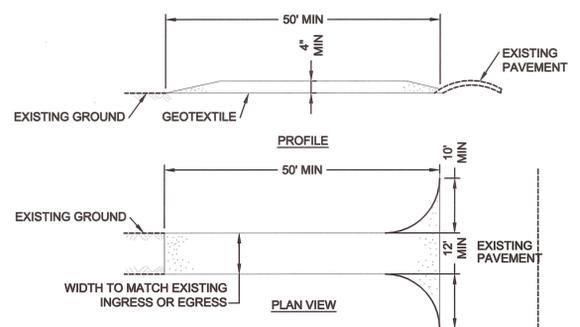


NOTE:  
 AUGMENTED SILTATION FENCE SHALL BE USED AT LOCATIONS AS SHOWN ON THE DRAWINGS.

**AUGMENTED SILTATION FENCE**  
 NTS

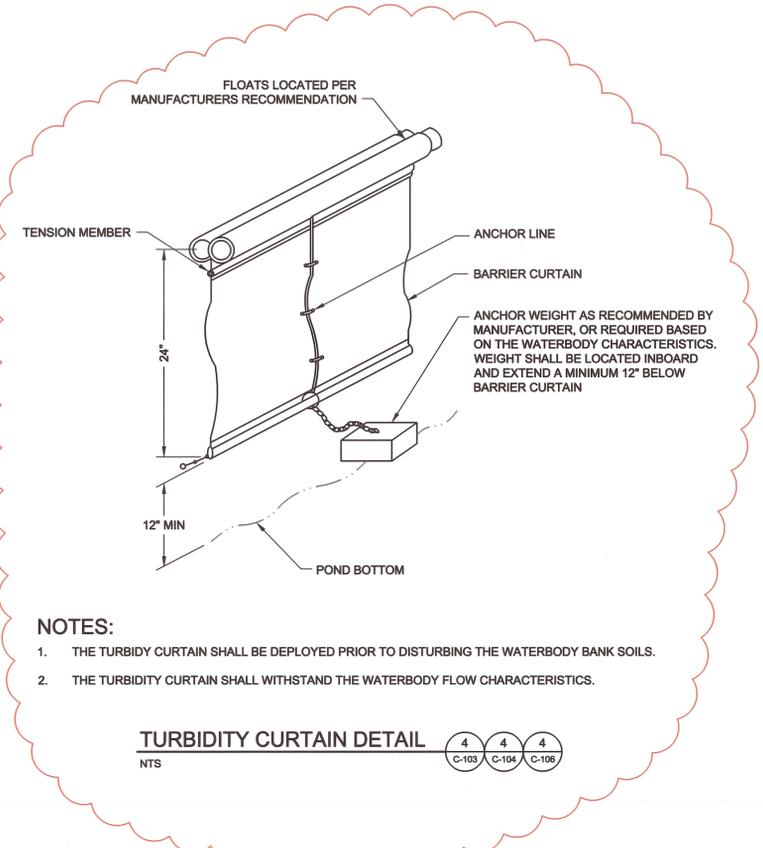


**FORMER SLAG AREA CAP TOE DETAIL**  
 NTS



- CONSTRUCTION SPECIFICATIONS:**
- STONE SIZE - USE 2 INCH CRUSHED STONE OR GRAVEL.
  - LENGTH - NOT LESS THAN 50 FEET.
  - THICKNESS - NOT LESS THAN FOUR (4) INCHES.
  - WIDTH - TWELVE (12) FEET MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FEET IF SINGLE ENTRANCE TO SITE.
  - GEOTEXTILE - WILL BE PLACE OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
  - SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
  - MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
  - WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
  - PERIODIC INSPECTION AND REQUIRED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN EVENT.

**STABILIZED CONSTRUCTION ENTRANCE**  
 NTS



- NOTES:**
- THE TURBIDITY CURTAIN SHALL BE DEPLOYED PRIOR TO DISTURBING THE WATERBODY BANK SOILS.
  - THE TURBIDITY CURTAIN SHALL WITHSTAND THE WATERBODY FLOW CHARACTERISTICS.

**TURBIDITY CURTAIN DETAIL**  
 NTS

REMOVED FROM SCOPE OF WORK

NO.	DATE	ISSUED FOR	ISSUED BY	APPROVED
1	06/13/12	ADDENDUM 1	DAA	RJB
0	05/24/12	ISSUED FOR BID	DAA	RJB
A	05/09/12	ISSUED FOR CLIENT REVIEW	DAA	RJB
		ISSUE / REVISION DESCRIPTION		

PROJECT: **PARCEL C-1 PHASE 1 CAP**  
**TEXTRON, INC.**  
**FORMER GORHAM MANUFACTURING SITE**  
**333 ADELAIDE AVENUE, PROVIDENCE, RI**  
 TITLE: **DETAILS 1**



CLIENT: **ROBERT J. BUKOWSKI**  
 No. **9217**  
 REGISTERED PROFESSIONAL ENGINEER  
 Signature: *[Signature]* 2/13/12

DESIGNED BY: DAA	DRAWN BY: DED
CHECKED BY: JPM	DATE: 09 MAY 2012
SCALE: AS SHOWN	REVISION: 1
PROJECT NUMBER: 3650110213	DRAWING NUMBER: <b>C-501</b>
SHEET NUMBER: <b>13 OF 15</b>	

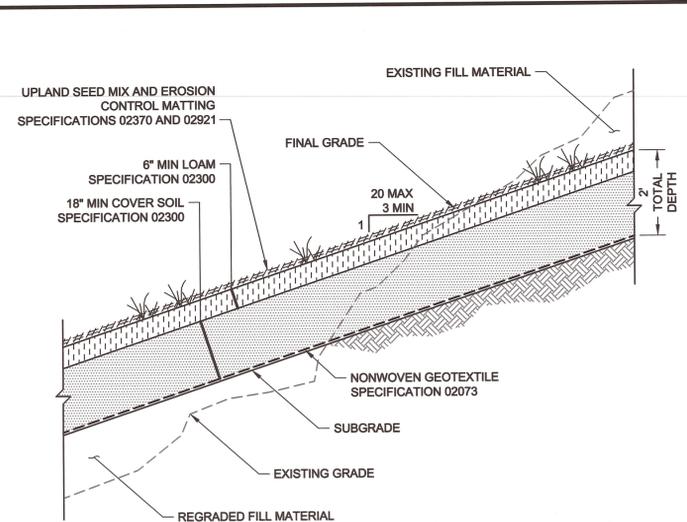
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NO.	DATE	ISSUED FOR	ISSUED BY	APPROVED
1	06/13/12	ADDENDUM 1	DAA	
0	05/24/12	ISSUED FOR BID	DAA	
A	05/09/12	ISSUED FOR CLIENT REVIEW	DAA	
		ISSUE / REVISION DESCRIPTION		

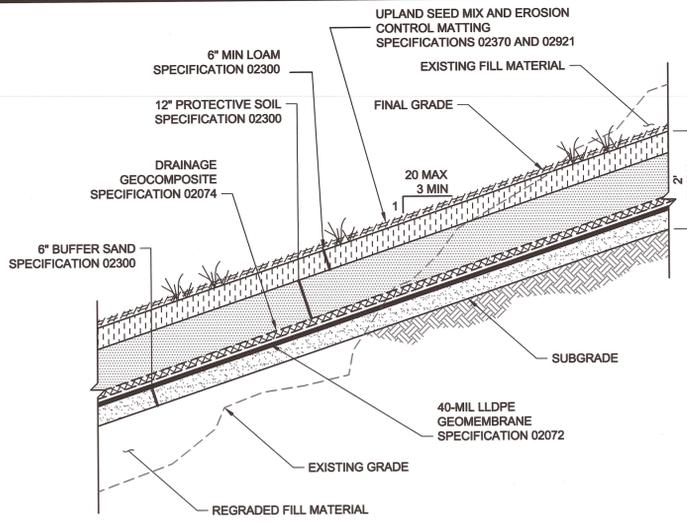
PROJECT: **PARCEL C-1 PHASE 1 CAP**  
**TEXTRON, INC.**  
**FORMER GORHAM MANUFACTURING SITE**  
**333 ADELAIDE AVENUE, PROVIDENCE, RI**  
 TITLE: **DETAILS 2**

CLIENT: **TEXTRON**

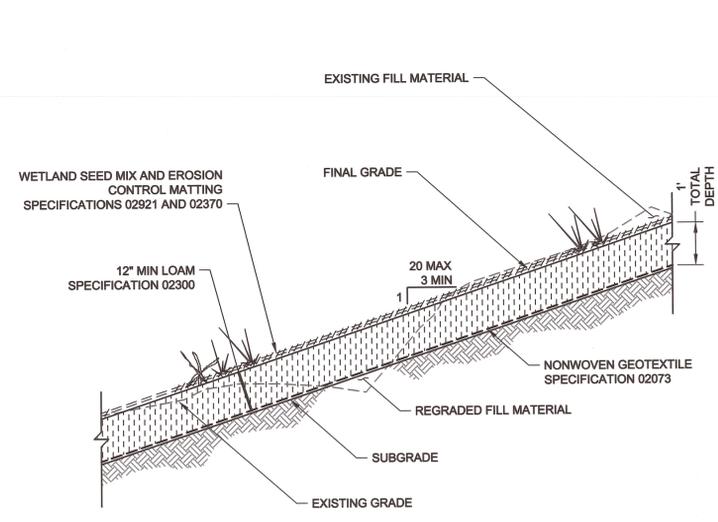
SEAL: **ROBERT J. BUKOWSKI**  
 No. **9217**  
 REGISTERED PROFESSIONAL ENGINEER  
 DESIGNED BY: DAA  
 CHECKED BY: JPM  
 SCALE: AS SHOWN  
 PROJECT NUMBER: 3650110213  
 DRAWING NUMBER: **C-502**  
 SHEET NUMBER: **14 OF 15**



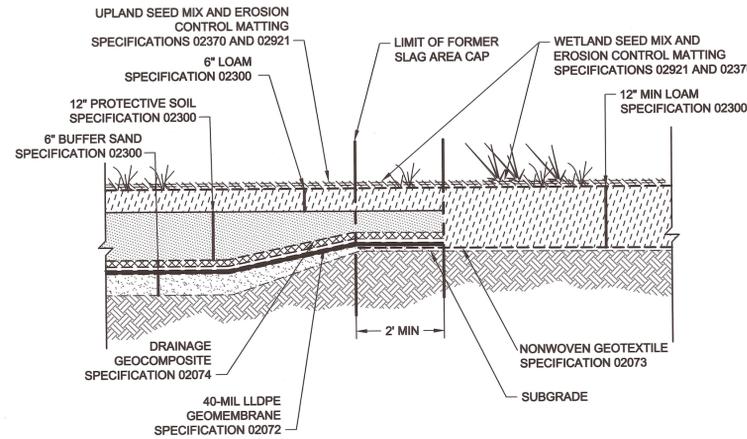
**TYPICAL UPLAND SOIL CAP**  
 NTS (5 C-102, 5 C-103, 5 C-104, 5 C-105, 5 C-106, 5 C-107)



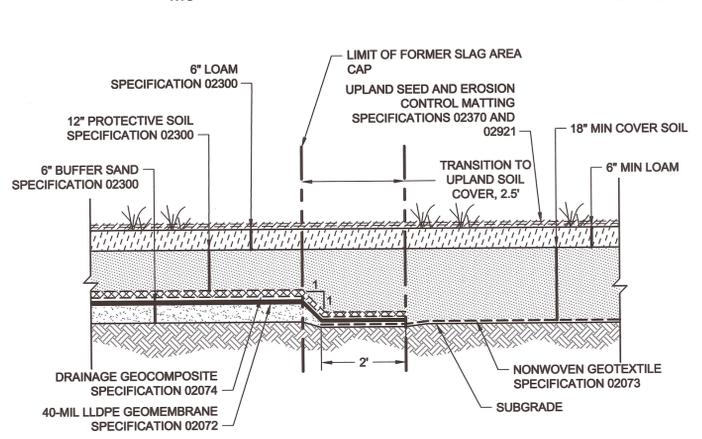
**TYPICAL FORMER SLAG AREA CAP**  
 NTS (6 C-103, 6 C-106, 6 C-107)



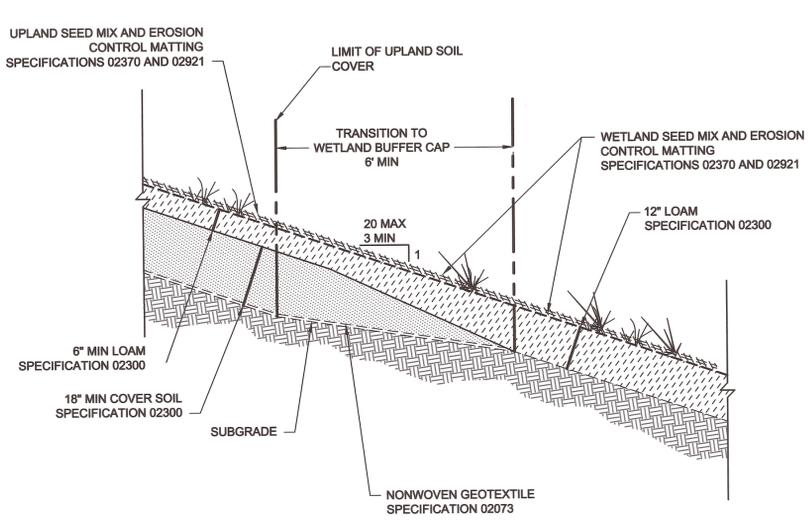
**TYPICAL WETLAND BUFFER CAP**  
 NTS (7 C-106, 7 C-107)



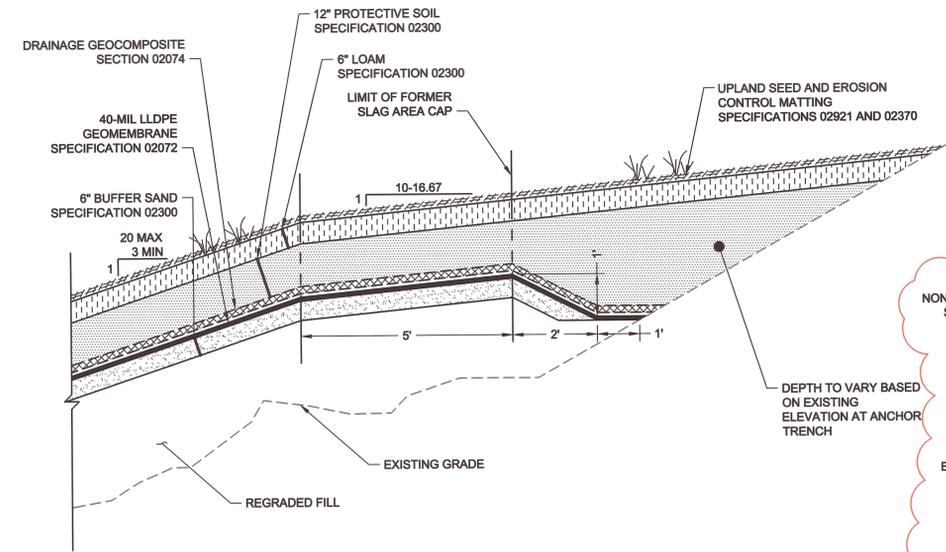
**TYPICAL TRANSITION DETAIL: FORMER SLAG AREA CAP TO WETLAND BUFFER CAP**  
 NTS (8 C-106, 8 C-107)



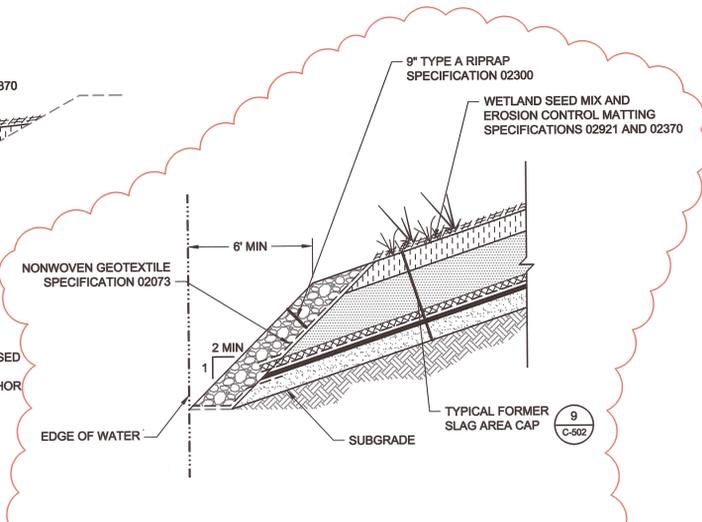
**TYPICAL TRANSITION DETAIL: FORMER SLAG AREA CAP TO UPLAND SOIL CAP**  
 NTS (9 C-106, 9 C-107)



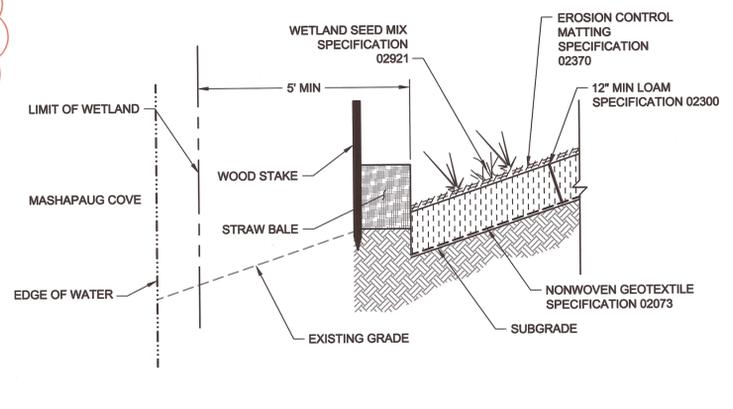
**TYPICAL TRANSITION DETAIL: UPLAND SOIL CAP TO WETLAND BUFFER CAP**  
 NTS (10 C-106, 10 C-107)



**FORMER SLAG AREA CAP ANCHOR DETAIL**  
 NTS (11 C-106, 11 C-107)



**FORMER SLAG AREA CAP TOE DETAIL**  
 NTS (12 C-106, 12 C-107)

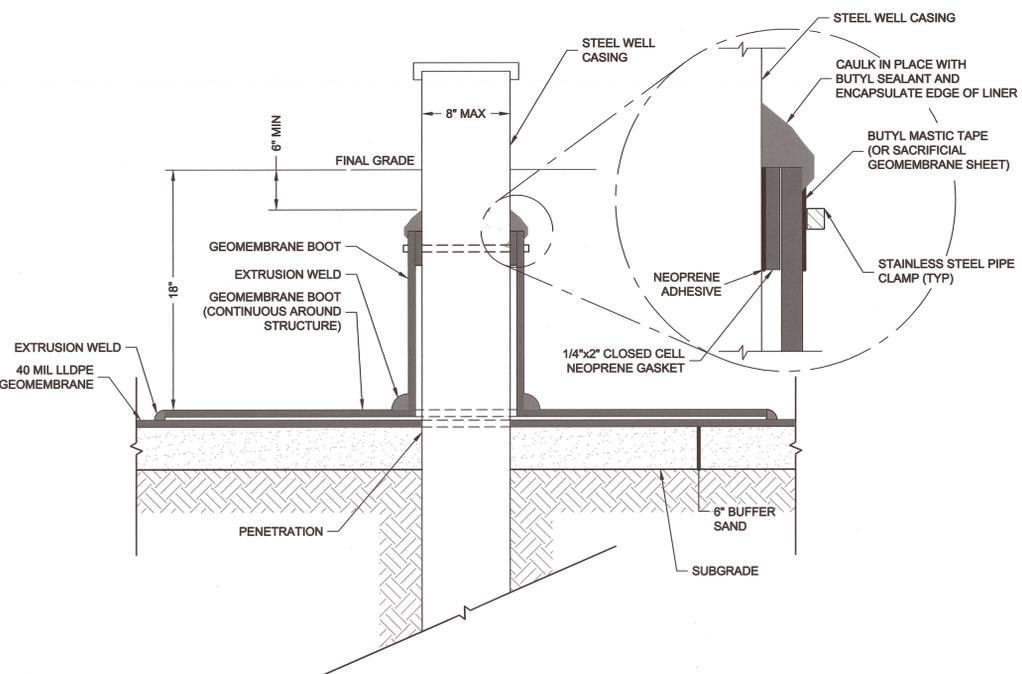


**WETLAND BUFFER CAP TOE DETAIL**  
 NTS (13 C-106)

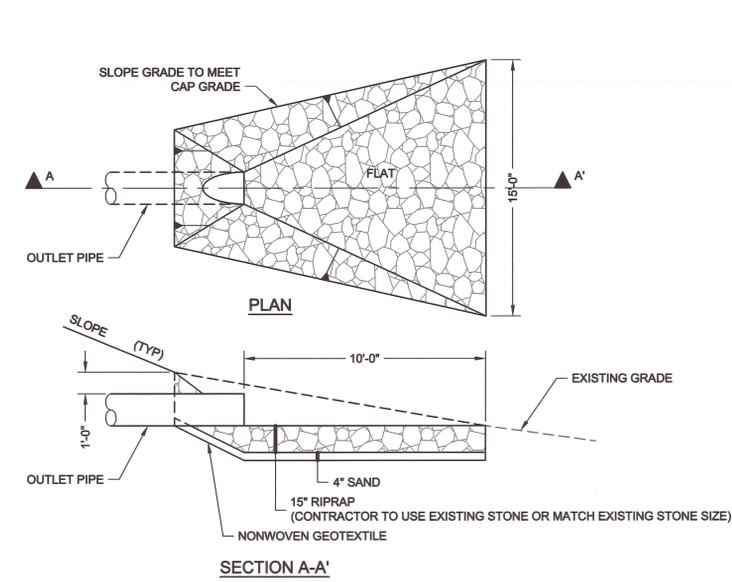
SEE REVISED DETAIL ON C-501

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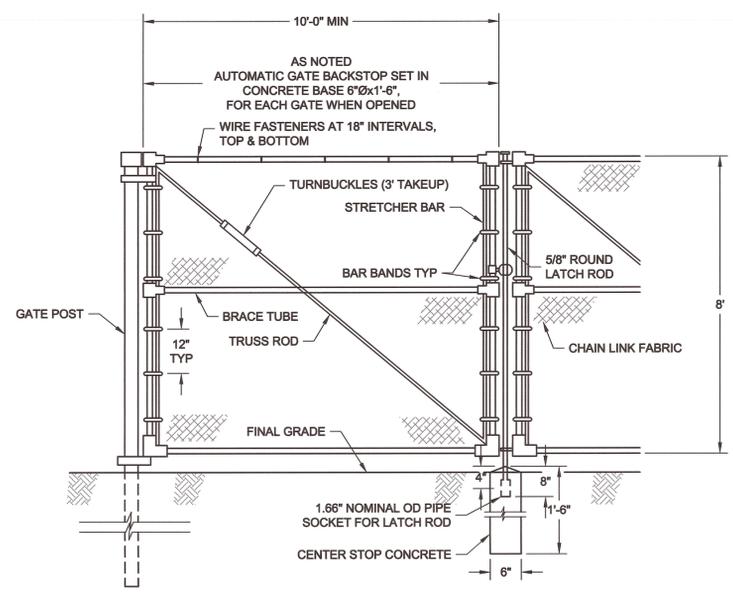
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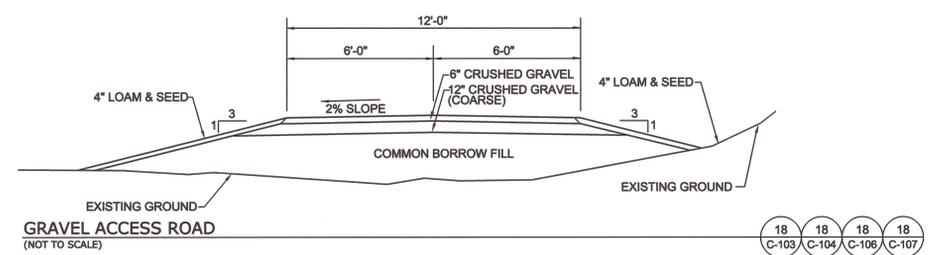
**MONITORING WELL PENETRATION DETAIL**  
 NTS (14) C-106



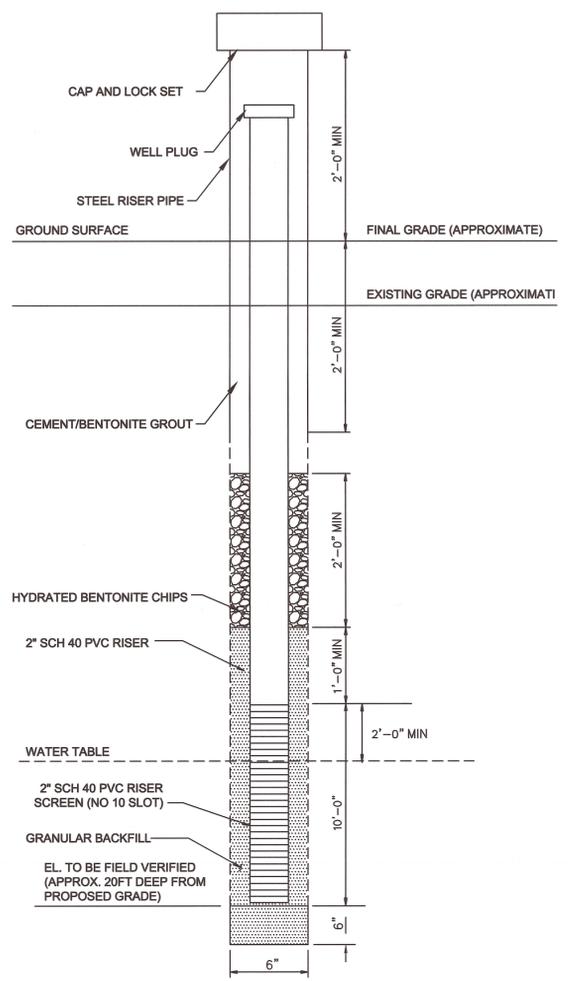
**RIPRAP APRON REPLACEMENT DETAIL**  
 NTS (15) C-110



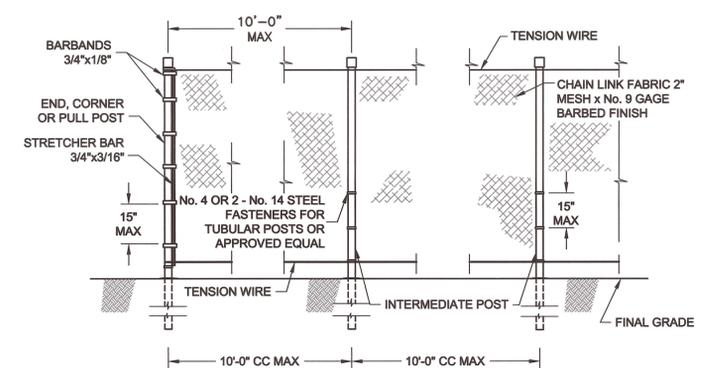
**CHAIN LINK FENCE WITH DOUBLE GATE**  
 NTS (16) C-102 (16) C-103 (16) C-105 (16) C-106



**GRAVEL ACCESS ROAD**  
 (NOT TO SCALE) (18) C-103 (18) C-104 (18) C-106 (18) C-107



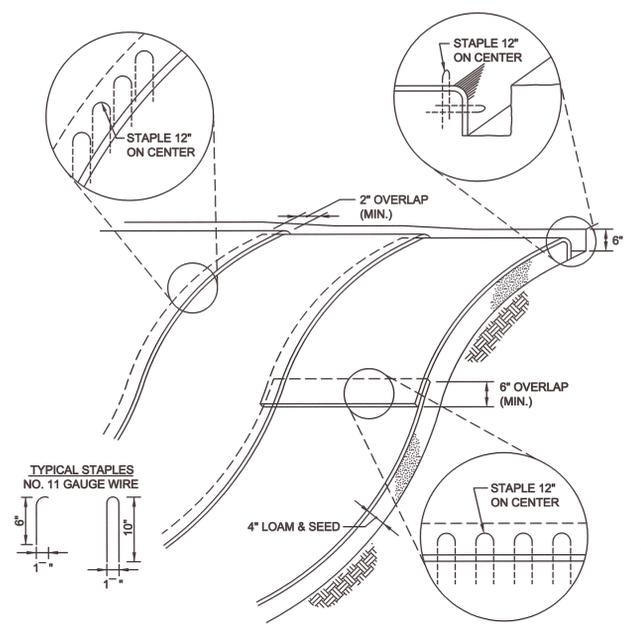
**TYPICAL MONITORING WELL INSTALLATION**  
 (NOT TO SCALE) (17) C-104 (17) C-107



DESCRIPTION			
<b>END, CORNER AND PULL POSTS FOR FABRIC HEIGHT:</b>			
≤ 6" ROUND	2.375"Ø		3.65#/FT
SQUARE	2.0"		3.60#/FT
> 6" ROUND	2.875"Ø		5.79#/FT
SQUARE	2.50"		5.70#/FT
<b>INTERMEDIATE POSTS FOR FABRIC HEIGHTS:</b>			
≤ 6" ROUND	1.90"		2.72#/FT
H-SECTION	1.875" x 1.625" x 0.113"		2.70#/FT
> 6" ROUND	2.375"		3.65#/FT
H-SECTION	2.25" x 1.95" x 1.43"		4.10#/FT
<b>BRACE TUBES:</b>			
1.86"ØD NOMINAL, 1.806#/FT GALVANIZED STEEL PIPE			
<b>STRETCHER BARS:</b>			
LENGTH TO BE 1" LESS THAN FULL HEIGHT OF FABRIC. ONE STRETCHER BAR FOR EACH GATE AND END POST. TWO STRETCHER BARS FOR CORNERS AND BRACING.			
<b>TENSION WIRE:</b>			
7 GA GALVANIZED			

**NOTE:**  
 POST DIMENSIONS SHOWN ARE OD NOMINAL

**CHAIN LINK FENCE**  
 NTS (19) C-102 (19) C-103 (19) C-104 (19) C-105 (19) C-106 (19) C-107 (19) C-108 (19) C-109

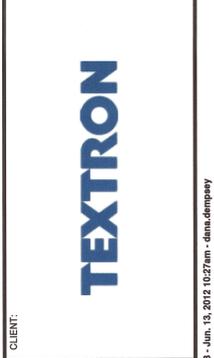


- NOTES:**
- BEGIN AT THE TOP OF MATTING INSTALLATION AREA BY ANCHORING MATTING IN A 6" DEEP TRENCH BACKFILL AND COMPACT TRENCH AFTER STAPLING.
  - ROLL THE MATTING DOWN THE SWALE IN THE DIRECTION OF THE WATER FLOW.
  - THE EDGES OF MATTINGS MUST BE STAPLED WITH A MINIMUM OF 4 INCH OVERLAP WHERE 2 OR MORE STRIP WIDTHS ARE REQUIRED.
  - WHEN MATTINGS MUST BE SPLICED DOWN THE SWALE, PLACE MATTING END OVER END WITH 6 INCH (MIN.) OVERLAP AND ANCHOR DOWN SLOPE MATTING IN A 6 INCH DEEP TRENCH.

**EROSION CONTROL MATTING SLOPE INSTALLATION**  
 (NOT TO SCALE) (20) C-108 (20) C-109 (20) C-110

ISSUED BY	ISSUE / REVISION DESCRIPTION	DATE	REVISION
RUB	ADDENDUM 1	06/13/12	1
RUB	ISSUED FOR BID	05/24/12	0
RUB	ISSUED FOR CLIENT REVIEW	05/09/12	A

**PROJECT:** PARCEL C-1 PHASE 1 CAP  
 TEXTRON, INC.  
 FORMER GORHAM MANUFACTURING SITE  
 333 ADELAIDE AVENUE, PROVIDENCE, RI  
**TITLE:** DETAILS 3



**CLIENT:** ROBERT J. BUKOWSKI  
 No. 9217  
 REGISTERED PROFESSIONAL ENGINEER  
**DESIGNED BY:** DAA  
**DRAWN BY:** DED  
**CHECKED BY:** JPM  
**DATE:** 09 MAY 2012  
**SCALE:** AS SHOWN  
**REVISION:** 1  
**PROJECT NUMBER:** 3650110213  
**DRAWING NUMBER:** C-503  
**SHEET NUMBER:** 15 OF 15

U:\DEPT\ENR\Textron\Gorham - Providence R\CAD\Sheet\3650110213 - C-503.dwg - C-503 - Jun. 13, 2012 10:27am - dana.dempsey

TEXTRON, INC.  
FORMER GORHAM MANUFACTURING FACILITY, PROVIDENCE, RI  
REMEDIAL ACTION WORK PLAN – PHASE I SOIL CAPPING: PARCEL C-1

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TEXTRON, INC.  
FORMER GORHAM MANUFACTURING FACILITY, PROVIDENCE, RI  
REMEDIAL ACTION WORK PLAN – PHASE I SOIL CAPPING: PARCEL C-1

**APPENDIX B**  
**SPECIFICATIONS**  
**(Division 0)**

SECTION 00200

INSTRUCTIONS TO BIDDERS

1. PART 1 - GENERAL

1.01 DESCRIPTION

A. BID OPENING of this project is scheduled for 2:00 p.m. Friday, June 15, 2012 at the Textron, Inc. Office located at 40 Westminster Street, Providence, Rhode Island. Construction is intended to start on July 9, 2012, and must be substantially complete within 90 calendar days and finally complete by October 7, 2012.

**a. A pre-bid meeting is scheduled for Tuesday, June 5, 2012, 10:00 a.m. at the Site located at 333 Adelaide Avenue, Providence, Rhode Island. Conference attendance is mandatory.**

B. ESTIMATES OF QUANTITIES: The quantities listed herein for unit price items shall be considered as approximate. The bidders are encouraged to make their own quantity estimates in bid preparation. The lump sum bid items are based on the Plans and Specifications as presented herein and are irrespective of quantities of work. Bid prices for supplemental units shall reasonably reflect the costs included in the Lump Sum Items.

Unit and Lump Sum prices in the Bid Proposal shall not be unbalanced. Unbalanced bids may be cause for rejection.

C. CONTRACT DOCUMENTS AND SITE OF WORK: Before submitting a proposal, the bidder shall examine carefully the Contract Documents and the site of the proposed work. He shall satisfy himself as to the character, quality and quantities of work to be performed and materials to be furnished. The submission of a proposal by a bidder shall be conclusive evidence that the Bidder has complied with these requirements. Claims for additional compensation due to variation between conditions actually encountered in construction and as indicated by the plans, except for payment under the specific payment items included herein, will not be allowed, unless in full conformance with the General Conditions Section 4.2.

D. PREPARATION OF PROPOSAL: The bidder must submit his proposal on the Bid Proposal form included herein. The blank spaces for each item in the proposal forms shall be correctly filled in, by writing in words and numerals, in ink. The bidder must submit a price for each item in the proposal. In case of conflict between words and numerals, **the words shall govern**. The proposal shall be executed with ink in the complete and correct name of the individual, firm or corporation making the proposal and signed by the person or persons authorized to bind the individual, firm or corporation. Bids by corporations shall have the corporate seal affixed.

The bidder shall properly acknowledge all addenda in the spaces provided therefore on the proposal form and acknowledge submission of all required bid documents as shown on the proposal form.

E. ADDENDA: Bidders desiring further information or interpretation of the plans, specifications or other Contract Documents must make a request for such information in writing to the Engineer, no later than seventy two (72) hours before the bid opening. Answers to such requests will be given in writing to all bidders, in addendum form, and all addenda will be bound with, and made a part of the

Contract Documents. No other explanation or interpretation will be considered official or binding. The Engineer will not be responsible for any other interpretations of the plans, specifications or Contract Documents. Should a bidder find discrepancies in or omissions from the plans, specifications or other Contract Documents, or should he be in doubt as to their meaning, he should at once notify the Engineer in order that a written addendum may be sent to all bidders. Any addenda issued prior to forty eight (48) hours of the opening of bids will be mailed or delivered to each pre-qualified Contractor contemplating the submission of a proposal on this work. The proposal as submitted by the Contractor will be so constructed as to include any addenda, if such are issued by the Engineer prior to forty eight (48) hours of the opening of bids.

The Client reserves the right to postpone the bid opening date or time, without prior notice, as it deems to be in its best interests.

- F. REJECTION OF PROPOSALS: Proposals containing any omission, alteration of form, additions or conditions not called for, incomplete bids or proposals otherwise regular which are not accompanied by acceptable proposal guaranty will be considered irregular and may be rejected. In case of any ambiguity or lack of clarity in stating the prices in the proposal, the Client reserves the right to consider the most advantageous construction thereof, or to reject the proposal. Unreasonable or unbalanced bid prices may be cause to reject any proposal.
- G. PROPOSAL GUARANTY: Not Applicable
- H. DELIVERY OF PROPOSAL: Each completed proposal shall be placed in an envelope sealed or via electronic mail to [gsimpson@textron.com](mailto:gsimpson@textron.com) and clearly identified on the outside as a proposal to the Client and including the project title and name and address of the bidder. When sent by mail, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope. Proposals will not be considered unless received at the place and/or electronically on or before the time designated in this Instruction to Bid.
- I. WITHDRAWAL OF PROPOSALS: Any bidder, upon his written request, will be given permission to withdraw his proposal no later than the time set for the opening thereof.
- J. QUALIFICATION OF BIDDER: The qualifications, experience, and demonstrated ability to complete the work on time and as specified are of importance to the Client and will be given significant consideration in the selection of a bidder. Before being awarded the contract, the bidder may be required to submit such evidence as the Client may require to establish his financial responsibility, experience and possession of such equipment as may be needed to prosecute the work in an expeditious, safe and satisfactory manner.
- K. DISQUALIFICATION OF BIDDERS: The following are some of the causes which may be considered as sufficient for the disqualification of a bidder and the rejection of his proposal:
  - (1) More than one proposal for the same work from an individual, firm, partnership or corporation.
  - (2) Evidence of collusion among bidders.
  - (3) Poor performance in the execution of work under previous contracts.
  - (4) For being in arrears on existing contracts, or having defaulted on a previous contract.

The Client reserves the right to waive any informalities in any or all proposals, to reject any or all proposals, or accept any proposal submitted for the project, as deemed by the Client to be in its best

interest based upon qualifications, experience, demonstrated ability to perform, cost, or other factors deemed by the Client to bear on the successful outcome of the Contract.

- L. **CONSIDERATION OF PROPOSALS:** For the purpose of award, after the proposals are opened and read, the summation of the products of the approximate quantities shown in the proposal by the lump sum or unit bid prices will be considered the amount of the bid.

The information provided by bidders shall be evaluated to determine compliance with the requirements of the project and other comparative favorability to the Client. The Client reserves the right to reject any and all proposals and waive technicalities as may be considered to be in the best interest of the Client.

- M. **SUBMISSION OF POST BID INFORMATION:** Upon request by the Engineer, selected bidders shall within two (2) calendar days thereafter submit the following:

- (1) A designation of the work to be performed by the bidder with his own forces.
- (2) A list of the names of the subcontractors or other persons or organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for such portions of the work. The bidder will be required to establish to the satisfaction of the Client the reliability and responsibility of the proposed subcontractors to furnish and perform such portions of the work.
- (3) Prior to the award of Contract, the Client will notify the bidder in writing if the Client, after due investigation, has reasonable and substantial objection to any person or organization on such list. If the Client has a reasonable and substantial objection to any person or organization on such list, and refuses in writing to accept such person or organization, the bidder may, at his option, withdraw his bid without forfeiture of bid security, notwithstanding anything to the contrary contained herein. If the bidder submits an acceptable substitute with an increase in his bid price to cover the difference in cost occasioned by such substitution, the Client may, at its discretion, accept the increased bid price or may disqualify the bidder. Subcontractors and other persons and organizations proposed by the bidder and accepted by the Client must be used on the work for which they were proposed and accepted and shall not be changed except with the written approval of the Engineer.
- (4) A proposed work schedule demonstrating the Bidder's plan to complete the work in the required time frame.

- N. **AWARD OF CONTRACT:** Only one Contract will be awarded for all the work called for in the plans and specifications.

- O. **RETURN OF PROPOSAL GUARANTY:** Not Applicable

- P. **EXECUTION OF CONTRACT AND BONDS:** The Contract will include all Contract Documents. Within seven (7) days after award of the Contract, the successful bidder shall execute the Contract in triplicate, and furnish the Client with Performance and Payment Bonds each in the full amount of the Contract price executed by a surety company acceptable to the Client. The Bonds are to be furnished as a guaranty of the faithful performance of the work and for protection of the claimants for labor and materials.

Q. FAILURE TO EXECUTE CONTRACT AND BONDS: Should the bidder to whom the Contract is awarded refuse or neglect to execute the Contract and furnish the required bonds within seven (7) days after notice of award of the Contract, at the option of the Client, the bidder's proposal shall be treated as withdrawn.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Not applicable.

PART 2 – PRODUCTS

Not applicable.

PART 3 – EXECUTION

Not applicable.

END OF SECTION

## SECTION 00330

### EXISTING CONDITIONS AND SUBSURFACE INFORMATION

#### PART 1 - GENERAL

##### 1.01 UNDERGROUND UTILITY DESCRIPTION

- A. There are historical abandoned utilities located within the Work Area of the Site, and there is a storm drain from the detention pond which outlets on the slope of the Site. The storm drain will remain active during the execution of the work. The Contractor shall exercise extreme caution when working in the vicinity of the existing active utility.
- B. Existing known utilities are shown on the Drawings. Utilities are shown diagrammatically and should be considered incomplete. It should not be inferred that the locations shown are precise, or that all existing utilities or underground structures are depicted.
- C. The Contractor shall locate or have located all existing utilities or underground structures in the vicinity of the Work Area on the Site. All utilities will be identified and marked in the field in accordance with required Rhode Island regulations. The Contractor shall contact Dig-Safe (1-888-DIG-SAFE) prior to commencing an on-site excavation.
- D. The Contractor shall be responsible for any and all work-related damage to any existing utilities, which are not to be abandoned and are to remain in service.
- E. The Contractor shall contact the affected utility or property owner as soon as any damage is discovered.

##### 1.02 SUBSURFACE DESCRIPTION

- A. Various subsurface explorations have been conducted for the sole purpose of assisting the Engineer in the evaluation of the extent of on-site contamination. Logs of these explorations are included in Attachment A.
- B. Explorations are not intended to indicate subsurface conditions except at the locations of the borings and are based on the information available and the Engineer's interpretations at the time borings were made.
- C. Explorations were not made for the purposes of determining or facilitating the constructability of the project or the cost thereof. Therefore, they may not be suitable or adequate for any purpose other than for the Engineer's use in designing the project.
- D. Any reuse of the exploration logs or other subsurface information, including, without limitation, any subsurface investigation prepared by the Engineer on behalf of the Client, by the Contractor or its subcontractors, regardless of tiers, shall be at its own risk and without legal liability on the Engineer or Client. Therefore, the Contractor shall indemnify and hold the Engineer and Client harmless from all claims, damages, expenses, or costs resulting from the Contractor's interpretation of this information.
- E. Additional test borings and other exploratory operations may be made by Contractor at no cost to the Client.

### 1.03 SUMMARY OF SOIL PARAMETERS

The Contractor shall review the available subsurface information (and conduct additional explorations as deemed necessary) to develop independent soil parameters for the purposes of shoring design, slope stability, and constructability.

### 1.04 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01500: Temporary Facilities and Controls
- B. Section 02110: Waste Excavation, Removal, and Handling
- C. Section 02221: Select Site Demolition
- D. Section 02231: Clearing and Grubbing
- E. Section 02300: Earthwork

### PART 2 – PRODUCTS

Not applicable.

### PART 3 – EXECUTION

Not applicable.

END OF SECTION

SECTION 00410

BID FORM

BIDDER: \_\_\_\_\_

PROJECT: Parcel C-1 Phase I Cap

CLIENT: Textron, Inc.

The undersigned, hereafter referred to as the BIDDER has examined the Contract Documents prepared in connection herewith by AMEC Environment and Infrastructure, Inc. (AMEC) the ENGINEER. In addition, he has examined the site and is familiar with all the conditions surrounding the Work contemplated. He hereby submits the following:

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices or lump sums:

**BID PROPOSAL  
PART I – BASE BID**

NO	ITEM	UNIT	EST QTY	LUMP SUM OR UNIT PRICE (WORDS)	LUMP SUM OR UNIT PRICE (FIGURES)	TOTAL PRICE (FIGURES)
1.	General Conditions	LS	1	_____ _____ _____ Dollars and _____ cents per lump sum.	\$ _____	\$ _____
2.	General Site Work	L.S.	1	_____ _____ _____ Dollars and _____ cents per lump sum.	\$ _____	\$ _____
3.	Clearing and Grubbing	L.S.	1	_____ _____ _____ Dollars and _____ cents per lump sum.	\$ _____	\$ _____
4.	Excavation and Filling	L.S.	1	_____ _____ _____ Dollars and _____	\$ _____	\$ _____

NO	ITEM	UNIT	EST QTY	LUMP SUM OR UNIT PRICE (WORDS)	LUMP SUM OR UNIT PRICE (FIGURES)	TOTAL PRICE (FIGURES)
				cents per lump sum.		
5.	Buffer Sand	L.S.	1	_____ _____ _____ Dollars and _____ cents per lump sum.	\$ _____	\$ _____
6.	Drainage Geocomposite	L.S.	1	_____ _____ _____ Dollars and _____ cents per lump sum.	\$ _____	\$ _____
7.	Geotextile	L.S.	1	_____ _____ _____ Dollars and _____ cents per lump sum.	\$ _____	\$ _____
8.	Geomembrane	L.S.	1	_____ _____ _____ Dollars and _____ cents per lump sum.	\$ _____	\$ _____
9.	Protective Soil	L.S.	1	_____ _____ _____ Dollars and _____ cents per lump sum.	\$ _____	\$ _____

NO	ITEM	UNIT	EST QTY	LUMP SUM OR UNIT PRICE (WORDS)	LUMP SUM OR UNIT PRICE (FIGURES)	TOTAL PRICE (FIGURES)
10.	Cover Soil	L.S.	1	_____ _____ _____ Dollars and _____ cents per lump sum.	\$ _____	\$ _____
11.	Type 'A' Rip Rap	L.S.	1	_____ _____ _____ Dollars and _____ cents per lump sum.	\$ _____	\$ _____
12.	Restoration, Loam and Seed	L.S.	1	_____ _____ _____ Dollars and _____ cents per lump sum.	\$ _____	\$ _____

**Total Price Part I (Items 1 – 12)**

(Figures)

\_\_\_\_\_

(Written)

\_\_\_\_\_

dollars and

\_\_\_\_\_

cents

**PART II - SUPPLEMENTAL UNIT PRICES**

Should certain additional work be required, or should quantities of certain classes of work be increased or decreased from those on which the Contract Sum is based, by order or approval of the Engineer, the undersigned agrees that the following supplemental unit prices may be used as the basis of payment to him/her or credit to the Client for such addition, increase, or decrease in the work as determined solely by the Client.

Supplemental prices shall cover all costs, complete in place, and the prices given shall balance with the respective amount per unit to be paid to the Contractor under applicable items of Part I – Base Bid, or refunded to the Client (in the case of deductions or decreases). No additional adjustments will be allowed for overhead, profit, insurance, or indirect expenses of the Contractor beyond the prices as listed. Client has the right to reject any or all supplemental unit prices when in Client’s opinion the price appears not to be balanced with Client’s assessment of balanced prices in comparison to other bidders.

**PART II – SUPPLEMENTAL UNIT PRICE ITEMS**

<b>NO.</b>	<b>ITEM</b>	<b>Unit</b>	<b>UNIT PRICE (WORDS)</b>	<b>UNIT PRICE (FIGURES)</b>
SU-1	Addition or Reduction in Clearing and Grubbing	S.F.	_____ _____ Dollars and _____ cents per square foot.	\$ _____
SU-2	Addition or Reduction in Excavation	C.Y.	_____ _____ Dollars and _____ cents per cubic yard.	\$ _____
SU-3	Addition or Reduction in Filling	C.Y.	_____ _____ Dollars and _____ cents per cubic yard	\$ _____
SU-4	Addition or Reduction in Buffer Sand	C.Y.	_____ _____ Dollars and _____ cents per cubic yard.	\$ _____
SU-5	Addition or Reduction in Geomembrane	S.F.	_____ _____ Dollars and _____ cents per square foot.	\$ _____
SU-6	Addition or Reduction in Drainage Geocomposite	S.F.	_____ _____ Dollars and _____ cents per square foot.	\$ _____

SU-7	Addition or Reduction in Geotextile	S.F.	_____ _____ Dollars and _____ cents per square foot.	\$ _____
SU-8	Addition or Reduction in Protective Soil	C.Y.	_____ _____ Dollars and _____ cents per cubic yard.	\$ _____
SU-9	Addition or Reduction in Cover Soil	C.Y.	_____ _____ Dollars and _____ cents per cubic yard.	\$ _____
SU-10	Addition or Reduction in Loam	C.Y.	_____ _____ Dollars and _____ cents per cubic yard.	\$ _____
SU-11	Addition or Reduction in Seeding	S.F.	_____ _____ Dollars and _____ cents per square foot.	\$ _____
SU-12	Addition or Reduction in Type "A" Rip Rap	C.Y.	_____ _____ Dollars and _____ cents per cubic yard.	\$ _____

The Bidder agrees to **add or deduct** work required by the Client or Engineer for the above mentioned Lump Sum, Unit, or Supplemental Unit prices (as applicable).

The undersigned, as Contractor herein referred to as singular and masculine declares as follows:

- (1) The only parties interested in the BID as Principals are named herein;
- (2) This BID is made without collusion with any other person, firm, or corporation;
- (3) The Bidder has carefully examined the site of the proposed work and is fully informed and is satisfied as to the conditions there existing, the character and requirements of the proposed Work, and the difficulties attendant upon its execution. The Bidder has carefully read and examined the Drawings, the proposed AGREEMENT and the Specifications and other Contract Documents therein referred to and knows and understands the terms and provisions thereof;
- 4) The Bidder understands the information relative to subsurface and other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) has been furnished only for his information and convenience without any warranty or guarantee, expressed or implied, that the subsurface and/or other conditions, natural

phenomena, existing pipes and other structures (surface or subsurface) actually encountered will be the same as those shown on the Drawings or in any other Contract Documents and he agrees that he shall not use or be entitled to use such information made available to him through the Contract Documents or otherwise obtained by him in his own examination of the site, as a basis of or ground for any claim against the Client or Engineer arising from or by reasons of any variance which may exist between the aforesaid information made available to, or otherwise obtained by, him and the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered during the construction work, and he has made due allowance therefore in the BID;

- (5) He understands that all reports of investigations and tests of subsurface physical conditions at the site and other information affecting the performance of the Work which have been relied upon by the Engineer in preparation of the Drawings and Specifications are not guaranteed as to accuracy or completeness and are not part of the Contract Documents.
- (6) And he understands that the quantities of work tabulated in this Proposal and indicated on the Drawings and in the Specifications and other Contract Documents are approximate and are subject to increase or decrease as deemed necessary by the Engineer, and as allowed for under the Contract Documents.

The undersigned agrees that for extra work, if any, authorized in writing by the Engineer to be performed by him in accordance with the terms and provisions of the Agreement, he will accept compensation as stipulated in the Contract Documents in full payment for such extra work, and agrees that for reductions in work as directed by the Engineer, he will accept reduced compensation as stipulated in the Contract Documents.

If this Bid Proposal is accepted by the Client, the undersigned agrees to substantially complete the work in accordance with the schedule for substantial completion of work per the Special Conditions, provided to be done under the Contract, and accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete any element of the work on time, except as otherwise expressly provided in the AGREEMENT.

Liquidated damages in the amount of **\$1,000 for each calendar day** of delay from the date established for Substantial Completion and or Contract Completion as provided in Section 00200.

The Bidder hereby agrees that, once opened, he will not withdraw this Bid within 60 days of Bid opening, and that if the Client shall accept this Bid, the Bidder will duly execute the Contract and provide BONDS as provided in paragraph 16 of Instructions to Bidders.

Respectfully Submitted:

\_\_\_\_\_ Company Name

By: \_\_\_\_\_  
Name (Printed) Address

\_\_\_\_\_ Address  
Title

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

(SEAL if Proposal is by a Corporation)

\_\_\_\_\_  
Attest

ADDENDA

The BIDDER acknowledges receipt of the following Addenda\*

No. \_\_\_\_\_ Dated

*\* to be filled in as appropriate*

SECTION 00510

NOTICE OF AWARD

Dated \_\_\_\_\_, 20 \_\_\_\_

TO: \_\_\_\_\_  
(BIDDER)

ADDRESS: \_\_\_\_\_

CLIENT'S PROJECT NO. N/A

PROJECT: Parcel C-1 Phase I Cap

CLIENT'S CONTRACT NO. N/A

CONTRACT FOR: Former Gorham Manufacturing Site – Parcel C-1 Phase I Cap  
(Insert name of contract as it appears in the Bid Documents)

You are notified that your Bid dated \_\_\_\_\_, 2012 for the above Contract has been considered. You are the apparent successful bidder and have been awarded a contract for

\_\_\_\_\_  
(Indicate total Work, alternates or sections of Work awarded)

The Contract Price of your contract is \_\_\_\_\_ Dollars (\$\_\_\_\_\_).

Three copies of each of the proposed Contract Documents (except Drawings) accompany this Notice of Award. Three sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within seven (7) days of the date of this Notice of Award, that is by \_\_\_\_\_, 20 \_\_\_\_ .

1. You must deliver to the CLIENT three fully executed counterparts of the Agreement including all the Contract Documents. This includes the 3 sets of Drawings. Each of the Contract Documents must bear your signature on (the cover) every page.
2. You must deliver with the executed Agreement the Contract Security (Bonds) as specified in the Information for Bidders and General Conditions.
3. (List other conditions precedent).

Failure to comply with these conditions within the time specified will entitle **CLIENT** to consider your bid abandoned, to annul this Notice of Award and to declare your Bid Security forfeited.

Within ten days after you comply with those conditions, **CLIENT** will return to you one fully signed counterpart of the Agreement with the Contract Documents attached.

\_\_\_\_\_  
(CLIENT)

By \_\_\_\_\_  
(AUTHORIZED SIGNATURE)

\_\_\_\_\_  
(TITLE)

SECTION 00520

AGREEMENT FOR REMEDIATION SERVICES

This Agreement is made and entered into as of the \_\_\_ day of \_\_\_\_\_, 2012, by and between Textron Inc., a Delaware corporation (hereinafter all referred to as "Client"), and \_\_\_\_\_, a \_\_\_\_\_ corporation ("Contractor").

WHEREAS, this Agreement is for the performance of the professional services ("Work") described in the Contract Documents. Client issues to Contractor during the term of this Master Services Agreement at the location described in such Contract Documents;

WHEREAS, Contractor represents and warrants that it possesses the requisite knowledge, ability, and professional experience, skill, and qualifications to perform the Work in accordance with Client's requirements and the requirements of any applicable government order, demand or permit;

WHEREAS, Contractor acknowledges that Client has relied on this representation and warranty in its selection of Contractor;

WHEREAS, Client has selected AMEC Environment and Infrastructure, Inc. of 107 Audubon Road, Building 2, Suite 301, Wakefield, Massachusetts 01880 (hereinafter referred to as "AMEC") to oversee the work on Client's behalf;

WHEREAS Contractor is willing to provide these services for the consideration and on the terms stated under this Agreement;

NOW, THEREFORE, in consideration of these premises and of the mutual covenants set forth herein, Client and Contractor agree as follows:

**1. CONTRACT DOCUMENTS**

1.1 Contract Documents includes the Contract Plans, Contract Specifications, and any other documents specifically referenced therein. The Contract Documents shall also include any applicable governmental standards, government order (whether unilateral or by consent), decree, demand, permit, record of decision, or Contract referenced by or incorporated into any of the foregoing documents, pursuant to which such work is performed regardless of whether any of the foregoing

documents are specifically referenced in the Contract Documents.

## **2. SERVICES OF THE CONTRACTOR**

2.1 Contractor shall perform the Work described in the Contract Documents and all applicable federal, state, and local laws.

2.2 If requested in the Contract Documents, the following services shall be provided by Contractor under Section 2.1:

2.2.1 Serving as remediation contractor and hiring all necessary subcontractors for performance of the Work.

2.2.4 Constructing and implementing the remedy, as described in Contract Documents.

2.2.8 Providing oral or written reports concerning construction progress, technical issues, regulatory issues, and other information reasonably requested by Client.

2.2.9 Obtaining temporary easements, rights of way, and access to enter upon public and/or private lands required to perform the Work, as reasonably requested by Client.

2.2.10 Obtaining all federal, state and local permits and approvals necessary for the Work or required under the Contract Documents, and submitting timely applications and requests for all such permits and approvals.

2.2.11 Securing and maintaining insurance coverage in the amounts and categories described in Section 17 of this Agreement and in the Contract Documents.

2.3 The Work will be completed in accordance with the substantive and procedural requirements of the Contract Documents and will be designed to achieve, and will meet, all performance standards, cleanup levels, and other requirements set forth in the Contract Documents.

2.4 In agreeing to perform the services under this Agreement for the Contract Price, Contractor recognizes and assumes the following risks inherent in performing the Work: the level of effort required to perform administrative obligations as indicated in the Contract Documents, secure needed permits and other government approvals, and construct remedial facilities; variances in the quantities of materials of construction; constructability of the components and productivity of the work force and equipment during construction of remedial facilities; and construction cost increases due to price changes or inflation.

2.5 The Work will be performed in a manner to avoid the incurrence of any work or cost obligation for which Client rather than Contractor would be responsible under this Agreement. If such work or cost obligation cannot be avoided, Contractor shall provide AMEC with prompt written

notice of any event, occurrence, condition, fact, claim, or circumstance that caused, will cause, or might reasonably be expected to cause the incurrence of such obligation.

### **3. AMOUNT AND METHOD OF PAYMENT**

3.1 Contractor shall supply all labor, equipment, materials, utilities, management, supervision, and subcontractors necessary to perform the Work in accordance with this Agreement and the Contract Documents.

3.1.1 Contractor shall submit simultaneously with each invoice the necessary supporting information, which shall contain adequate detail to permit Client and AMEC to verify the invoice and Contractor's estimates of the percentage of Work completed, including a statement of the percentage of Work completed in, and the full amount to be invoiced for, each item of Work activity. Upon Client and AMEC's verification of the invoice and percentage of Work completed, Client shall pay to Contractor the properly invoiced amount less ten percent (10%) of the full value of the invoice (the "Retainage") If any invoiced amount is disputed, Client shall pay the undisputed amount, and shall use best efforts to resolve the dispute with Contractor prior to Contractor's issuance of the next invoice. All Retainage Amounts shall be disbursed in accordance with Section 3.1.6 of this Agreement.

3.1.2 Each invoice submitted by Contractor shall constitute a representation by Contractor that (i) the amount requested is justly due based on Contractor's best good faith estimates of the percentage of Work completed, (ii) the Work which is the subject of the invoice has been performed in accordance with this Agreement and the Contract Documents, (iii) the materials, supplies, and equipment for which such invoice is submitted have been installed at the Site, (iv) the materials, supplies, and equipment for which such invoice is submitted are not subject to any encumbrances, and, (v) no mechanics', laborers', vendors', materialmen's, or other liens have been filed in connection with or on account of the Work or any of the materials, supplies, or equipment incorporated therein or purchased in connection therewith.

3.1.3 Invoices shall be due and payable within thirty (30) calendar days after receipt of the invoice and the necessary supporting information. Client shall notify Contractor in writing of any disputed amount within twenty (20) calendar days after receipt of the invoice.

3.1.4 Client shall have the right at its own expense to audit Contractor's books and documents relating to the Agreement during the period in which the Work is being performed and for one (1) year following termination of this Agreement. Any such audits may be carried out at reasonable intervals and shall be accomplished during normal business hours.

3.1.5 In the event that Contractor fails, neglects, or refuses to comply with any material provision of this Agreement, Client may withhold payment from Contractor until there has been compliance with such provision to the extent the payment is directly related to the failure, neglect, or refusal of Contractor or damage suffered by Client.

3.1.6 Within sixty (60) days of the submission by Contractor to Client of the Final Completion Certification that all components of the Work are constructed in accordance with the Contract Documents and with all applicable statutory and regulatory requirements and are properly operating, Client shall either approve or reject the certification, and, upon Client's approval of the submitted or resubmitted certification, which approval shall not be unreasonably withheld, shall pay to Contractor all Retainage Amounts.

3.1.7 When applicable within thirty (30) days of: (1) Client's receipt of written notice of the government agency ("Agency") overseeing the Work's determination that all remedial construction has been completed, or if the Agency indicates that such a determination is not required, Client's receipt of written notice of the Agency's approval of Contractor's closeout reports for all components of the remedy, and, following Client's receipt of the Agency's determination or approval, (2) the submission by Contractor to Client of the Final Completion Certification that all components of the remedy have been constructed in accordance with the Contract Documents and with all applicable statutory and regulatory requirements and are properly operating, Client shall pay to Contractor all Retainage Amounts.

3.1.8 No payment (including payment of the Retainage Amounts) under this Agreement shall be deemed acceptance of the performance of this Agreement, either in whole or in part, or be construed as an acceptance of defective or non-conforming work or material; or in any manner release the obligations of Contractor under this Agreement.

3.1.9 Neither Contractor nor Client shall make any adjustments to the Contract Price other than for reasons expressly identified in this Agreement.

3.1.10 If an Agency requests a change in the Work or performance of any activity that would not be included in the price specified in Section 3.1 herein, Contractor shall consult with Client and then respond to the Agency by proposing to the extent available an alternative change or activity that would be included in the price specified in Section 3.1. In no event may Contractor propose or suggest to the Agency, directly or indirectly, orally or in writing, any activity or work not included within the price set forth in Section 3.1 without the express prior written consent of Client.

#### **4. PROJECT SCHEDULE**

4.1 Contractor shall commence the performance of services under this Agreement immediately upon execution of this Agreement by all parties.

4.2 Contractor shall, upon execution of this Agreement, submit to AMEC a detailed schedule showing all activities and sequence of operations needed for the orderly performance and completion of all separable parts of the Work and the entire Work in accordance with this Agreement and the Contract Documents. Such schedules shall set forth the dates at which Contractor will start each separable part of the Work and the estimated dates of completion of each such part of the Work.

4.3 Contractor shall not modify the Work schedule without the prior written approval of Client and AMEC. Contractor shall promptly inform AMEC of any proposed change in the schedule and, in the event Client approves such change, Contractor shall furnish AMEC with a revised schedule within five (5) calendar days after such approval. The schedule shall be kept up to date at all stages of performance of the Work under this Agreement, taking into account the actual progress of the Work. The schedule shall comply with the time requirements for the completion of the separable parts of the Work and the entire Work as set forth in the Contract Documents.

## **5. WORK CHANGES**

5.1 Client, from time to time, may authorize or require changes in the Work, consisting of additions, deletions, or other revisions in the Work. Client shall indicate its intention to order changes in the Work by either giving Contractor a written change order proposal ("Change Order Proposal") or requesting Contractor to prepare a Change Order Proposal and then countersigning that Proposal, which shall set forth in detail the nature of the proposed change.

5.2 Upon the issuance of any Change Order Proposal under Section 5.1 of this Agreement, Contractor shall forthwith furnish to Client a statement signed by Contractor ("Contractor's Statement"), setting forth in detail, with a suitable breakdown by trades and work classifications, Contractor's estimate of the cost or savings of the change, if any, together with Contractor's estimate of changes, if any, in the performance schedule which will be required as a result of such change. If Client countersigns Contractor's Statement, such Change Order Proposal, together with Contractor's Statement, collectively shall constitute a change order ("Change Order"), the changes in the Work reflected therein shall become part of the Work, and Contractor shall revise the performance schedule in accordance therewith.

5.3 [DELETED]

5.4 [DELETED]

**6. CONSULTATION WITH CLIENT AND AMEC**

6.1 Contractor shall provide Client and AMEC with copies of all draft submissions and/or deliverables required for any reason to be submitted to any federal, state, or local governmental or regulatory authority sufficiently in advance of any deadline for such submission to allow meaningful review and comment by Client and AMEC.

6.2 Contractor shall provide Client and AMEC prompt written notice of any event or condition, fact that might reasonably be expected to have a material adverse effect on the Contractor's ability to fulfill its obligations under this Agreement.

6.3 Contractor shall provide Client and AMEC with written notice of any proposed change in key Contractor personnel and consultants at least five (5) business days prior to making such proposed change.

6.4 Contractor shall utilize only those environmental testing laboratories approved by Client.

**7. PERSONNEL AND LABOR**

7.1 Contractor has, or will secure all personnel required for the performance of its obligations under this Agreement. Contractor shall be responsible for the supervision and direction of the performance of the Work under this Agreement by Contractor's employees and any subcontractors. Contractor reserves the right to review the qualifications of any individuals assigned by Contractor to perform the Work under this Agreement and to reject those who are not in Client's reasonable opinion qualified or otherwise acceptable. Any such review and/or rejection shall in no way relieve Contractor of the obligation to select and assign qualified personnel to perform the Work under this Agreement or of the liability incurred therefrom.

7.2 Contractor agrees that, other than those persons designated in writing by Client, only agents and employees of Contractor or subcontractors, and authorized federal, state, and local officials, will be allowed access to any Work location.

7.3 Contractor shall take all necessary precautions for the safety of its employees, subcontractors, agents, and others who may be affected by Contractor's performance of Work under this Agreement.

7.4 Contractor shall inform its employees, agents, subcontractors, and other persons who may come into contact with any Work location of the nature and extent of the health and

environmental risk, if any, associated with the Work location and Contractor's performance of Work at the Work location.

7.5 Contractor shall adopt working conditions and other employment policies reasonably satisfactory to Client and shall comply with all applicable federal, state, and local labor laws, regulations and ordinances as now or hereafter in effect.

7.6 Contractor shall take all reasonable precautions to prevent labor disputes which could interfere in any way with the performance of the Work under this Agreement. Contractor shall notify Client and AMEC of any actual or potential labor disputes as soon as the existence thereof is known to Contractor.

7.7 Contractor recognizes that, subsequent to completion and final acceptance of the Work, the need may arise to provide testimony during hearings and/or court proceedings involving specific activities or other matters relating to the Work, with regard to which personnel provided by Contractor under this Agreement (including subcontractor personnel) would have gained expertise and first-hand knowledge as a result of the tasks performed under this Agreement. Therefore, Contractor agrees to make available its personnel in such proceedings and to enter into intent agreements as necessary with subcontractors to ensure the availability of subcontractor personnel provided under this Agreement.

## **8. SUBCONTRACTORS**

8.1 Contractor may employ one or more subcontractors or other persons to complete a portion of the Work, including, but not limited to, drilling, laboratory analysis, and engineering.

8.2 In the event Contractor subcontracts any Work pursuant to this provision each subcontractor shall be required in its contract with Contractor to waive all liens against Contractor and Client and any Work location and agree to be joined in any dispute resolution matter between Client and Contractor pursuant to Section 26 of this Agreement that requires the subcontractor's joinder to complete resolution of the dispute and Contractor shall remain responsible and accountable for all Work performed or to be performed by a subcontractor to the same extent as if Contractor had performed such Work itself.

8.3 Client may reject any subcontractors whom Client reasonably determines not to be acceptable, and notwithstanding client's approval of or failure to reject any subcontractor, Contractor shall remain fully responsible for such subcontractor's performance.

## **9. MATERIALS, EQUIPMENT, AND TOOLS**

9.1 Unless otherwise provided under this Agreement, all materials and equipment for the Work are to be provided by Contractor.

9.2 Materials, equipment, and tools furnished by Contractor arriving at the Site, whether before or after the commencement of the Work, shall be unloaded, transported, handled, and stored by Contractor.

9.3 Contractor shall be responsible for the care, custody, and control of materials until such time as all of the Work is approved by Client.

9.4 To the extent that Client has complied with the requirements for payment to Contractor under this Agreement, title to materials and equipment shall pass to Client upon incorporation into the project or, if delivered to the Site and stored for incorporation into the project, upon delivery to the Site. If materials, equipment, or tools are lost, stolen, or damaged while in the care, custody, or control of Contractor, its employees, agents, or subcontractors, the replacement cost thereof shall be charged to Contractor.

## **10. COMPLIANCE WITH LAW AND PREVENTIVE MAINTENANCE**

10.1 In performing the Work, Contractor shall comply with all of the laws, decrees, and orders of all governmental authorities having jurisdiction. Without limiting the foregoing, Contractor shall observe all laws and regulations relating to labor, occupational safety, health, sanitation, fire, pollution, and, if necessary, hazardous materials.

10.2 Client reserves the right to review Contractor's operations and safety procedures, but Client's review or failure to review shall in no way affect Contractor's obligations under this Agreement or pursuant to law.

10.3 Contractor shall provide sufficient, safe, and proper facilities at all times for the installation of the Work.

10.4 Contractor shall maintain the Site, excavations, staging areas, access roads, borrow areas, and all other Work areas free from dust.

10.5 Contractor shall not permit unauthorized fires within or adjacent to any Work location and shall be liable for all damage from fire due directly or indirectly to its own activities, or to those of its employees or of its subcontractors or their employees.

10.6 All mobile equipment and all machinery located at any Work location shall be locked or otherwise made inoperable whenever unattended.

10.7 All construction debris deposited on public ways shall be removed immediately

and all vehicles engaged in the Work shall be so policed and cleaned so that no debris carried from any Work location is deposited on public ways. Contractor and its subcontractors are mutually liable for enforcement of this provision and Contractor shall hold Client harmless from all liability due to Contractor's failure to observe the precautions of this provision.

10.8 Contractor shall provide all guard rails or temporary enclosures around pits, open excavation, trenches, and other hazards as shall be necessary or appropriate to protect any person or property located about any Work location.

10.9 Contractor shall at all times keep any Work location free from accumulation of unusable materials caused by its operations or the operations of its representatives, agents, or subcontractors. At the completion of the Work, Contractor shall remove all such materials from and about any Work location, as well as its tools, construction equipment, machinery, and surplus materials.

10.10 If Contractor fails to clean up at the completion of the Work, Client may do so or arrange to have a third party do so and the cost thereof shall be charged to the Contractor and may be withheld from any payment due to Contractor.

10.11 [DELETED]

## **11. DISPOSAL OF HAZARDOUS SUBSTANCES**

11.1 Contractor shall assist Client and AMEC with logistical matters associated with off-site transportation, treatment, and/or disposal of hazardous substances from any Work location. Client will contract offsite transportation and disposal activities directly.

## **12. PENALTIES FOR LATE OR INADEQUATE PERFORMANCE**

12.1 Contractor shall be responsible for any costs incurred by Client, including, but not limited to legal, investigative and stipulated penalty costs imposed by any federal, state or local governmental or regulatory agency, to the extent such costs are the consequence of, or result from, delays by Contractor in complying with the schedule approved by Client in accordance with Section 4 of this Agreement, or otherwise as a result of Contractor's failure to perform the Work in accordance with the requirements of this Agreement, and to the extent the performance schedule for the Work has not been changed or excused pursuant to the Force Majeure provisions of Section 13 of this Agreement. When payment is required by Contractor pursuant to this provision, payment shall be made by the Contractor in a timely manner to prevent additional fines or penalties but in no event shall payment occur any later than twenty (20) days after notification.

12.2 If both Contractor and Client are responsible for late or improper performance resulting in the imposition of costs described in Section 12.1, then Contractor and Client shall each pay the proportionate share of such costs attributable to the relative responsibility or fault of each party giving rise to the late or improper performance.

12.3 It is understood and agreed that if any dispute arises between Contractor and Client concerning responsibilities for late or improper performance giving rise to the imposition of costs described in Section 12.1, Contractor and Client shall suspend consideration of the matter for a period of five (5) business days and at the end of such five days shall meet to reconsider the matter.

12.4 Notwithstanding anything in this Agreement to the contrary, the right of Client to obtain reimbursement of costs pursuant to this Section 12 is not an exclusive remedy and shall not preclude Client from electing to pursue any other remedies or sanctions, in law and equity, which may be available to them by reason of Contractor's violation of this Agreement.

### **13. FORCE MAJEURE**

13.1 No delay or failure in performance by either party hereto shall constitute default hereunder or give rise to any claim for damages, if, and to the extent, such delay or failure is caused by an unforeseen occurrence beyond the control and without the fault or negligence of the party affected and which said party is unable to prevent or provide against by exercise of reasonable diligence, including, but not limited to, acts of God or the public enemy, expropriation or confiscation of facilities, changes in applicable law, war, legal disputes, rebellion, sabotage or riots, floods, unusually severe weather, fires, explosions, or other catastrophes, strikes, lockouts or similar occurrences ("Force Majeure").

13.2 Unless the Force Majeure substantially frustrates the performance of this Agreement, it shall not operate to excuse but only to delay, performance hereunder. Contractor shall adopt all reasonable measures necessary to avoid or minimize delay, and shall restart the Work as soon as reasonably possible following termination of the Force Majeure, and in no event shall the time for performance of the Work under this Agreement be extended for a period greater than the period equal to the delay directly resulting from the Force Majeure.

13.3 Contractor understands that to the extent Client is required under the Contract Documents to perform the Work strictly in accordance with the schedules set forth therein, that time is of the essence in the performance of this Agreement.

### **14. DOCUMENTS AND RECORDKEEPING**

14.1 Contractor understands the Client may have recordkeeping and record preservation obligations in accordance with the Contract Documents and agrees to be bound by, and comply with, those obligations and to require that any subcontractors comply with those obligations, notwithstanding final payment under this Agreement.

14.2 All written data, notes, and information, samples, materials, documents (including, but not limited to reports, studies, drawings, photographs, plans and specifications, and laboratory tests), and all copies, reproductions, and portions thereof, prepared or furnished by or for Contractor, its associates, consultants and subcontractors (including documents obtained from third parties) pursuant to this Agreement, shall be and remain the exclusive property of Client. Contractor shall provide Client and AMEC with copies of such documents, promptly upon Client or AMEC's request, at any time during the term of this Agreement or with the original documents following its termination.

14.3 Contractor represents that Client and any successor in interest or assignee of Client may rely upon any final reports or recommendations produced by Contractor, as well as any data generated by or for Contractor during the course of performing the Work under this Agreement.

## **15. CONFIDENTIALITY; PRIVILEGE**

15.1 Contractor shall not disclose or use for any purpose other than the performance of Work under this Agreement any data, samples, materials or other information disclosed to, made available to, obtained by, or developed, directly or indirectly, by Contractor (whether directly from Client or otherwise) pursuant to its performance of Work under this Agreement.

15.2 If any legal proceedings (including, but not limited to, any court orders, subpoenas, notices of deposition, or other discovery requests) are instituted against, or if any governmental or regulatory directive is issued against, Contractor to obtain any Confidential Information, Contractor shall immediately notify Client in writing thereof. Client may seek an appropriate protective order or may waive Contractor's compliance with this provision. If, in the absence of a protective order or the receipt of a waiver hereunder, Contractor is nonetheless, in the opinion of its counsel, compelled to disclose any confidential information to any tribunal or governmental or regulatory agency or else stand liable for contempt or suffer other censure or penalty, Contractor agrees that it will furnish only that portion of the Confidential Information which is legally required and will exercise its best efforts to obtain reliable assurance that confidential treatment will be accorded to that portion of the Confidential Information so disclosed.

15.3 Contractor shall restrict the knowledge of all Confidential Information to its officers, employees, and others who are directly connected with the performance of Contractor's obligations under this Agreement and have need of such knowledge. The confidentiality obligations set forth in this Section 15 shall apply to all such persons, and Contractor shall take all reasonable steps to obligate and bind all such persons to honor such confidentiality obligations.

15.4 Contractor may make, retain and use copies of any documents generated by or prepared for it under this Agreement, consistent with the confidentiality obligations as set forth in this Section 15 and provided that such copies are maintained as confidential in a secure file with access restricted only to Contractor's personnel or counsel with a need for access thereto, and are not used for any purpose other than performance of Contractor's obligations under this Agreement.

**16. PATENTS AND INVENTIONS**

16.1 Contractor hereby agrees to defend, protect, indemnify and hold harmless Client, its parents, subsidiaries, affiliates, successors, and assigns, and its and their stockholders, directors, officers, employees, agents, and representatives from and against any and all damages, liabilities, claims, demands, fines, penalties, forfeitures, losses, actions, and suits (and the costs and expenses incident thereto, including reasonable attorneys' fees and costs, and court costs relating to defense or settlement), which any of the same may hereafter incur, become responsible for or pay out in relation to the alleged infringement of any patent rights in the manufacture, use or disposition of any article or material supplied under this Agreement, except for articles or materials provided by Client to Contractor.

**17. INSURANCE AND BONDING**

17.1 In addition to any insurance that may be required by the Contract Documents, Contractor shall, at its sole cost and expense, secure and at all times during the term of this Agreement maintain such insurance as will provide the following types and limits of coverage to Contractor:

	<u>Type</u>	<u>Limits</u>
(a)	Workers' Compensation	Statutory
(b)	Employer's Liability	\$1,000,000 each occurrence

- |     |                         |   |
|-----|-------------------------|---|
| (c) | Automobile Liability    | Bodily injury and property damage: \$1,000,000<br>combined single limit   |
| (d) | General Commercial      | Bodily injury and property damage: \$1,000,000<br>combined single limit, \$2,000,000 aggregate                            |
| (e) | Contractor's Pollution  | Bodily injury and property damage: \$2,000,000<br>combined single limit, \$2,000,000 aggregate                            |
| (f) | Engineer's Professional | Bodily injury and property<br>with damage: \$1,000,000 combined Pollution<br>Coverage single limit, \$2,000,000 aggregate |

17.2 Contractor shall name Client and AMEC and the City of Providence, and, where as required by the Contract Documents, any government agency, as additional insureds under the policies providing the foregoing coverages, and shall provide that such insurance is primary to any similar insurance that Client may have.

17.3 Within thirty (30) days of the execution of this Agreement, and prior to the commencement of Work, Contractor shall provide Client with certificates of such insurance. The certificates shall specify the dates when such insurance expires and shall provide further that Contractor shall provide Client not less than twenty (20) days' written notice before termination, cancellation of, or any material change in, such insurance (which notice shall not relieve Contractor from any breach of this Agreement). A renewal certificate shall be furnished to Client prior to the expiration date of policies noted therein.

17.4 Contractor, on behalf of itself, and any and all of its officers, directors, employees, agents, subcontractors, suppliers and consultants, hereby releases Client from all claims, demands, causes of action, liability, damages, losses, costs and expense due to any act or omission of Client which is subject to coverage by one or more of the insurance policies required to be maintained pursuant to this Section 17.

17.5 Where applicable, Contractor shall maintain the coverage specified in (d), (e), and (f), above, until three months after: (1) Client's receipt of written notice that a government agency

has issued a determination that all remedial construction has been completed, or if the agency indicates that such a determination is not required, Client's receipt of written notice of the agency's approval of Contractor's closeout reports for all components of the remedy, and, following Client's receipt of the agency's determination or approval, (2) the submission by Contractor to Client of a final certification that all components of the remedy have been constructed in accordance with the Contract Documents and with all applicable statutory and regulatory requirements and are properly operating.

17.6 Contractor shall furnish performance and payment bonds, each in an amount at least equal to the price of the Work as security for the faithful performance and payment of all of Contractor's obligations under this Agreement. These bonds shall remain in effect at least until one year after the date when Client makes its final payment to Contractor for the Work, except as otherwise provided by an applicable federal, state, or local laws, regulations, or ordinances. Each bond shall be in form and substance acceptable to Client and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff, Bureau of Government Financial Operations, U.S. Treasury Department. All bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

17.7 [DELETED]

## **18. REPRESENTATIONS OF CONTRACTOR**

18.1 Contractor hereby represents to Client and acknowledges that Client is relying on Contractor's representations that:

18.1.1 Contractor is a qualified and experienced construction firm with such expertise in construction remediation and related activities as is necessary and sufficient to perform the Work in accordance with this Agreement and the Contract Documents.

18.1.2 Contractor is familiar with and understands the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"), as amended by the Superfund Amendments and Reauthorization Act ("SARA"), the Resource Conservation and Recovery Act ("RCRA"), regulations promulgated under CERCLA and RCRA, including the National Contingency Plan ("NCP"), U.S. EPA Guidance Documents and policy statements applicable to site remediation under CERCLA and RCRA, and analogous remediation laws, regulations and policies in effect in the State in which the Work is to be performed.

18.1.3 Contractor warrants that it is familiar with the requirements of all the Contract

Documents pertaining to the Work.

18.1.4 Contractor understands that Work location conditions may differ from those presently known to Contractor.

18.1.5 Contractor represents that it currently has no, and shall not accept for the duration of this Agreement, employment or engagement for its services that would lead to a conflict of interest with respect to its obligations to Client under this Agreement.

## **19. WARRANTIES**

19.1 Contractor warrants that it shall use its best professional judgment in the performance of the Work and shall at all times in the performance of its duties under this Agreement exercise the degree of care and skill ordinarily exercised, under similar circumstances, by reputable contractors performing comparable services. Contractor further warrants that it shall be responsible for the safe condition and operation of all equipment employed by it in the performance of the Work, and shall take all action necessary to protect the health and safety of all personnel (whether or not Contractor's employees) engaged by Contractor in the performance of the Work.

19.2 Contractor warrants that the services hereunder shall be performed in accordance with generally and currently accepted engineering and construction principles and practices.

19.3 Contractor warrants that the services hereunder shall be performed in a skillful and workmanlike manner, free from defects in design, materials, and workmanship.

19.4 Contractor warrants that the services hereunder shall be performed in conformance with the Contract Documents and that all performance standards, cleanup levels, and other requirements of the Contract Documents shall be achieved.

19.5 Contractor warrants that it, and its subcontractors, will perform the Work under this Agreement in a manner consistent with all applicable federal, state and local laws, regulations, standards, orders and decrees.

19.6 To the extent that any manufacturer, distributor or supplier provides any guarantee or warranty in excess of the guarantees and warranties provided herein, Contractor shall provide or assign to Client any benefits associated therewith. Contractor shall render reasonable assistance to Client when requested in order to enable Client to enforce such warranties and guarantees by the third party manufacturers, distributors or suppliers.

19.7 Nothing in this Section 19 shall be construed to limit or restrict any other right, claim, cause of action, or remedy available to Client under federal or state law, including common law.

19.8 In addition to any and all other remedies afforded Client herein or by law, if Contractor breaches any representations or warranties contained in this Agreement, Contractor shall correct any aspect of the Work not performed in accordance with such representations and warranties at no additional charge to Client.

19.9 Where the Work involves subsurface exploration, excavation or drilling at any Work location, Contractor warrants that it shall be responsible for determining the existence and location of underground utilities, conveyances and structures of any kind and shall undertake the Work so as not to destroy, damage, or come into contact with any such utilities, conveyances and structures.

## **20. INDEMNIFICATION**

20.1 Contractor acknowledges and is aware of hazards inherent in performing the Work under this Agreement and as between Client and Contractor, Contractor knowingly and voluntarily assumes all risk of injury and damage to Contractor and Contractor's property while at any Work location.

20.2 Contractor hereby agrees to defend, protect, indemnify and hold harmless Client, its parents, subsidiaries, affiliates, successors, and assigns, and its and their stockholders, directors, officers, employees, agents, and representatives from AMEC and against any and all damages, liabilities, claims, demands, fines, penalties, forfeitures, losses, actions, and suits (and the costs and expenses incident thereto, including reasonable attorneys' fees and costs, and court costs relating to defense or settlement), which any of the same may hereafter incur, become responsible for or pay out as a result of death or bodily injuries to any person, destruction or damage to or loss of any property, contamination of or adverse effects on the environment, or any violation of any federal, state, or local law, regulation, rule, or order to the extent caused by (i) Contractor's breach of any term of this Agreement; or (ii) any negligent, wrongful, or willful act, error, or omission of Contractor, its directors, officers, employees, associates, agents, consultants and subcontractors. Contractor shall cause its indemnity obligation under this provision to be insured under its professional liability insurance policy and its general liability insurance policies carried pursuant to Section 17.1.

20.3 Client hereby agrees to defend, protect, indemnify and hold harmless Contractor, its parents, subsidiaries, affiliates, successors, and assigns, and its and their stockholders, directors, officers, employees, agents, and representatives from and against any and all damages, liabilities, claims, demands, fines, penalties, forfeitures, losses, actions, and suits (and the costs and expenses incident thereto, including reasonable attorneys' fees and costs, and court costs relating to defense or settlement),

which any of the same may hereafter incur, become responsible for or pay out as a result of death or bodily injuries to any person, destruction or damage to or loss of any property, contamination of or adverse effects on the environment, or any violation of any federal, state, or local law, regulation, rule, or order to the extent caused by (i) Client's breach of any term of this Agreement; or (ii) any negligent, wrongful, or willful act, error, or omission of Client, its directors, officers, employees, associates, agents, consultants and subcontractors (other than Contractor and its subcontractors); or (iii) Contractor's assisting Client in arranging transportation, treatment and/or disposal of hazardous substances subject to the terms of Section 11.1 of this Agreement.

20.4 Client shall have the right if it so elects to participate at its own expense in the defense of any claim or action referred to in Section 20.2, but such participation shall not affect Contractor's liability for any judgment herein, or release Contractor from the indemnity therein provided.

## **22. LIENS AND RELEASES**

22.1 Contractor shall promptly discharge its obligations to its laborers, materialmen, creditors, and Subcontractors. Client may, but shall not be obligated to, discharge any such obligations of Contractor and charge the Contractor therefor and set off the amount thereof against its obligations to Contractor under this Agreement.

22.2 The final invoice submitted by Contractor for payment shall be accompanied by waivers of any lien by Contractor.

22.3 Contractor shall at all times defend, indemnify and hold harmless Client, its parents, subsidiaries, affiliates, successors, and assigns, and its and their stockholders, directors, officers, employees, agents, and representatives from and against any and all damages, liabilities, claims, demands, fines, penalties, forfeitures, losses, actions, and suits (and the costs and expenses incident thereto, including reasonable attorneys' fees and costs, and court costs relating to defense or settlement), which any of the same may hereafter incur, become responsible for or pay out in relation to any claims or liens for labor performed or materials furnished in the performance of Work. Contractor may, in good faith, dispute any such lien and may litigate same, provided that, at the request of Client, Contractor shall provide adequate security to protect Client from any such claims or liens and to discharge such liens when such discharge is available under applicable law.

22.4 Concurrently with final payment by Client to Contractor, Contractor shall deliver to Client an instrument satisfactory to Client in form and substance releasing Client from all contractor, subcontractor, supplier, and materialmen's claims, liens, or encumbrances of whatever kind arising out of

this Agreement.

### **23. SUSPENSION OF SERVICES**

23.1 In the event the Work is prevented or suspended by order of any legally constituted governmental or regulatory agency or judicial body, or should Client at its sole option decide to suspend, at any time, the performance of all or any portion of the Work to be performed under this Agreement, Contractor will be notified of such decision or order by Client in writing. During the period of suspension, Contractor shall use its best efforts to utilize its labor and equipment in such manner as to minimize costs associated with the suspension.

23.2 Upon receipt of any such notice or order, and as long as there is no violation of any law or regulation, the Contractor shall, unless the notice requires otherwise: (i) immediately discontinue Work on the date and to the extent specified in the notice; (ii) place no further orders or subcontracts for materials, services, or facilities with respect to suspended Work other than to the extent required in the notice; (iii) promptly make every reasonable effort to obtain suspension of all orders, subcontracts, and rental agreements to the extent they relate to performance of the Work suspended; and (iv) unless otherwise specifically stated in the notice, continue to protect and maintain the Work theretofore completed, including those portions on which Work as been suspended.

23.3 Contractor shall be paid for services performed to the suspension date plus, as full compensation for suspension, suspension costs reasonably incurred, without duplication of any item, to the extent such costs are directly attributable to the suspension of Work, such as standby costs, demobilization costs, and personnel and equipment rescheduling and/or reassignment adjustments.

23.4 Upon receipt of notice to resume suspended Work, Contractor shall immediately resume Work on the suspended Work to the extent required in the notice. Any claim on the part of Contractor for an extension of time or for compensation under Section 23.3 shall be made within twenty (20) calendar days after receipt of notice to resume Work and shall be accompanied by a revised Work schedule.

23.5 Should a suspension exceed ninety (90) days in duration, Contractor shall have the right to terminate this Agreement.

23.6 Should Contractor be obstructed or delayed in its performance or completion of the Work for any reason, including any act or omission of Client, Contractor, or any subcontractors, Contractor shall in no event and under no circumstances be entitled to any additional compensation, cost or damage.

23.7 If Contractor is delayed or disrupted by the neglect of Client, Contractor's sole remedy is to receive a non-compensable extension of time, provided claim is submitted in writing within three (3) days of delay or disruption. If delay is caused by any reason other than the sole neglect or default of Client, Contractor shall in no event and in no circumstances be entitled to any additional compensation, damage or extension of time.

## **24. TERMINATION**

24.1 This Agreement may be terminated without cause by mutual agreement of the parties or by Client for any reason at any time.

24.2 [DELETED]

24.3 [DELETED]

24.4 If this Agreement is terminated by Client without cause under Section 24.1, Contractor shall be paid for services performed to the date of termination plus reasonable termination costs incurred by Contractor. Termination costs may include personnel and equipment rescheduling and/or reassignment adjustments and other costs incurred directly attributable to termination including subcontract termination and/or cancellation fees or penalties.

24.5 If this Agreement is terminated by Client for cause, Client may exclude Contractor from the Work location, and take possession of the design plans and all Contractor's tools, appliances, equipment and machinery at the Work location, if any, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion), incorporate in the Work all materials and equipment stored at the Work location or for which Client had paid Contractor, but which are stored elsewhere, and complete (or cause to be completed) the Work as Client may deem expedient. In such case, Contractor shall not be entitled to receive any further payment until the Work is completed. If direct, indirect and consequential costs of completing the Work, including but not limited to fees and charges of all engineers, architects, attorneys and other professionals and consultants and court and arbitration costs, exceed the unpaid balance of the contract price, Contractor shall pay the difference to Client. Termination of the Agreement by Client shall not affect any of Client's existing or thereafter accruing rights or remedies against Contractor. Any retention or payment of monies due Contractor by Client will not release Contractor from liability. Upon completion of the Work, Client shall pay Contractor any outstanding and unpaid amounts due Contractor on account of Work satisfactorily completed by Contractor, less any increased costs of completing the Work suffered or incurred by Client.

24.6 Upon receipt of any notice of termination, Contractor shall: (i) immediately discontinue the Work on the date and to the extent specified in the notice; (ii) place no further orders or subcontract for materials, equipment, services, or facilities, except as may be necessary for completion of such portion of the Work as is not to be discontinued; (iii) at Client's request, either promptly make every reasonable effort to procure cancellation upon terms satisfactory to Client of all orders, subcontracts, and rental agreements to the extent they relate to the performance of the work discontinued or assign to Client all such orders, subcontractors, and rental agreements; and (iv) thereafter do only such work as may be necessary to preserve and protect the Work already in progress and to protect materials and equipment at the Site or in transit thereto.

24.7 Contractor recognizes that the services under this Agreement are vital to Client and must be continued without interruption and that, upon a termination by Client, a successor (either Client or another contractor) may continue such services. Contractor agrees to furnish phase-in training and exercise its best efforts and cooperation to effect an orderly and efficient transition to any such successor.

24.8 Unless the parties agree otherwise, in the event of termination, Contractor shall submit to Client no later than thirty (30) days after the date of termination a final invoice based on the percentage of Work completed up to the effective date of termination. Client shall be entitled to take possession of and to use all materials and equipment for which they have paid Contractor pursuant to this Agreement.

**25. NOTICES**

25.1 Any notice, notification, request, demand, statement, or other communication (any of the foregoing being a "notice") which any party hereto is required, permitted, or desires to serve on another party shall be in writing and served personally by United States certified mail, return receipt requested, or by electronic mail (e-mail), with hard copy to follow by certified mail, return receipt requested to the party to be charged with receipt thereof. Notices shall be deemed given and effective hereunder when received by the persons and at the addresses shown below:

For Client:

Director of Site Remediation  
Textron Inc.  
40 Westminster Street  
Providence, RI 02903

For Contractor:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

25.2 [DELETED]

**26. DISPUTE RESOLUTION; ARBITRATION**

26.1 If there is a dispute arising out of or relating to this Agreement or the alleged breach thereof, there shall be a meeting of the parties which shall be attended by a representative of each party who has authority to resolve the dispute and at which the representatives will make a good faith effort to resolve the dispute without litigation. The meeting shall take place within seven (7) days from written notice by any party that the dispute exists.

26.2 All disputes arising out of or relating to this Agreement or the alleged breach thereof that are not resolved pursuant to Section 26.1 shall be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then in effect. This agreement to arbitrate shall be specifically enforceable and the determination rendered by the arbitrators shall be final and judgment may be entered upon it in accordance with the applicable law of any court having jurisdiction thereover.

26.3 Any arbitration proceeding initiated under the terms of this Agreement may, at the request of either party hereto, be joined or consolidated with other arbitration proceedings involving additional parties if the dispute arises out of common or interrelated factual occurrences.

26.4 Notice of demand for arbitration shall be filed in writing with the other party to this Agreement and with the American Arbitration Association. The demand for arbitration shall be filed within a reasonable period of time after the claim, dispute, or other matter in question has arisen, but in no event shall it be made after the date when institution of legal or equitable proceedings based on such claim, or dispute, or other matter in question would be barred by the applicable statute of limitations.

26.5 [DELETED]

26.6 Unless otherwise agreed in writing, Contractor shall remain obligated to perform the Work and duly adhere to the project schedule pending resolution of any dispute and/or during any arbitration proceeding with Client. No Work shall be delayed or postponed pending resolution of any dispute and/or during any arbitration proceeding with Client, and all provisions of the Agreement shall remain in effect during the period of any dispute and/or arbitration.

**27. CONTRACTUAL RELATIONSHIP**

27.1 Contractor and Client agree that Contractor is an independent contractor and that

this Agreement shall not be construed to make Contractor or any of the officers, employees, agents, representatives or subcontractors of Contractor the employees, agents, or representatives of Client.

27.2 Contractor shall have exclusive control over its employees, agents, representatives and subcontractors and over all details and means of performing the Work under this Agreement.

27.3 Neither Contractor nor anyone employed or engaged by it in connection with this Agreement shall be, represent, act, purport to act or be deemed to be the agent, representative, employee or servant of Client, except as specifically provided in this Agreement.

## **28. SUCCESSORS AND ASSIGNS**

28.1 This Agreement shall inure to the benefit of and be binding on the successors and assigns of Client and Contractor.

28.2 Notwithstanding the foregoing, this Agreement may not be assigned by Contractor without the express, prior written consent of Client.

28.3 Unless otherwise provided herein, no provision of this Agreement, express or implied, is intended to confer any right or remedy on any person other than the parties hereto and their respective successors and assigns, nor is any provision of this Agreement intended to relieve or discharge the obligation or liability of any third person to any party hereto.

## **29. ENTIRE AGREEMENT; SEVERABILITY**

29.1 This Agreement (and the Contract Documents incorporated by reference) constitutes the entire agreement between the parties with respect to the subject matter hereof and supersedes all prior agreements and understandings, whether written or oral, between the parties in connection with said subject matter.

29.2 No terms, conditions, prior course of dealings, course of performance, usage of trade, understandings, purchase orders, or agreements purporting to modify, vary, implement, or explain any provision of this Agreement shall be effective unless in writing, signed by representatives of the parties hereto.

29.3 The headings of the several sections of this Agreement are inserted solely for convenience of reference and are not a part of and are not intended to govern, limit, or aid in the construction of any term or provision hereof to which they refer.

29.4 If any section or provision of this Agreement is adjudged by any court of

competent jurisdiction to be illegal or unenforceable, such adjudication shall not affect the legality, or enforceability of the Agreement as a whole or of any provision hereof not so adjudged.

29.5 This Agreement may be executed in any number of counterparts, each of which shall be deemed to be an original and all of which together shall be deemed to the same instrument.

**30. GOVERNING LAW**

30.1 This Agreement shall be governed and construed in accordance with the laws of the State of Rhode Island.

For Contractor:

For Client:

By: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

SECTION 00614

CONSTRUCTION PERFORMANCE BOND

Any singular reference to Contractor, surety, Client or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Principal Place of Business):

CLIENT (Name and Address):

CONSTRUCTION CONTRACT

Date:

Amount:

Description (Name and Location):

BOND

Date (Not earlier than Construction Contract Date):

Amount:

Modifications to this Bond Form:

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

SURETY

Company: (Corp. Seal)

Signature:

Name and Title:

Signature:

Name and Title:

CONTRACTOR AS PRINCIPAL

Company:

SURETY

Company:

(Corp. Seal)

(Corp. Seal)

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Client for the performance of the Construction Contract, which is incorporated herein by reference. \*
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Subparagraph 3.1.
3. If there is no Client Default, the Surety's obligation under this Bond shall arise after:
  - 3.1. The Client has notified the Contractor and the Surety at its address described in Paragraph 10 below, that the Client is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Construction Contract. If the Client, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Client's right, if any, subsequently to declare a Contractor Default; and
  - 3.2. The Client has declared a Contractor Default and formally terminated the Contractor's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Subparagraph 3.1; and
  - 3.3. The Client has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Construction Contract or to a contractor selected to perform the Construction Contract in accordance with the terms of the contract with the Client.
4. When the Client has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
  - 4.1. Arrange for the Contractor, with consent of the Client, to perform and complete the Construction Contract, or
  - 4.2. Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors; or
  - 4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Client for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Client and the contractor selected with the Client's concurrence to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Client the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the Client resulting from the Contractor's default; or
  - 4.4. Waive its right to perform and complete arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:
    1. After investigation, determine the amount for which it may be liable to the Client and, as soon as practicable after the amount is determined, tender payment therefor to the Client; or
    2. Deny liability in whole or in part and notify the Client citing reasons therefor.
5. If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the Client to the Surety demanding that the Surety perform its obligations under this Bond, and the Client shall be entitled to enforce any remedy available to the Client. If the Surety proceeds as provided in Subparagraph 4.4, and the Client refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Client shall be entitled to enforce any remedy available to the Client.
6. After the Client has terminated the Contractor's right to complete Construction Contract, and if the Surety elects to act under Subparagraph 4.1., 4.2., or 4.3 above, then the responsibilities of the Surety to the Client shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Client to the Surety shall not be greater than those of the Client under the Construction Contract. To limit of the amount of this Bond, but subject to commitment by the Client of the Balance of the Contract Price to mitigation of costs and damages on the Construction Contract, the Surety is obligated without duplicate for:
  - 6.1. The responsibilities of the Contractor for correction of defect work and completion of the Construction Contract;
  - 6.2. Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions failure to act of the Surety under Paragraph 4; and
  - 6.3. Liquidated damages, or if no liquidated damages are specified, the Construction Contract, actual damages caused by delay performance or non-performance of the Contractor.
7. The Surety shall not be liable to the Client or others for obligation the Contractor that are unrelated to the Construction Contract, and Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on Bond to any person or entity other than the Client or its heirs, executed administrators, or successors, or assigns.
8. The Surety hereby waives notice of any challenge, including change time, to the Construction Contract or to related subcontracts purchase orders and other obligations.
9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the or part of the work is located and shall be instituted within two years after Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform obligations under this Bond, whichever occurs first. If the provision this Paragraph are void or prohibited by law, the minimum period limitation available to sureties as a defense in the jurisdiction of the shall be applicable.
10. Notice to the Surety, the Client or the Contractor shall be made delivered to the address shown on the signature page.
11. When this Bond has been furnished to comply with a statutory other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory legal requirement shall be deemed deleted herefrom and provisions forming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed statutory bond and not as a common law bond.
12. Definitions.
  - 12.1. Balance of the Contract Price: The total amount payable by Client to the Contractor under the Construction Contract, all proper adjustments have been made, including allowance the Contractor of any amounts received or to be received, the Client in settlement of insurance or other claims for ages to which the Contractor is entitled, reduced by all and proper payments made to or on behalf of the Contractor under the Construction Contract.
  - 12-2. Construction Contract: The agreement between the Client, the Contractor identified on the signature page, including Contract Documents and changes thereto.
  - 12-3. Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.
  - 12.4. Client Default: Failure of the Client, which has neither remedied nor waived, to pay the Contractor as required by Construction Contract or to perform and complete or comply with the other terms thereof, in any material respect.
13. Any Contractor selected to perform the obligations of the Contractor under the construction contract must be approved, in advance, by the Client, which approval shall not be unreasonably withheld.

\*Including, without limitations, the one year correction period under Paragraph 13.12 of the Standard General Conditions.  
(FOR INFORMATION ONLY-Name, Address and Telephone)

AGENT or BROKER: CLIENT'S REPRESENTATIVE (Architect, Engineer or other party.)

EJCDC No. 1910-28A (1984 Edition)

Prepared through the joint efforts of The Surety Association of America, Engineers' Joint Contract Documents Committee. The Associated General Contractors of America, and the American Institute of Architects.

SECTION 00615

CONSTRUCTION PAYMENT BOND

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Principal Place of Business):

CLIENT (OWNER) (Name and Address):

CONSTRUCTION CONTRACT

Date:

Amount:

Description (Name and Location):

BOND

Date (Not earlier than Construction Contract Date):

Amount:

Modifications to this Bond Form:

CONTRACTOR AS PRINCIPAL

SURETY

Company: (Corp. Seal)

Company: (Corp. Seal)

\_\_\_\_\_  
Signature:

\_\_\_\_\_  
Signature:

Name and Title:

Name and Title:

CONTRACTOR AS PRINCIPAL

SURETY

Company: (Corp. Seal)

Company: (Corp. Seal)

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference.\*

2. With respect to the Owner, this obligation shall be null and void if the Contractor:

2.1 Promptly makes payment directly or indirectly, for all sums due Claimants, and

2.2 Defends, indemnifies and holds harmless the Owner from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Construction Contract, provided the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety, and provided there is no Owner Default.

3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.

4. The Surety shall have no obligation to Claimants under this Bond until:

4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2 Claimants who do not have a direct contract with the Contractor:

1. Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and

2. Have either received an injection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and

3. Not having been paid within the above 30 days, have sent a written notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.

5. If a notice required by Paragraph 4 is given by the Owner to the Contractor or to the Surety, that is sufficient compliance.

6. When the Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:

6.1 Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

6.2 Pay or arrange for payment of any undisputed amounts.

7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

8. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any Construction Performance Bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of Construction Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

9. The Surety shall not be liable to the Owner, Claimants or others obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. The Surety hereby waives notice of any change, including change time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which work or part of the work is located or after the expiration of one year, from the date (1) on which the claimant gave the notice required Subparagraph 4.1 or Clause 4.2 (iii), or (2) on which the last labor service was performed by anyone of the last materials or equipment work furnished by anyone under the Construction Contract, whichever of (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a debt in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner or the Contractor shall be mailed, delivered to the address shown on the signature page. Actual receipt notice by Surety, the Owner or the Contractor, however accomplished shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory, other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or other legal requirement shall be deemed incorporated herein. The intent is, that this Bond shall be construed statutory bond and not as a common law bond.

14. Upon t by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

#### 15. DEFINITIONS

15.1 Claimant: An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms labor, materials or equipment@ that of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted; the jurisdiction where the labor, materials or equipment furnished.

15.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including Contract Documents and changes thereto.

15.3 Owner Default: Failure of the Owner, which has neither remedied nor waived, to pay the Contractor as required by Construction Contract or to perform and complete or comply with the other items thereof, in any material respect.

\*including without limitations the one year correction period under Paragraph 13.12 of the Standard General Conditions.

(FOR INFORMATION ONLY-Name, Address and Telephone)

AGENT or BROKER:

OWNER'S REPRESENTATIVE (Architect, Engineer or other party)

## SECTION 00700

### GENERAL CONDITIONS

#### 1.0 DEFINITIONS

- A. Wherever used in the Contract Documents, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:
- B. Addenda: Written or graphic instruments issued prior to the opening of Bids which modify or interpret the Contract Documents, Drawings, and Specifications, by additions, deletions, clarifications, or corrections.
- C. Bid: The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
- D. Bidder: Any person, firm, or corporation submitting a Bid for the Work.
- E. Bonds: Bid, Performance, and Payment Bonds and other instruments of security, furnished by the Contractor and his surety in accordance with the Contract Documents.
- F. Change Order: A written order to the Contractor authorizing an addition, deletion, or revision in the Work within the general scope of the Contract Documents, or authorizing an adjustment in the Contract Price or Contract Time issued after the effective date of the Agreement.
- G. Client: A public or quasi-public body or authority, corporation, association, partnership, or individual for whom the Work is to be performed.
- G. Change Directive: A written directive effecting a change in the Work that may or may not involve an adjustment in the Contract Price or an extension of the Contract Time, issued by the Engineer to the Contractor during construction.
- H. Contract Documents: The contract, including, Instructions to Bidders, Bid Bond, Agreement, Notice of Award, Notice to Proceed, Change Order, Drawings, Specifications, and Addenda after the effective date of the Agreement.
- I. Contract Price: The total monies payable to the Contractor under the terms and conditions of the Contract Documents.
- J. Contract Time: The number of calendar days stated in the Contract Documents for the completion of the Work.
- K. Contractor: The person, firm, or corporation with whom the Client has executed the Agreement.
- L. Drawings: The part of the Contract Documents which show the characteristics and scope of the Work to be performed and which have been prepared or approved by the Engineer.
- M. Engineer: The person, firm, or corporation named as such in the Contract Documents.
- N. Notice of Award: The written notice of the acceptance of the Bid from Contractor to the Successful Bidder.
- O. Notice to Proceed: Written communication issued by the Contractor to the Contractor authorizing them to proceed with the Work and establishing the date of commencement of the Work.
- Q. Project: The undertaking to be performed as provided in the Contract Documents.
- R. Resident Project Representative: The authorized representative of the Contractor who is assigned to the Project site or any part thereof.
- S. Shop Drawings: All drawings, diagrams, illustrations, brochures, schedules, and other data which are prepared by the Contractor, their Contractor, manufacturer, supplier, or distributor, which illustrate how specific portions of the Work shall be fabricated or installed.

- T. Specifications: A part of the Contract Documents consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards, and workmanship.
- U. Contractor: An individual, firm, or corporation having a direct contract with the Contractor or with any other Contractor for the performance of a part of the Work at the site.
- V. Substantial Completion: That date as certified by the Engineer when the construction of the Project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the Project or specified part can be utilized for the purposes for which it is intended.
- W. Supplementary Conditions: Modifications to General Conditions required by the Client or Engineer.
- X. Suppliers: Any person, supplier, or organization who supplies materials or equipment for the work, including that fabricated to a special design, but who does not perform labor at the site.
- Y. Work: All labor necessary to produce the construction required by the Contract Documents, and all materials and equipment incorporated or to be incorporated in the Project.
- Z. Written Notice: Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at their last given address, or delivered in person to said party or his authorized representative on the Work.

## 2.0 ADDITIONAL INSTRUCTIONS AND DRAWINGS

- A. The Contractor may be furnished additional instructions and detail drawings, by the Engineer, as necessary, to carry out the Work required by the Contract Documents.
- B. The additional detail drawings and instruction thus supplied will become a part of the Contract Documents. The Contractor shall carry out the Work in accordance with the additional detail drawings and instructions.
- C. In the event that the requirements in these General Conditions conflicts with the Agreement (Master Subcontract Agreement for Remediation Services), the Agreement shall take precedence.
- D. The Engineer will furnish to the Contractor up to 3 sets of Contract Documents free of charge. Additional sets shall be furnished at cost of reproduction.

## 3.0 SCHEDULES, REPORTS, AND RECORDS

- A. The Contractor shall submit to the Engineer such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records, and other data as the Engineer may request concerning Work performed or to be performed.
- B. Prior to the first partial payment estimate the Contractor shall submit schedules showing the order in which they propose to carry on the Work, including dates at which they will start the various parts of the Work, estimated date of completion of each part, and, as applicable:
  - 1. The dates at which special detail drawings will be required; and
  - 2. Respective dates for submission of Shop Drawings, the beginning of manufacture, the testing and the installation of materials, supplies, and equipment.
- C. The Contractor shall also submit a schedule of payments that he anticipates he will earn during the course of the Work.

#### 4.0 DRAWINGS AND SPECIFICATIONS

- A. The Drawings and Specifications indicate the Work to be performed by the Contractor. The Contractor shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the Work in accordance with the Contract Documents and all incidental work necessary to complete the Project in an acceptable manner, ready for use, occupancy, or operation by the Client.
- B. In case of conflict between the Drawings and Specifications, the Specifications shall govern. Labeled dimensions on Drawings shall govern over scale dimensions, and detailed Drawings shall govern over general Drawings.
- C. Any discrepancies found between the Drawings and Specifications and site conditions or any inconsistencies or ambiguities in the Drawings or Specifications shall be immediately reported to the Engineer, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. Work done by the Contractor after his discovery of such discrepancies, inconsistencies, or ambiguities shall be done at the Contractor's risk.

#### 5.0 SHOP DRAWINGS

- A. The Contractor shall provide Shop Drawings as required by the Engineer for the prosecution of the Work and as required by the Contract Documents. The Engineer shall promptly review all Shop Drawings. The Engineer's approval of any Shop Drawing shall not release the Contractor from responsibility for deviations from the Contract Documents. The approval of any Shop Drawing which substantially deviates from the requirement of the Contract Documents shall be evidenced by a Change Order.
- B. When submitted for the Engineer's review, Shop Drawings shall bear the Contractor's certification that he has reviewed, checked, and approved the Shop Drawings and that they are in conformance with the requirements of the Contract Documents.
- C. Portions of the Work requiring a Shop Drawing or sample submission shall not begin until the Shop Drawing or submission has been approved by the Engineer. A copy of each approved Shop Drawing and each approved sample shall be kept in good order by the Contractor at the Site and shall be available to the Engineer.
- D. Before ordering any material or doing any work, the Contractor shall verify all dimensions and shall be responsible for correctness of same. No extra charge or compensation will be allowed on account of any differences in dimensions or quantities from those indicated on the Contract Drawings, unless such difference is submitted to the Engineer before proceeding with the work.

#### 6.0 MATERIALS, SERVICES, AND FACILITIES

- A. It is understood that, except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the Work within the specified time.
- B. The Contractor shall provide such temporary enclosures as the Work may warrant. In addition, they shall provide the necessary temporary office, heat, utilities, telephone, and sanitary facilities, as required by the job, the Contractor, or the Engineer.
- C. Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the Work. Stored materials and equipment to be incorporated in the Work shall be located so as to facilitate prompt inspection.
- D. Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer.
- E. Materials, supplies, and equipment shall be in accordance with samples submitted by the Contractor and approved by the Engineer.

- F. Materials, supplies, or equipment to be incorporated into the Work shall not be purchased by the Contractor or their Contractor subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.
- G. Workmanship shall, at all times, be of a grade expected from skilled workers in each trade. Fitting of all materials shall be done to preserve the strength and durability of the materials and to present a clean, well worked appearance. The standards of all Work shall be such as to produce first-class results throughout. Where different materials abut, or where it is necessary to cut or pass through one material with other, care must be taken not to injure or deface one material in placing the other. Various trades shall, at all times, cooperate in the installation of their work to complete the whole in a satisfactory, acceptable manner.
- H. All materials permanently incorporated into the project shall be new unless otherwise noted.

## 7.0 INSPECTION AND TESTING

- A. All materials and equipment used in the construction of the Project shall be subject to adequate inspection and testing in accordance with generally accepted standards.
- B. The Contractor shall provide, at his expense or through agreement with Suppliers and Manufacturers, testing and inspection services required at source of supply or manufacture. The wages and overhead costs of inspectors and testing technicians, employed by the Contractor for inspection and materials quality control of on-site work, shall be paid by the Contractor except those costs associated with failing tests and services required anytime on Saturdays, Sundays, or holidays, or on weekdays outside of the hours 8:00 a.m. to 6:00 p.m. inclusive, shall be borne by the Contractor. The Contractor shall note that work performed on the following holidays shall require inspector's wages and overhead costs to be paid by the said Contractor: New Year's Day, President's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Day before Christmas, and Christmas Day.
- C. The Contractor shall provide all other inspection and testing services not required by the Contract Documents.
- D. If the Contract Documents, laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction require any Work to specifically be inspected, tested, or approved by someone other than the Contractor, the Contractor will give the Engineer timely notice of readiness. The Contractor will then furnish the Engineer the required certificates of inspection, testing, or approval.
- E. Neither observations by the Engineer nor inspections, tests, or approval by persons other than the Contractor shall relieve the Contractor from his obligations to perform the Work in accordance with the requirements of the Contract Documents.
- F. The Engineer and their representatives will at all times have access to the Work and shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records. The Contractor will provide proper facilities for such access and observation of the Work and also for any inspection, or testing thereof.
- G. If any Work is covered contrary to the written request of the Engineer, it must, if requested by the Engineer, be uncovered for their observation and replaced at the Contractor's expense.
- H. If any Work has been covered which the Engineer has not specifically requested to observe prior to its being covered, or if the Engineer considers it necessary or advisable that covered Work be inspected or tested by others, the Contractor, at the Engineer's request, will uncover, expose, or otherwise make available for observation, inspection, or testing as the Engineer may require, that portion of the Work in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such Work is defective, the Contractor will bear all the expenses of such uncovering, exposure, observation, inspection, testing,

and satisfactory reconstruction. If, however, such Work is not found to be defective, the Contractor will be allowed, an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, and reconstruction and an appropriate Change Order shall be issued.

## 8.0 SUBSTITUTIONS

- A. Whenever a material, article, or piece of equipment is identified on the Drawings or in the Specifications by reference to brand/product name or catalogue/model number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered. The Contractor may recommend the substitution of a material, article, or piece of equipment of equal substance and function to that specified. If the Engineer approves the substitution, the Contractor may purchase it for incorporation into the Work. Any cost differential shall be deductible from the Contract Price and the Contract Documents shall be appropriately modified by Change Order. The Contractor warrants that if substitutes are approved, no major changes in the function or general design of the Project will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the Contractor without a change in the Contract Price or Contract Time.
- B. Bids shall be prepared on the basis of the particular equipment and materials specified.
- C. An item shall be considered equal to the item so named or described if:
  - 1. It is at least equal in quality, durability, appearance, and design.
  - 2. Its performance is equal to or better than that specified and proven by an experience record of five years, minimum.
  - 3. It conforms substantially to the detailed requirements for the item specified.
- D. Prior to purchase, fabrication, or use of any substitute materials or equipment, detailed descriptive data shall be submitted to the Engineer for approval. Tests required by the Engineer to establish quality standards shall be at the Contractor's expense. Approval by the Engineer shall be in writing to be effective and their decision to approve or disapprove the item shall be final.
- E. The Contractor, when using substitute material or equipment, shall assume the cost of and responsibility for accomplishing all required changes, including costs of redesign by the Engineer.
- F. These Specifications for bids are not written in such a way or such a manner as to contain proprietary, exclusionary, or discriminatory requirements other than those based on performance, unless such requirements are necessary to test or demonstrate a specific function or to provide for necessary interchangeability of parts and equipment.

## 9.0 PATENTS

The Contractor shall pay all applicable royalties and license fees. They shall defend all suits or claims for infringement of any patent rights and save the Contractor and Client harmless from loss on account thereof, except that the Client shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer(s) is specified, but if the Contractor has reason to believe that the design, process, or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Engineer.

10. SURVEYS, PERMITS, REGULATIONS

- A. The Client shall furnish all land surveys and establish a baseline or survey coordinates for locating the principal component parts of the Work together with a suitable number of bench marks adjacent to the Work as shown in the Contract Documents. The Contractor shall provide construction surveys to establish layout stakes, batter boards, and other working points, lines, and elevations as required.
- B. The Contractor shall carefully preserve bench marks and survey control points. In case of willful or careless destruction, the Contractor shall be charged with the resulting expense to replace and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.
- C. Permits and licenses of a temporary nature necessary for the prosecution of the Work shall be secured and paid for by the Contractor. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the Client, unless otherwise specified. The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work as drawn and specified. If the Contractor observes that the Contract Documents are at variance therewith, they shall promptly notify the Engineer in writing, and any necessary changes shall be adjusted as provided in Section 13.0, Changes in the Work.

11.0 PROTECTION OF WORK, PROPERTY, AND PERSONS

- A. This Project is subject to all of the Safety and Health Regulations (CFR 29 Part 1926 and all subsequent amendments) as promulgated by the U.S. Department of Labor. Contractors are urged to make themselves familiar with the requirements of these regulations.
- B. The Contractor will be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. They will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury, or loss to all employees and other persons who may be affected thereby.
- C. The Contractor will take all necessary precautions to provide the necessary protection to prevent damage to the Work and materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.
- D. The Contractor will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. They will erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for safety and protection. They will notify Owners of adjacent utilities when prosecution of the Work may affect them. The Contractor will remedy all damage, injury, or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, their Sub-contractors or anyone directly or indirectly employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the Contractor.
- E. In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Engineer or Client, shall act to prevent threatened damage, injury, or loss. They will give the Engineer prompt Written Notice of any significant changes in the Work or deviations from the Contract Documents caused thereby, and a Change Order shall thereupon be issued covering the changes and deviations involved.
- F. All equipment used on this Project must be maintained and operated so as to provide maximum safety for workers and the public.
- G. The Contractor, or their Sub-contractors, shall be responsible for the proper care and protection of all materials, equipment, etc. during transportation and after delivery at the

site. The Contractor and their Sub-contractors shall handle all material as directed so that it may be inspected by the Engineer. All materials capable of being injuriously affected by weather shall be protected from injury while being transported to the site as well as while being stored there.

- H. The Contractor shall take such action as may be required to protect labor, materials, and equipment including the land, trench, and appurtenances in any way connected with the Project, from the effect of extremes of heat, cold, wind, and rain; and other climatological conditions. Such action by the Contractor shall meet the requirements of the Engineer.
- I. The Contractor shall ascertain the true location of all underground structures of any kind whatsoever and shall be completely responsible for same regardless of their indication on Drawings or Specifications. They shall assume the cost of and make such arrangements as may be warranted to protect same or adjust or replace with the appropriate authority.

#### 12.0 SUPERVISION BY CONTRACTOR

- A. The Contractor will supervise and direct the Work. They will be solely responsible for the means, methods, techniques, sequences, and procedures of construction. The Contractor will employ and maintain on the Work a qualified supervisor or superintendent who shall have been designated in writing by the Contractor as the Contractor's representative at the Site. The supervisor shall have full authority to act on behalf of the Contractor and all communications given to the supervisor shall be as binding as if given to the Contractor. The supervisor shall be present on the Site at all times as required to perform adequate supervision and coordination of the Work. There will be no supervision by a designated working foreman without prior approval of the Engineer each time.
- B. If so ordered by the Engineer, the Contractor shall immediately remove any employee, Sub-contractor, or supplier, or any employee of a sub-contractor or supplier, who fails or refuses to carry out orders properly given, or who is, in the judgment of the Engineer, disorderly, unwilling to submit to authority, or lacking in requisite skill, and such person shall not again be employed on the Work.
- C. If, in the opinion of the Engineer, the progress of the work is such that the completion date of the Contract cannot be met for causes other than those provided in Section 15, he may request the Contractor to work additional men, additional hours, or both. The cost of all such overtime shall be borne by the Contractor.

#### 13.0 CHANGES IN THE WORK

- A. The Contractor may at any time, as the need arises, order changes within the scope of the Work without invalidating the Agreement. If such changes increase or decrease the amount due under the Contract Documents, or in the time required for performance of the Work, an equitable adjustment shall be authorized by Change Order.
- B. The Engineer, also, may at any time issue a Change Directive, which directs Contractor to perform such additional and/or modified Work prior to agreement by Contractor on an adjustment in compensation or schedule, or both. To the extent that a Change Directive modifies the Work, Contractor may be entitled to an equitable adjustment in compensation or schedule, or both. Contractor shall promptly give written notice to seek an adjustment to the Contractor within (3) business days. Contractor shall promptly proceed to perform the changes in Work, notwithstanding its disagreement with the Change Directive.

#### 14.0 CHANGES IN CONTRACT PRICE

- A. The Engineer may at any time by written order and without notice to the sureties require the performance of extra work or changes in the Work as may be found necessary or desirable. The amount of compensation to be paid to the Contractor for any extra work so ordered shall be made in accordance with whichever of the following plans the Engineer elects: (1)

a price agreed upon between the parties and stipulated in the order for the extra work, (2) a price based on the unit prices of the contract, (3) a price determined by adding 15% to the "reasonable cost" of the extra work performed, such "reasonable cost" to be determined by the Engineer in accordance with the following paragraph.

- B. In arriving at the "reasonable cost" for the purposes of (3) above, the Engineer shall include the reasonable cost to the Contractor of all materials used, of all labor common and skilled, of foreman, trucks, and the fair-market rental rate for all machinery and equipment for the period employed directly on the Work. The reasonable cost for extra work shall include the cost to the Contractor of any additional insurance that may be required covering public liability for injury to persons and property, the cost of Workmen's Compensation Insurance, Federal Social Security, and any other costs based on payrolls, and required by law. The cost of extra work shall not include any cost or rental of small tools, buildings, or any portion of the time of the Contractor, their project supervisor or superintendent, or any allowance for use of capital or the premium on the bond as assessed upon the amount of extra work, these items being considered covered by the fifteen percent (15%) added to the reasonable cost.
- C. In the case of extra work which is done by a Sub-contractor of the Contractor, whether these are under the specific contract items provided herein, or otherwise if so approved by the Engineer, the 15% added to the reasonable cost of the Work will be allowed only to the Sub-contractor. On such work, an additional 5% of the reasonable cost (before addition of the 15%) will be paid to the Contractor for his work in directing the operations of the Sub-contractor and for any overhead involved.

#### 15.0 TIME FOR COMPLETION AND LIQUIDATED DAMAGES

- A. The date of beginning and the time for completion of the Work are essential conditions of the Contract Documents and the Work embraced shall be commenced on a date specified in the Notice to Proceed.
- B. The Contractor will proceed with the Work at such rate of progress to insure full completion within the Contract Time. It is expressly understood and agreed, by and between the Client, Engineer, and the Contractor that the Contract Time for the completion of the Work described herein is a reasonable time, taking into consideration the average climatic, economic conditions, and other factors prevailing in the locality of the Work.
- C. If the Contractor shall fail to complete the Work within the Contract Time, or extension of time granted by the Engineer, then the Contractor will pay to the Engineer the amount for liquidated damages as specified in the Bid for each calendar day that the Contractor shall be in default after the time stipulated in the Contract Documents.
- D. The Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the Work is due to the following, and the Contractor has promptly given Written Notice of such delay to the Engineer.
  - 1. to any preference, priority, or allocation order duly issued by the Engineer;
  - 2. to unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God, or of the public enemy, acts of the Client, acts of another Contractor in the performance of a contract with the Client, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and
  - 3. to any delays of Sub-Contractors of the Contractor occasioned by any of the causes specified in paragraphs 1 and 2 of this section.

#### 16.0 CORRECTION OF WORK

- A. The Contractor shall promptly remove from the premises all Work rejected by the Engineer for failure to comply with the Contract Documents, whether incorporated in the

construction or not, and the Contractor shall promptly replace and re-execute the Work in accordance with the Contract Documents and without expense to the Client and shall bear the expense of making good all Work of Contractors or Sub-contractors destroyed or damaged by such removal or replacement.

- B. All removal and replacement Work shall be done at the Contractor's expense. If the Contractor does not take action to remove such rejected Work within ten (10) days after receipt of Written Notice, the Engineer may remove such Work and store the materials at the expense of the Contractor.
- C. The Engineer or a designated representative of the Engineer has the right to remove and replace rejected work after ten (10) days of receipt of Written Notice at the expense of the Contractor.

#### 17.0 SUBSURFACE CONDITIONS

- A. The Contractor shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the Engineer by Written Notice of:
  - 1. Subsurface or latent physical conditions at the Site differing materially from those indicated in the Contract Documents; or
  - 2. Unknown physical conditions at the Site, of an unusual nature, differing materially from those ordinarily encountered.
- B. The Engineer shall promptly investigate the conditions, and if they find that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the Work, an equitable adjustment shall be made and the Contract Documents shall be modified by a Change Order. Any claim of the Contractor for adjustment hereunder shall not be allowed unless he has given the required Written Notice; provided that the Engineer may, if he determines the facts so justify, consider and adjust any such claims asserted before the date of final payment.

#### 18.0 SUSPENSION OF WORK, TERMINATION, AND DELAY

- A. The Engineer may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the Contractor, by Written Notice to the Contractor which notice shall fix the date on which Work shall be resumed. The Contractor will resume that Work on the date so fixed. The Contractor will be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension. When the whole or any portion of the Work is suspended for any reason, the Contractor shall properly cover, secure, and protect or caused to be so protected, such Work as may be liable to sustain injury from any cause.
- B. If the Contractor is adjudged bankrupt or insolvent, or if they make a general assignment for the benefit of their creditors; or if a trustee or receiver is appointed for the Contractor or for any of their property; or if they file a petition to take advantage of any debtor's act; or to reorganize under the bankruptcy or applicable laws; or if they repeatedly fail to make prompt payments to their Contractors or for labor, materials, or equipment; or if they disregard laws, ordinances, rules, regulations, or orders of any public body having jurisdiction of the Work; or if they disregard the authority of the Engineer; or if they otherwise violate any provision of the Contract Documents, then the Client may, without prejudice to any other right or remedy and after giving the Contractor and his surety a minimum of ten (10) days from delivery of a Written Notice, terminate the services of the Contractor and take possession of the Project and of all materials, equipment, tools, construction equipment, and machinery thereon owned by the Contractor, and finish the Work by whatever method the Contractor may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the Work is finished. If

the unpaid balance of the Contract Price exceeds the direct and indirect costs of completing the Project, including compensation for additional professional services, such excess shall be paid to the Contractor. If such costs exceed such unpaid balance, the Contractor will pay the difference to the Contractor. Such costs incurred by the Contractor will be determined by the Engineer and incorporated in a Change Order.

- C. Where the Contractor's services have been so terminated by the Client, said termination shall not affect any right of the Client against the Contractor then existing or which may thereafter accrue. Any retention or payment of monies by the Client due the Contractor will not release the Contractor from compliance with the Contract Documents.
- D. After ten (10) days from delivery of a Written Notice to the Contractor, the Client may, without cause and prejudice to any other right or remedy, elect to abandon the Project and terminate the Contract. In such case, the Contractor shall be paid for all Work executed and any expense sustained plus reasonable profit.
- E. If, through no act or fault of the Contractor, the Work is suspended for a period of more than ninety (90) days by the Client or under an order or court or other public authority, or the Client fails to act on any request for payment within thirty (30) days after it is submitted, or the Client fails to pay the Contractor substantially the sum approved by the Engineer or awarded by arbitrators within thirty (30) days of its approval and presentation, then the Contractor may, after ten (10) days from delivery of a Written Notice to the Client and the Engineer, terminate the Contract and recover from the Client payment for all Work executed and all expenses sustained. In addition and in lieu of terminating the Contract, if the Engineer has failed to act on a request for payment or if the Client has failed to make any payment as aforesaid, the Contractor may upon ten (10) days notice to the Client and the Engineer stop the Work. Change Orders shall be issued for adjusting the Contract Price or extending the Contract Time or both to compensate for the costs and delays attributable to the stoppage of the Work.
- F. If the performance of all or any portion of the Work is suspended, delayed, or interrupted as a result of a failure of the Client or Engineer to act within the time specified in the Contract Documents, or if no time is specified, within a reasonable time, an adjustment in the Contract Price or an extension of the Contract Time, or both, shall be made by Change Order to compensate the Contractor for the costs and delays necessarily caused by the failure of the Client or Engineer.

#### 19.0 PAYMENTS TO CONTRACTOR

- A. At least ten days before each progress payment falls due (but not more often than once a month), the Contractor will submit to the Engineer a partial payment estimate filled out and signed by the Contractor covering the Work performed during the period covered by the partial payment estimate and supported by such data as the Engineer may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the Work, but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the Client, as will establish the Client's title to the material and equipment and protect his interest therein, including applicable insurance. The Engineer will, within ten days after receipt of each partial payment estimate, either indicate in writing their approval of payment and present the partial payment estimate to the Client or return the partial payment estimate to the Contractor indicating in writing their reasons for refusing to approve payment. In the latter case, the Contractor may make the necessary corrections and resubmit the partial payment estimate.
- B. Progress payments are detailed in Section 3 of the Agreement (Section 00520) and summarized below:

The Client will retain an amount of the progress payment, each month, in accordance with the following procedures:

1. Retainage shall be 10 percent of the monthly payments claimed.
  2. Upon substantial completion, the amount of retainage will be reduced to 2 percent of the total amount due the Contractor plus an additional retainage based on the Engineer's estimate of the fair value of the punch list items and the cost of completing specified amounts for each incomplete or defective item of work. As these items are completed or corrected, they shall be paid for out of the retainage until the entire project is declared complete. The final 2 percent retainage shall be held during the one-year warranty period and released only after the project has been accepted by the Client.
- C. On completion and acceptance of a part of the Work on which the price is stated separately in the Contract Documents, payment may be made in full, including retained percentages, less authorized deductions.
1. The request for payment may also include an allowance for the cost of such major materials and equipment which are suitably stored either at or near the site.
  2. All Work covered by partial payment made shall thereupon become the sole property of the Client, but this provision shall not be construed as relieving the Contractor of the sole responsibility for the care and protection of the Work upon which payments have been made or the restoration of any damaged Work, or as a waiver of the right of the Contractor to require the fulfillment of all terms of the Contract Documents.
  3. The Client also reserves the right to occupy certain finished portions of the work before final acceptance. If such right is exercised, the Client will assume all responsibility for his damage to the structure, but assumption of such responsibility by the Client in no way relieves the Contractor of his obligation as defined under Section 29, Guaranty.
  4. Upon completion and acceptance of the Work, the Engineer shall issue a certificate attached to the final payment request that the Work has been accepted by them under the conditions of the Contract Documents. The entire balance found to be due the Contractor, including the retained percentages, but except such sums as may be lawfully retained by the Client, shall be paid to the Contractor within sixty (60) days of completion and acceptance of the Work.
  5. The Contractor will indemnify and save the Client or the Client's agents harmless from all claims growing out of the lawful demands of Sub-contractors, laborers, workmen, mechanics, material men, and furnishers of machinery and parts thereof, equipment, tools and all supplies, incurred in the furtherance of the performance of the Work. The Contractor shall, at the Client's request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the Contractor fails to do so, the Client may, after having notified the Contractor, either pay unpaid bills or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the Contractor shall be resumed, in accordance with the terms of the Contract Documents, but in no event shall the provisions of this sentence be construed to impose any obligations upon the Client to either the Contractor, their Surety, or any third party. In paying any unpaid bills of the Contractor, any payment so made by the Contractor shall be considered as a payment made under the Contract Documents by the Client to the Contractor and the Client shall not be liable to the Contractor for any such payments made in good faith.

## 20.0 ACCEPTANCE OF FINAL PAYMENT AS RELEASE

The acceptance by the Contractor of final payment shall be and shall operate as a release to the Client of all claims and all liability to the Contractor other than claims in stated amounts as may be specifically excepted by the Contractor for all things done or furnished in connection with this Work and for every act and neglect of the Contractor and others relating to or arising out of this Work. Any payment, however, final or otherwise, shall not release the Contractor or his sureties from any obligations under the Contract Documents.

## 21.0 INSURANCE

Refer to Section 17 of the Agreement (Section 00520) for insurance requirements.

## 22.0 SEPARATE CONTRACTS

- A. The Client reserves the right to let other contracts in connection with this Project. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their Work, and shall properly connect and coordinate their Work with the others. If the proper execution or results of any part of the Contractor's Work depends upon the Work of any other Contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such Work that render it unsuitable for such proper execution and results.
- B. The Contractor may perform additional Work related to the Project on their own, or may let other contracts containing provisions similar to these. The Contractor will afford the other Contractors who are parties to such contracts (or the Contractor, if they are performing the additional Work themselves), reasonable opportunity for the introduction and storage of materials and equipment and the execution of Work, and shall properly connect and coordinate their Work with the others.
- C. If the performance of additional Work by other subcontractors or the Engineer is not noted in the Contract Documents prior to the execution of the Contract, written notice thereof shall be given to the Contractor prior to starting any such additional Work. If the Contractor believes that the performance of such additional Work by the Engineer or others involved results in additional incurred expense or entitles them to an extension of the Contract Time, they may make a claim thereof as provided in Sections 14 and 15.

## 23.0 SUBCONTRACTING

- A. The Contractor may utilize the services of specialty Sub-contractors on those parts of the Work which, under normal contracting practices, are performed by specialty Sub-contractors.
- B. The Contractor shall not award Work to Sub-contractor(s), in excess of fifty (50%) percent of the Contract Price, without prior written approval of the Engineer. The Contractor shall obtain the Engineer's approval of all Sub-contractors prior to entering into a sub-contractor's agreement.
- C. The Contractor shall be fully responsible to the Client for the acts and omissions of their Sub-contractors, and of persons either directly or indirectly employed by them, as they are for the acts and omissions of persons directly employed by them.
- D. The Contractor shall cause appropriate provisions to be inserted in all other subcontracts relative to the Work to bind other Sub-contractors to the Contractor by the terms of the Contract Documents insofar as applicable to the Work of other Sub-contractors and to give the Contractor the same power in regard to terminating any subcontract that the Client may exercise over the Contractor under any provision of the Contract Documents.
- E. Nothing contained in this Contract shall create any contractual relation between any Sub-contractor of the Contractor and the Client.

#### 24.0 ENGINEERS AUTHORITY

- A. The Engineer shall act as the Client's representative during the construction period. They shall decide questions which may arise as to quality and acceptability of materials furnished and Work performed. They shall interpret the intent of the Contract Documents in a fair and unbiased manner. The Engineer will make visits to the site and determine if the Work is proceeding in accordance with the Contract Documents.
- B. The Contractor will be held strictly to the intent of the Contract Documents in regard to the quality of materials, workmanship, and execution of the Work. Inspections may be made of the factory or fabrication plant of the source of material supply.
- C. The Engineer will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.
- D. The Engineer shall promptly make decisions relative to interpretation of the Contract Documents.

#### 25.0 LAND AND RIGHTS-OF-WAY

- A. Prior to issuance of Notice to Proceed, the Client shall obtain all land and rights-of-way necessary for carrying out and for the completion of the Work to be performed pursuant to the Contract Documents, unless otherwise mutually agreed.
- B. The Engineer shall provide to the Contractor information which delineates and describes the lands owned and rights-of-way acquired.
- C. The Contractor shall provide at their own expense and without liability to the Client any additional land and access thereto that the Contractor may desire for temporary construction facilities, or for storage of materials.

#### 26.0 GUARANTY

The Contractor shall guarantee all materials and equipment furnished and Work performed for a period of one (1) year from the date of Substantial Completion. The Contractor warrants and guarantees for a period of one (1) year from the date of Substantial Completion of the system that the completed system is free from all defects due to faulty materials or workmanship and the Contractor shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. The Engineer will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments, or perform other Work that may be made necessary by such defects, the Client may do so and charge the Contractor the cost thereby incurred.

#### 27.0 DISPUTE RESOLUTION

Refer to Section 26 of the Agreement (Section 00520) for dispute resolution requirements.

#### 28.0 TAXES

The Contractor will pay all sales, consumer, use, and other similar taxes required by the law of the place where the Work is performed.

END OF SECTION

SECTION 00943

CHANGE ORDER No. \_\_\_\_\_

<b>PROJECT:</b>	Former Gorham Manufacturing Plant – Parcel C-1 Phase I Cap	
<b>DATE OF ISSUANCE:</b>		
<b>CLIENT (OWNER):</b>	Textron, Inc.	<b>CONTRACTOR:</b>
<b>RIDEM Project No.:</b>		<b>ENGINEER:</b> AMEC Environment and Infrastructure, Inc.

*You are directed to make the following changes in the Contract Documents.*

**DESCRIPTION:**

**REASON FOR CHANGE ORDER:**

**ATTACHMENTS:**

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIME:
Original Contract Price: \$	Original Contract Times: Substantial Completion: Ready for Final Payment:
Net Changes from Previous Change Orders No. _____ to No. _____ \$	Net Change from previous Change Orders No. _____ to No. _____
Contract Price prior to this Change Order \$	Contract Time Prior to this Change Order Substantial Completion: Ready for Final Payment:
Net Increase of this Change Order \$	Net Increase of this Change Order (days)
Contract Price with all approved Change Orders \$	Contract Times with all approved Change Orders Substantial Completion: Ready for Final Payment:

**RECOMMENDED:**

By: \_\_\_\_\_

Date: \_\_\_\_\_

*Engineer – AMEC*

**APPROVED:**

By: \_\_\_\_\_

Date: \_\_\_\_\_

*Client - Textron*

**APPROVED:**

By: \_\_\_\_\_

Date: \_\_\_\_\_

*Contractor -*

TEXTRON, INC.  
FORMER GORHAM MANUFACTURING FACILITY, PROVIDENCE, RI  
REMEDIAL ACTION WORK PLAN – PHASE I SOIL CAPPING: PARCEL C-1

**APPENDIX B**  
**SPECIFICATIONS**  
**(Division 1)**

## SECTION 01110

### SUMMARY OF WORK

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. SECTION INTENT: This section is intended to provide a summary of the project and the various elements of work associated with it. This summary should be used in conjunction with other Specification sections and the construction Drawings. This section does not provide the technical detail for particular Work Items, but describes the work as a whole, providing an overall perspective to the separate tasks and their interrelationships.
- B. GENERAL: The scope of work for the Parcel C-1 Phase I Cap project (the Project) is to cap approximately 3 acres of a wetland buffer area, an upland area, and a former slag area with a combination of soil and soil/geosynthetic material in order to cover soil which exceeds the Rhode Island DEM Residential Direct Exposure Criteria. The scope of work includes, but is not limited to the following activities:
  - 1. Installation of Erosion and Sedimentation Controls
  - 2. Clearing and grubbing
  - 3. Selective Demolition
  - 3. Excavation, hauling and filling to balance the site and establish subgrade
  - 4. Subgrade preparation and fill placement
  - 5. Installation of geosynthetic materials
  - 6. Placement of cap soils
  - 7. Restoration

##### 1.02 DEFINITIONS

- A. "Engineer" as used in the Specifications/Drawings shall mean AMEC Environment & Infrastructure, Inc.
- B. "Contractor" as used in these specifications shall refer to the company who has entered into a contractual agreement with the Client for scope of work and price to complete the work identified in the project's Contract Documents. The term Contractor also includes all agents, employees, vendors, and their sub-contractors.
- C. "Client" as used in these specifications shall refer to Textron, Inc.
- D. "Owner" as used in these specifications shall refer to the City of Providence, RI.

##### 1.03 WORK COVERED BY THE SPECIFICATIONS AND DRAWINGS

- A. The Work for this contract includes:
  - 1. Submit a Construction Work Plan, Health and Safety Plan, and Contractor Quality Control Plan to the Engineer. Work plans shall include details on equipment and personnel, schedule, work sequence, and means and methods. Construction Quality Control Plan shall be as specified in Section 01450, "Contractor Quality Assurance / Quality Control". Health and Safety Plan shall be as detailed in Section 01351, "Safety, Health, and Emergency Response."
  - 2. Mobilize equipment and personnel to the Site.
  - 3. Stage Site to provide temporary facilities, material storage, and laydown areas.
  - 4. Install security fence as shown on the Contract Drawings.

5. Install erosion and sedimentation controls (sedimentation barriers, stabilized construction accesses) prior to any soil disturbance.
6. Clear and grub the Phase I work surface and apply chemical control of invasive species.
7. Excavate and consolidate contaminated soil from the areas shown on the drawings and backfill with clean soil. Confirmatory soil sampling will be conducted by others prior to backfill.
8. Remove stone pile from slag area and stage at laydown area. Excavate soil below stone pile as shown in the drawings and perform test pits for confirmation sampling. Note: transportation and disposal and confirmation sampling by others.
9. ~~Install stone wall within Former Slag Cap Area~~ (design to be submitted for approval by Contractor prior to construction).
10. Excavate, haul and re-grade surficial waste at Phase I to establish subgrade.
11. Construct upland soil cap, wetland buffer cap, and a former slag area cap.
12. Stabilize and seed capped areas.
13. Repair and seed disturbed areas used for construction staging and storage.
14. Remove temporary erosion and sedimentation controls, and remove temporary facilities.

**Deleted:** turbidity curtain

**Deleted:** Install shoring and dewatering systems

#### 1.04 WORK SEQUENCE

- A. The work shall be planned, scheduled, and performed in stages in order to complete the work within the requirements of the Specifications and Drawings and the requirements of appropriate regulatory agencies and permits.
- B. The sequence will be in the suggested general sequence described by Article 1.03.
- C. Project Closeout:
  1. Request a Certificate of Substantial Completion;
  2. Perform a Site Inspection with Engineer to accept work and identify remaining work to be completed (punch list);
  3. Complete all remaining work noted in the punch list;
  4. Perform a Final Site Inspection with Engineer to verify all work is complete;
  5. Submit final record documents to Engineer;
  6. Complete final pay requisition with accompanying balancing change order as required; and
  7. Achieve Certificate of Final Completion.

#### 1.05 OTHER GENERAL REQUIREMENTS

- A. Comply with all project related permits and apply/obtain all Contractor responsible permits prior to the commencement of work.
- B. Make arrangements for temporary storage of materials and supplies and for timely delivery to the job site.
- C. Maintain up-to-date records on site.
- D. Maintain the project Site in a neat condition.

#### PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 HEALTH AND SAFETY

- A. The Contractor is advised that the work will be performed on a Site that contains hazardous waste. The Contractor and its Sub-contractors are responsible for developing a Site-Specific Health and Safety Plan (HASP) for its operations. The Contractor shall implement this plan taking precautions as necessary to protect the public and work force personnel from potential hazards. The Contractor shall utilize personnel with approved hazardous waste training as required.

3.02 PROTECTION OF PROPERTY AND OPERATIONS

- A. The Contractor shall utilize every precaution to protect the property from damage during execution of the Work. Any damage that the Contractor may inflict shall be repaired or replaced in a prompt manner as directed by Engineer at no additional cost to the Client.
- B. The Contractor shall take all measures required to minimize adverse impacts from execution of the work on property abutters and shall not interfere with their operations.
- C. The Contractor shall coordinate site restrictions and vehicular/pedestrian traffic control plans as appropriate.

3.03 CONTRACTOR'S USE OF PREMISES

- A. The Contractor shall use only those designated areas of the Site for staging and storage. Staging and storage areas are to be agreed upon and accepted by Engineer and the Client.
- B. The Contractor shall assume full responsibility for the protection and safe keeping of products and equipment under this Contract that are stored on-site during the project construction.

3.04 OTHER REQUIREMENTS

- A. The Contractor is responsible for using special care and or special considerations which may be necessary for proper execution of the work, but which may not be specifically identified in this section. The Contractor shall comply with the entire requirements of the Specifications and Drawings and shall exercise special care wherever required for proper execution of the intended work of this contract.
- B. The Contractor shall comply with all the requirements of any necessary permits.

END OF SECTION

SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Measurement of Quantities
- B. Scope of Payment
- C. Payment for Increased and Decreased Quantities
- D. Eliminated Bid Items
- E. Partial Payments
- F. Payment for Materials on Hand
- G. Incidental (Subsidiary) Work
- H. Measurement and Payment of Bid Items

1.02 RELATED REQUIREMENTS

Not Used

1.03 GENERAL

- A. Each unit and lump sum price stated in the Bid Proposal shall constitute full compensation, as herein specified, for each item of the work completed.
- B. All unit price bid items will be measured to determine final quantities of Work in place after completion of the Work and prior to the Final Payment of the Contract.
- C. All units of measurement shall be standard United States units as applied to the specific items of work by industry tradition and as interpreted by the Engineer.

1.04 PARTIAL PAYMENT/MONTHLY PAY ESTIMATE

- A. After Award of the Contract and prior to the Contractor's Mobilization on-site, the Contractor shall submit a breakdown of component quantities (and their unit prices) of the individual lump sum unit bid prices. This information shall form the basis for preparation of the monthly cost estimate in the Application for Payment form.
- B. Prior to request for partial payment, the Contractor's superintendent or other authorized representative of the Contractor shall meet with the Engineer and determine and agree upon quantities of the unit price work accomplished and/or completed during the work period.
- C. Once each month the Contractor will prepare the Application for Payment form as part of his partial payment request.
- D. These completed forms will provide the basis of the Engineer's review of monthly quantity estimates upon which payment will be made. Items not appearing on the Application for Payment will not be considered for payment.

- E. The Contractor shall submit with each payment application a bill of sale, invoice, or other documentation warranting that the Client has received the material and equipment free and clear of all liens and that the materials and equipment are covered by appropriate insurance per Section 19 of the General Conditions.

#### 1.05 SCOPE OF PAYMENT

- A. For lump sum payment items, payments to the Contractor will be based upon the Engineer's estimate of percentage completion of the lump sum tasks. The estimate shall be based on approximated quantities of work completed in accordance with the Plans and Specifications and shall be reviewed and approved by the Engineer.

For unit price payment items (where applicable), payments to the Contractor will be made for the actual quantities of contract items performed and accepted in accordance with the plans and specifications. Upon completion of the construction, if these actual quantities show either an increase or decrease from the quantities given in the Bid Form, the contract unit prices will still prevail, except as provided hereinafter.

- B. The Contractor shall accept as payment as herein provided, full compensation for furnishing all materials, labor, tools, equipment, and incidentals necessary to the completed work and for performing all work contemplated and embraced by the contract. The payment shall be made with the prices contained in the Bid Form and shall include compensation for all loss or damage arising from the nature of the work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the work and until its final acceptance by the Engineer, and for all risks of every description connected with the prosecution of the work, except as provided herein, and also for all expenses incurred in consequence of the suspension of the work as herein authorized.
- C. The payment of any partial estimate or of any retained percentage except by and under the approved final invoice in no way shall affect the obligation of the Contractor to repair or renew any defective parts of the construction or to be responsible for any damage due to such defects.

#### 1.06 PAYMENT FOR INCREASED OR DECREASED QUANTITIES

- A. When alterations in the quantities of work not requiring supplemental agreements are ordered and performed, the Contractor shall accept payment in full at the contract price for the actual quantities of work done. No allowance will be made for anticipated profits.

Unit quantity bid items and prices shall apply to extra authorized work or decreases in work as determined by the Engineer, where required work is in addition to or decreased from the limits of work indicated on the Drawings.

- B. Increased or decreased work involving supplemental agreements will be paid for as stipulated in such agreements.
- C. Measurements for increased or decreased work shall be based on actual field surveys performed jointly by the Engineer and Contractor unless other measurement techniques are approved by the Engineer.

1.07 ELIMINATED ITEMS

- A. The Engineer may eliminate any items from the Contract should they be found unnecessary for the proper completion of the work contracted. Such action shall in no way invalidate the contract, and no allowance will be made for items so eliminated in making final payment to the Contractor.

1.08 PARTIAL PAYMENT

- A. Partial Payments shall be made monthly as the work progresses. All partial invoices and payments shall be subject to correction in the final quantity invoice and payment.
- B. No monthly payment shall be required to be made when, in the judgment of the Engineer, the work is not proceeding in accordance with the provisions of the contract, or when, in his judgment, the total value of the work done since the last payment amounts to less than \$1,000.

1.09 PAYMENT FOR MATERIAL DELIVERED ON LUMP SUM PROJECTS

- A. At the discretion of the Engineer, acting upon the request of the Contractor, an invoice, accompanied by receipted bills, may be made for payment of all or part of the value of acceptable, non-perishable materials and equipment which are to be incorporated into the contract which have been delivered to the site of the work or in acceptable storage places, and not used at the time of such invoice.
- B. Materials, when so paid for by the Client shall become the property of the Client and in the event of default on the part of the Contractor, the Client may use, or cause to be used, these materials in the construction of the work provided for in the contract.
- C. The Contractor shall be responsible for any damage to, or loss of, these materials.
- D. The amount thus paid by the Client shall go to reduce estimated amounts due the Contractor as the material is used in the work.

1.10 INCIDENTAL WORK

- A. Incidental work items for which payment is not measured or made include but are not limited to, the following items:
  - 1. Bond, insurance, and administrative costs.
  - 2. Incidental Site Preparation.
  - 3. Clean up.
  - 4. Security, signs, safety equipment, etc.
  - 5. Restoration of property.
  - 6. Cooperation with other Contractors.
  - 7. Utility crossing, unless otherwise paid for.
  - 8. Minor items - such as replacement of fences, guard rails, rockwalls, etc.
  - 9. Dewatering.
  - 10. Roadway and parking area - signage.
  - 11. Erosion control.
  - 12. Preconstruction photographs.
  - 13. Temporary utilities.

14. Traffic regulation.
15. Other associated work.
16. Testing.
17. All other work indicated on the Drawings or in the Specifications which is required and not specifically indicated in the bid items below.

**PART I - BASE BID**

Item Number 1 - General Conditions

MEASUREMENT: This item will be measured as a unit.

PAYMENT: Payment for General Conditions will be full compensation for all labor, materials, equipment, administration required to mobilize the Contractor's work force and initiate administrative functions, both on site and off site. Payment will include compensation for the provision of the Contractor's field office and Engineer's field office per specification 01500, and all other on-site activities required to start Work. In addition, payment shall include full compensation for demobilizing Contractor's equipment, completion of administrative and closeout tasks, and removal of all construction related temporary materials from the site.

Partial payment under bid item #1 General Conditions will be as follows:

The adjusted contract amount for construction items used below is defined as the total contract amount less the lump sum bid for Mobilization/Demobilization.

When 5% of the adjusted contract amount for construction items is earned, 25% of the lump sum bid will be paid.

When 25% of the adjusted contract amount for construction items is earned, 50% of the lump sum bid will be paid.

When 50% of the adjusted contract amount for construction items is earned, 75% of the lump sum bid will be paid.

Upon completion of all work under this contract, payment for the remainder of the lump sum bid for will be made. The amount bid for General Conditions cannot exceed ten percent (10%) of the total Bid Price.

Item Number 2 - General Site Work

MEASUREMENT: This item will be measured as the estimated percentage of total work under this item completed during each pay period.

PAYMENT: Payment for this item will be full compensation for all labor, materials, and equipment required to complete all general site work as shown on the Drawings. Payment for this item includes the design and installation of the stone retaining wall within the former slag cap area, demolition as described in Section 02221, transportation and off-site disposal of construction and demolition debris, the removal and installation of the chain link fence, installation, maintenance, and removal of all temporary erosion control devices and adjustments to and abandonment of monitoring wells as described in Section 02522 and Section 02526 in full conformance with the Drawings and Specifications.

This item shall include all other work required to complete the Work not included on other payment items.

**Deleted:** removal/installation/reconstruction

**Deleted:** Payment for this item also includes the dewatering and shoring design and installation per Specification Sections 02235 and 02236 in full conformance with the Drawings and Specifications.

MEASUREMENT AND PAYMENT	00150-4	5/24/2012
<u>ADDENDUM 1</u>		<u>6/11/2012</u>

Item Number 2 - Clearing and Grubbing

MEASUREMENT: This item will be measured as the estimated percentage of total acres cleared and grubbed during each pay period.

PAYMENT: Payment for this item will be full compensation for all labor, materials, and equipment required to clear and grub to the limits shown on the Drawings. All clearing and grubbing material shall be handled and disposed of in accordance with Sections 02120 and 02231 per Addendum 1.

**Deleted:** and stage the debris for Client transportation and off-site disposal. Removal of stumps shall be in full conformance with the Drawings and Specifications.

Item Number 3 - Excavation and Filling

MEASUREMENT: This item will be measured as the estimated percentage of excavation and filling completed during each pay period.

PAYMENT: Payment for this item will be full compensation for all labor, materials, and equipment required to complete all excavation, filling and grading to the prepared subgrade as shown on the Drawings and as necessary to complete the work. Payment for this item includes consolidating the impacted soils outside the limit of cap areas, excavation and filling to the proposed limit of waste subgrade within the cap areas and to proposed grades outside the limit of waste footprint. The work also includes all sorting, hauling and stockpiling of excavated materials in designated areas to balance the site as required in all respects of the Contract Documents.

Item Number 5 – Buffer Sand

MEASUREMENT: This item will be measured as the estimated percentage of buffer sand completed during each pay period.

PAYMENT: Payment for this item will be full compensation for all labor, materials, and equipment required to haul, stockpile, excavate from stockpiles, transport, screen, test, install and compact the Buffer Sand as a component of the Former Slag Area Cap in full conformance with the Drawings and Specifications

Item Number 6 – Drainage Geocomposite

MEASUREMENT: This item will be measured as the estimated percentage of completed Drainage Geocomposite during each pay period.

PAYMENT: Payment for this item will be full compensation for all labor, materials, and equipment required to furnish, install and test the Drainage Geocomposite as a component of the Former Slag Area Cap in full conformance with the Drawings and Specifications.

Item Number 7 – Geotextile

MEASUREMENT: This item will be measured as the estimated percentage of geotextile completed during each pay period.

PAYMENT: Payment for this item will be full compensation for all labor, materials, and equipment required to furnish and install the non-woven geotextile in full conformance with the Drawings and Specifications.

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MEASUREMENT AND PAYMENT	00150-5	5/24/2012
<u>ADDENDUM 1</u>		<u>6/11/2012</u>

Item Number 8 – Geomembrane

MEASUREMENT: This item will be measured as the estimated percentage of Geomembrane completed during each pay period.

PAYMENT: Payment for this item will be full compensation for all labor, materials, and equipment required to furnish and install the 40-mil textured LLDPE as a component of the Former Slag Area Cap liner system. This includes all seaming, testing, replacing/repairing, or other installation work, pipe/well penetration boots, warranties, providing all quality control documentation, and all other work required to achieve full compliance with the Drawings and Specifications.

Item Number 9 – Protective Soil

MEASUREMENT: This item will be measured as the estimated percentage of Protective Soil completed during each pay period.

PAYMENT: Payment for this item will be full compensation for all labor, materials, and equipment required to haul, stockpile, excavate from stockpiles, transport, screen, test, install and compact the Protective Soil as a component of the Former Slag Area Cap in full conformance with the Drawings and Specifications

Item Number 10 – Cover Soil

MEASUREMENT: This item will be measured as the estimated percentage of Cover Soil completed during each pay period.

PAYMENT: Payment for this item will be full compensation for all labor, materials, and equipment required to haul, stockpile, excavate from stockpiles, transport, screen, test, install and compact the Cover Soil as a component of the Upland Soil Cap in full conformance with the Drawings and Specifications

Item Number 11 – Type ‘A’ Rip Rap

MEASUREMENT: This item will be measured as the estimated percentage of Type ‘A’ Rip Rap completed during each pay period.

PAYMENT: Payment for this item will be full compensation for all labor, materials, and equipment required to haul, stockpile, excavate from stockpiles, transport, screen, test and install the riprap stone in full conformance with the Drawings and Specifications

Item Number 12 – Restoration, Loam and Seeding

MEASUREMENT: This item will be measured as the estimated percentage of the total work under this item completed during the pay period.

PAYMENT: Payment for this item will be full compensation for all labor, materials, and equipment required to haul, stockpile, and spread loam and seed in complete conformance with the Drawings and Specifications. This item includes furnishing and application of all fertilizer, limestone, and mulch in full conformance with the Drawings and Specifications. This item also includes all incidental site restoration to existing pavement or other surfaces which were damaged during construction.

**PART II - SUPPLEMENTAL UNIT PRICES**

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MEASUREMENT AND PAYMENT	00150-6	5/24/2012
<u>ADDENDUM 1</u>		<u>6/11/2012</u>

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Item Number SU-1 - Authorized Addition or Reduction in Clearing and Grubbing

MEASUREMENT: Authorized Addition or Reduction in Clearing and Grubbing will be measured by survey as the number of acres of excavation added, or the number of acres deleted, as authorized in writing by the Engineer.

PAYMENT: Payment or credit will be at the unit price per cubic yard in the Bid Form, and will constitute full compensation for all labor, materials, and equipment required to complete the work.

Item Number SU-2 - Authorized Addition or Reduction in Excavation

MEASUREMENT: Authorized Addition or Reduction in Excavation will be measured by survey as the number of cubic yards of excavation added, or the number of cubic yards deleted, as authorized in writing by the Engineer.

PAYMENT: Payment or credit will be at the unit price per cubic yard in the Bid Form, and will constitute full compensation for all labor, materials, and equipment required to complete the work.

Item Number SU-3 - Authorized Addition or Reduction in Filling

MEASUREMENT: Authorized Addition or Reduction in Filling will be measured by survey as the number of cubic yards of regular fill, as compacted in-place, added or deleted as authorized in writing by the Engineer.

PAYMENT: Payment or credit will be at the unit price per cubic yard in the Bid Form, and will constitute full compensation for all labor, materials, and equipment required to complete the work using on-site materials.

Item Number SU-4 - Authorized Addition or Reduction in Buffer Sand

MEASUREMENT: Authorized Addition or Reduction in Buffer Sand will be measured by survey as the number of cubic yards of material added or deleted as authorized in writing by the Engineer.

PAYMENT: Payment or credit will be at the unit price per cubic yard in the Bid Form, and will constitute full compensation for all labor, materials, testing, and equipment required to complete the work.

Item Number SU-5 - Authorized Addition or Reduction in Geomembrane

MEASUREMENT: Authorized Addition or Reduction in LLDPE Geomembrane will be measured by survey as the number of square feet of LLDPE geomembrane added or deleted as authorized in writing by the Engineer.

PAYMENT: Payment or credit will be at the unit price per square foot (installed in place, excluding all overlap and waste) in the Bid Form, and will constitute full compensation for all labor, materials, testing, and equipment required to complete the work.

Item Number SU-6 - Authorized Addition or Reduction in Drainage Geocomposite

MEASUREMENT: Authorized Addition or Reduction in Drainage Geocomposite will be measured by survey as the number of square feet of material which may be added or deleted as authorized in writing by the Engineer.

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MEASUREMENT AND PAYMENT

00150-7

5/24/2012

ADDENDUM 1

6/11/2012

PAYMENT: Payment or credit will be at the unit price per square foot (installed in place, excluding all overlap and waste) in the Bid Form, and will constitute full compensation for all labor, materials, and equipment required to complete the work.

Item Number SU-7 - Authorized Addition or Reduction in Geotextile

MEASUREMENT: Authorized Addition or Reduction in Geotextile will be measured by survey as the number of square feet of material which may be added or deleted as authorized in writing by the Engineer.

PAYMENT: Payment or credit will be at the unit price per square foot (installed in place, excluding all overlap and waste) in the Bid Form, and will constitute full compensation for all labor, materials, and equipment required to complete the work.

Item Number SU-8 - Authorized Addition or Reduction in Protective Soil

MEASUREMENT: Authorized Addition or Reduction in Protective Soil materials will be measured by survey as the number of cubic yards (installed in place) of material added or deleted as authorized in writing by the Engineer.

PAYMENT: Payment or credit will be at the unit price per cubic yard in the Bid Form, and will constitute full compensation for all labor, materials, and equipment required to sort, process, and install Protective Soil.

Item Number SU-9 - Authorized Addition or Reduction in Cover Soil

MEASUREMENT: Authorized Addition or Reduction in Cover Soil materials will be measured by survey as the number of cubic yards (installed in place) of material added or deleted as authorized in writing by the Engineer.

PAYMENT: Payment or credit will be at the unit price per cubic yard in the Bid Form, and will constitute full compensation for all labor, materials, and equipment required to sort, process, and install Cover Sand.

Item Number SU-10 - Authorized Addition or Reduction in Loam

MEASUREMENT: Authorized Addition or Reduction in Loam will be measured by survey as the number of cubic yards (installed in place) of Loam added or deleted as authorized in writing by the Engineer.

PAYMENT: Payment or credit will be at the unit price per cubic yard in the Bid Form, and will constitute full compensation for all labor, materials, and equipment required to complete the work.

Item Number SU-11 - Authorized Addition or Reduction in Seeding

MEASUREMENT: Authorized Addition or Reduction in Seeding will be measured by survey as the number of acres of Seeding added or deleted as authorized in writing by the Engineer. (unit price in the bid form shall be per acre - quantities will be measured to 1/10 acre)

PAYMENT: Payment or credit will be at the unit price per acre in the Bid Form, and will constitute full compensation for all labor, materials, and equipment, including maintenance through the warranty period, required to complete the work.

Item Number SU-12 - Authorized Addition or Reduction in Type 'A' Rip Rap

MEASUREMENT: Authorized Addition or Reduction in Type 'A' RipRap will be measured by survey as the number of cubic yards of Rip Rap as defined by RIDOT (in place) added or deleted as authorized in writing by the Engineer.

PAYMENT: Payment or credit will be at the unit price per cubic yard in the Bid Form, and will constitute full compensation for all labor, materials, and equipment required to complete the work, including all excavation, preparation and placement.

END OF SECTION

SECTION 012900  
PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. 00700 – General Conditions

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections:
  - 1. 01270 – Measurement and Payment
  - 2. 00943 – Change Order
  - 3. 01320 – Construction Progress Documentation
  - 4. 01330 – Submittal Procedures

1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments.
  - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Client and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Application Preparation: Complete every entry on form. Engineer will return incomplete applications without action.
  - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  - 3. Include amounts of Change Orders issued before last day of construction period covered by application.
  - 4. Indicate separate amounts for work being carried out under Client-requested project acceleration.

- D. **Stored Materials:** Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Client, and consent of surety to payment, for stored materials.
  2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  3. Provide summary documentation for stored materials indicating the following:
    - a. Materials previously stored and included in previous Applications for Payment.
    - b. Work completed for this Application utilizing previously stored materials.
    - c. Additional materials stored with this Application.
    - d. Total materials remaining stored, including materials with this Application.
- E. **Transmittal:** Submit three signed and notarized original copies of each Application for Payment to Engineer by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. **Initial Application for Payment:** Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of values.
  3. Payment schedule.
  4. Contractor's construction schedule (preliminary if not final).
  5. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
  6. Products list (preliminary if not final).
  7. Schedule of unit prices.
  8. Submittal schedule (preliminary if not final).
  9. List of Contractor's staff assignments.
  10. List of Contractor's principal consultants.
  11. Copies of building permits.
  12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  13. Initial progress report.
  14. Performance and payment bonds.
  15. Data needed to acquire Client's insurance.
- G. **Application for Payment at Substantial Completion:** After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Client occupancy of designated portions of the Work.
- H. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Updated final statement, accounting for final changes to the Contract Sum.
  2. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Client took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

## SECTION 01312

### PROJECT MEETINGS

#### PART 1 GENERAL

##### 1.01 REQUIREMENTS INCLUDED

- A. Contractor attendance and participation in preconstruction conferences.
- B. Contractor attendance at progress meetings and pre-installation conferences.

##### 1.02 RELATED REQUIREMENTS

- A. Section 01320 – Construction Progress Documentation: Schedule.
- C. Section 01330 – Submittal Procedures: Schedule, shop drawings, etc.
- D. Section 01450 – Contractor Quality Assurance/Quality Control.
- E. Section 01770 – Project Closeout Procedures: Project record documents.

##### 1.03 PRECONSTRUCTION CONFERENCES

- A. After award of the bid and prior to beginning construction, a conference will be held with representatives of the Contractor, Client, Owner and Engineer to discuss the Project. This conference is intended to establish lines of communication between the parties involved. Time and place of the preconstruction conference will be determined at time of bid award.
- B. The Engineer will administer the preconstruction conference at the Project site for clarification of Contractor responsibilities and for review of administrative procedures.

##### 1.04 PROGRESS MEETINGS

- A. The Contractor will schedule Project meetings throughout progress of the Work at one week to two week intervals.
- B. The Contractor will make physical arrangements for meetings. The Engineer will prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies to participants and those affected by decisions made at meetings.
- C. Attendance: Job superintendent, major subcontractors, and suppliers; Client, and Engineer as appropriate to agenda topics for each meeting.
- D. Suggested Agenda: Review of Work progress, status of progress schedule and adjustments thereto, delivery schedules, submittals, maintenance of quality standards, pending changes and substitutions, and other items affecting progress of Work.
- E. The Contractor's representatives at project meetings shall have the authority to make relevant decisions on behalf of the Contractor.

1.05 PRE-INSTALLATION CONFERENCES

- A. When required in the individual specification Section, convene a conference prior to commencing work of the Section.
- B. Require attendance of entities directly affecting, or affected by, work of the Section.
- C. Review conditions of installation, preparation and installation procedures, and coordination with related work.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

## SECTION 013200

### CONSTRUCTION PROGRESS DOCUMENTATION

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. 00700 – General Conditions

##### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Start-up construction schedule.
  - 2. Contractor's construction schedule.
  - 3. Daily construction reports.
  - 4. Material location reports.
  - 5. Special reports.
- B. Related Sections:
  - 1. 00520 – Agreement for Remediation Services
  - 2. 01330 - Submittal Procedures
  - 3. 01450 – Contractor Quality Control

##### 1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by the Engineer.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the Project.

- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time belongs to Client.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. PDF electronic file.
  - 2. Two paper copies.
- B. Start-up construction schedule.
  - 1. Approval of cost-loaded start-up construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Start-up Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working electronic copy of schedule. Include type of schedule (initial or updated) and date on label.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
  - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
  - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
  - 3. Total Float Report: List of all activities sorted in ascending order of total float.
  - 4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.
- F. Daily Construction Reports: Submit at weekly intervals.

- G. Material Location Reports: Submit at weekly intervals.
- H. Special Reports: Submit at time of unusual event.

## 1.5 QUALITY ASSURANCE

- A. Construction Conference: Conduct conference at Project site to comply with requirements in Section 01312 Project Meetings. Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
  - 1. Review software limitations and content and format for reports.
  - 2. Verify availability of qualified personnel needed to develop and update schedule.
  - 3. Discuss constraints, including phasing, work stages, area separations, interim milestones and partial Client occupancy.
  - 4. Review delivery dates for Client-furnished products.
  - 5. Review schedule for work of Client's separate contracts.
  - 6. Review time required for review of submittals and resubmittals.
  - 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
  - 8. Review time required for completion.
  - 9. Review and finalize list of construction activities to be included in schedule.
  - 10. Review submittal requirements and procedures.
  - 11. Review procedures for updating schedule.

## 1.6 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
  - 1. Secure time commitments for performing critical elements of the Work from entities involved.
  - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

## PART 2 - PRODUCTS

### 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

- B. Activities: Treat each separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 30 calendar days, unless specifically allowed by the Engineer.
  2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 calendar days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, inspection, and delivery.
  3. Submittal Review Time: Include review and resubmittal times indicated in Section 01330 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  4. Testing and Inspecting: Include not less than 7 calendar days for major testing and inspecting activities.
  5. Startup and Testing Time: Include not less than 15 calendar days for startup and testing.
  6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Project Engineer's administrative procedures necessary for certification of Substantial Completion.
  7. Punch List and Final Completion: Include not more than 30 calendar days for punch list and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
  2. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Limitations of continued occupancies.
    - b. Uninterruptible services.
    - c. Partial occupancy before Substantial Completion.
    - d. Use of premises restrictions.
    - e. Provisions for future construction.
    - f. Environmental control.
  3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Fabrication.
    - e. Sample testing.
    - f. Deliveries.
    - g. Installation.
    - h. Tests and inspections.
    - i. Adjusting.
    - j. Startup and placement into final use and operation.

4. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
  - a. Structural completion.
  - b. Permanent space enclosure.
  - c. Completion of mechanical installation.
  - d. Completion of electrical installation.
  - e. Completion of communication system installation.
  - f. Completion of track installation.
  - g. Completion of signal work installation.
  - h. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, milestones from Project Engineer, Substantial Completion, and final completion.
- E. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.
  1. Refer to Section 01290 "Payment Procedures" for cost reporting and payment procedures.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
  1. Unresolved issues.
  2. Unanswered RFIs.
  3. Rejected or unreturned submittals.
  4. Notations on returned submittals.
- G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

## 2.2 START-UP CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit start-up horizontal bar-chart-type construction schedule to Engineer within 30 calendar days after the Notice of Award. Start-up schedule must be approved by Engineer before Notice to Proceed will be issued.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities, restraints, submittals, including durations, start dates, and finish dates for period of 30 calendar days after

Notice to Proceed. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

- C. Start-up schedule will be in effect only until Engineer's approval of Contractor's construction schedule.

## 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Base schedule on the start-up construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
  - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

## 2.4 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report, submitted to Project Engineer, recording the following information concerning events at Project site:
  - 1. Shift start and end times.
  - 2. List of subcontractors at Project site.
  - 3. Equipment at Project site.
  - 4. Material deliveries.
  - 5. Quantities of materials installed.
  - 6. Equipment and materials used.
  - 7. High and low temperatures and general weather conditions, including presence of rain or snow.
  - 8. Accidents.
  - 9. Meetings and significant decisions.
  - 10. Unusual events (refer to special reports).
  - 11. Stoppages, delays, shortages, and losses.
  - 12. Meter readings and similar recordings.
  - 13. Emergency procedures.
  - 14. Orders and requests of authorities having jurisdiction.
  - 15. Change Orders received and implemented.
  - 16. Written or oral orders received and implemented.
  - 17. Services connected and disconnected.
  - 18. Equipment or system tests and startups.
  - 19. Partial completions and occupancies.
  - 20. Substantial Completions authorized.
- B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

- C. Daily reports and material location reports do not substitute for the notices, time slips, or other data required related to compensation for Change Orders.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At intervals to coordinate with Progress Meetings, update schedule to reflect actual construction progress and activities. Issue schedule before each regularly scheduled progress meeting.
  - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  - 3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Engineer, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

## SECTION 01330

### SUBMITTAL PROCEDURES

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. Required submittals are identified in each technical specification section of the Contract Documents. A summary of submittals is provided at the end of this section. Submittals shall be provided to the Engineer, as required, unless otherwise specified. Submittals may include:
1. Data;
  2. Drawings;
  3. Instructions;
  4. Schedules;
  5. Statements;
  6. Reports;
  7. Plans;
  8. Certificates;
  9. Samples;
  10. Records; and
  11. Operation and Maintenance Manuals.

##### 1.02 GENERAL REQUIREMENTS

- A. All costs necessary for compliance with requirements of this Section shall be incidental to the bid items under which labor, equipment, and material is paid.
- B. All data, drawings, and correspondence from subcontractors, manufacturers, or suppliers shall be routed through Contractor. Engineer shall review only such data and details as are transmitted to him by Contractor. All correspondence from Contractor to Engineer shall refer to appropriate specification number and paragraph and/or sheet number of the Drawings containing subject matter of inquiry.
- C. Upon review and acceptance of the Submittal by the Engineer, the Submittal shall become a part of the Contract, and the work executed shall be in conformity with the same. Review of Submittals, however, shall in no way release the Contractor from his responsibility for proper fulfillment, by any fabrication, of the requirements of this Contract.
- D. The Contractor's attention is specifically directed to the fact that no work shall be conducted, nor equipment or materials ordered, nor any construction performed, prior to approval by Engineer of Submittals applicable thereto. Construction performed in violation of this requirement will be neither approved nor certified for payment until applicable Submittals have been submitted and approved. If any equipment or materials are ordered by Contractor prior to submission and approval of Submittals, it is done at Contractor's risk.
- E. The Contractor is responsible for making necessary changes to other items, which may result from deviations or changes requested by the Contractor and approved by Engineer, so that all items of work satisfy the requirements and intent of Contract Documents.

### 1.03 CONTRACTOR RESPONSIBILITIES

- A. Review submittals prior to submission.
- B. Coordinate each submittal with requirements of work and of Contract Documents.
- C. Contractor's responsibility for errors and omissions in submittals is not relieved by Engineer's review of submittals.
- D. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by Engineer's review of submittals, unless Engineer gives written acceptance of specific deviations.
- E. Notify Engineer, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.
- F. Begin work which requires submittals after return of Engineer's approval.
- G. After Engineer's review, maintain file copies.

### 1.04 ENGINEER'S REVIEW OF SUBMITTALS

- A. The Engineer's review of submittals shall not be construed as a complete check, but is only for general conformance with design concept for the project and general compliance with the information given in the Contract Documents. Review will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor is responsible for dimensions, the design of adequate connections and details, the fabrication processes, the construction methods, and the satisfactory construction of all work.
- B. Engineer's review action codes are listed below.
  - 1. Approved (Code 1): Fabrication and installation may proceed.
  - 2. Approved as Noted (Code 2): Contractor shall make the changes noted, and then may proceed with fabrication or installation.
  - 3. Resubmit with Revisions (Code 3): Contractor shall make the changes noted, and resubmit for an additional review cycle.
  - 4. Disapproved (Code 4): Contractor shall make the changes noted, which may involve a complete new product submittal, and resubmit for an additional review cycle.
  - 5. Not Subject to Approval (Code 5): For information only submittals provided by the Contractor.
- C. After submittals have received a review action 1 or 2 by the Engineer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by a detailed explanation of why a substitution is necessary.

### PART 2 - PRODUCTS

Not Applicable.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. The Contractor shall make submittals as required by the individual specification sections and as summarized in the Index of Submittals provided at the end of this section.
- B. The Engineer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections.
- C. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings.
- D. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements.
- E. Prior to submittal, all items shall be checked and reviewed by the Contractor and each item shall be certified, signed, and dated by the Contractor. Proposed deviations from the Contract Documents shall be clearly identified.
- F. Submittals shall include items such as:
  - 1. Manufacturer's or fabricator's drawings;
  - 2. Descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves;
  - 3. Test reports;
  - 4. Samples;
  - 5. Operation and Maintenance Manuals (including parts list);
  - 6. Certifications;
  - 7. Warranties; and
  - 8. Other pertinent data.
- G. Submittals requiring Engineer review shall be scheduled and made prior to the acquisition of the material or equipment covered thereby.
- H. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

### 3.02 SUBMITTAL REQUIREMENTS

- A. Transmittal Form:
  - 1. A Transmittal form shall accompany all submittals.
  - 2. The Transmittal form shall be developed and furnished by the Engineer.
  - 3. Transmittals shall include the following information, at a minimum:
    - a. Submittal number in sequence, beginning with 1 (subsequent revised submittals shall be identified with a number and letter);
    - b. Date;
    - c. Project title and project number;
    - d. Contractor's name and address;
    - e. Identification of each item submitted under the single Transmittal with a separate sequential number (e.g., 1.1, 1.2, etc.);
    - f. Reference to the specification number and paragraph and/or Contract Drawing sheet number and detail number (if applicable) pertinent to the data submitted.
    - g. Notification of any deviations from Contract Documents;
    - h. Return date required by Contractor; and



### 3.03 RESUBMITTALS

- A. The Contractor shall make all corrections required by the Engineer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. If the Contractor considers any correction indicated on a submittal to constitute a change to the Contract, a notice in accordance with the Contract shall be given promptly to the Department and the Engineer.
- B. Identify as a resubmission by adding a letter suffix to the original submittal number (1A for the first resubmission of the first submittal; 1B for the second resubmission; etc.).

### 3.04 REVIEW OF SUBMITTALS

- A. Upon completion of review of submittals, the Engineer will email review action and comments to the Contractor.

### 3.05 DISTRIBUTION OF SUBMITTALS PROVIDED IN HARD COPY FORMAT

- A. Two copies of the submittal will be retained by the Engineer, with review action and comments attached to each copy.
- B. Two copies of the submittal will be returned to the Contractor by the Engineer, with review action and comments attached to each copy.
- C. A file of all submittals made to the Engineer, reviews by the Engineer, resubmittals, and final approved submittals shall be maintained by the Contractor.
- D. This file or a copy of the file shall be maintained by the Contractor at the project Site while work is being conducted at the Site.

### 3.06 SUBMITTAL SUMMARY:

- A. See Section 01340 Submittal Schedule Attachment

END OF SECTION

SECTION 01340

SUBMITTAL SCHEDULE ATTACHMENT

**DIVISION I – GENERAL REQUIREMENTS**

			<b>Revision Date</b>	<b>Rev. No.</b>
01110		Summary of Work	TBD	0
	1.01.B	Work Plan	TBD	0
01270		Measurement and Payment (No submittals required)		
01330		Submittal Procedures (No submittals required)		
01351		Safety, Health, and Emergency Response	TBD	0
	1.04.A.1	Site Health and Safety Plan	TBD	0
	1.04.A.1.b	Emergency Response Plan	TBD	0
	1.04.A.1.c	Spill Control Measures and Abatement Plan	TBD	0
	1.21.B	SSHO's Daily Inspection Logs	TBD	0
		Employee Medical Examination Statements	TBD	0
01400		Environmental Protection (No submittals required)		
01410		Regulatory Requirements (No submittals required)		
01450		Contractor Quality Control	TBD	0
	1.03.A.1	Contractor Quality Control (CQC) Plan - shall identify personnel, procedures, instructions, records and forms to be used in carrying out the requirements of this project.	TBD	0
	1.03.B	Weekly CQC Reports, Test Reports, Deficiency Reports, and Summary	TBD	0
01460		Field Engineering and Survey Control	TBD	0
	1.03.A	Qualifications – of persons providing field engineering and survey services	TBD	0
	1.03.B	Documentation – verify accuracy of survey work	TBD	0
	1.03.C	Results of Field Verification Surveys	TBD	0
	1.03.D	Log of Control and Survey Work	TBD	0
		Record Documents: (see also 01780 – “Project Record Documents”)	TBD	0
01510		Temporary Facilities and Control	TBD	0
	1.2.A	Temporary Leachate Management Plan	TBD	0
01780		Project Record Documents	TBD	0
	1.03.B	Certification that work is complete	TBD	0
	1.05	Warranty copies	TBD	0
	1.07	Project Record Documents with Transmittal Letter and Directory	TBD	0
▲				
<del>02072</del>		Geomembrane	TBD	0
	1.04.A	Liner Manufacturer and Liner Material related Submittals	TBD	0
	<u>1.04 B</u>	<u>Origin of Resin</u>	<u>TBD</u>	<u>0</u>
	<u>1.04 C</u>	<u>Quality Control Certificate</u>	<u>TBD</u>	<u>0</u>
	<u>1.04 D</u>	<u>Sample Warranty</u>	<u>TBD</u>	<u>0</u>
	<u>1.04 E</u>	<u>Sample of Rolls to be Provided</u>	<u>TBD</u>	<u>0</u>
	1.04.FB	Installer Capabilities and Information	TBD	0
	1.04.G	Shop Drawings and Installation Quality Control	TBD	0
	<u>1.04 H</u>	<u>Installation Quality Control</u>	<u>TBD</u>	<u>0</u>
	<u>1.04 IJ</u>	<u>Material Quality Control</u>	<u>TBD</u>	<u>0</u>

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02073		Geotextiles	TBD	0
	1.04.A	Product Data	TBD	0
	1.04 B	Manufacturer Quality Control Certification	TBD	0
02074		Geocomposite	TBD	0
	1.04 A	Shop Drawings	TBD	0
	1.04 B	Samples	TBD	0
	1.04 C.1	Manufacturers Certificate of Compliance	TBD	0
	1.04 C.2	Installation Procedures	TBD	0
	1.04 C.3	Interface Sprength	TBD	0
	1.04 C.4	Transmissivity Results	TBD	0
	1.04 C.5	Mill Certificate	TBD	0
02221		Select Site Demolition	TBD	0
	1.5 B	Sequence of Select Demolition Activities	TBD	0
02101		Clearing and Grubbing		
	2.01.B	Herbicide	TBD	0
02300		Earthwork	TBD	0
	1.04.A	Borrow Source(s)	TBD	0
	1.04.B	Subcontractors Quality Control Testing Laboratory	TBD	0
	1.04.C	Test Reports	TBD	0
02370		Erosion and Sedimentation Control		
	2.01 F	Erosion Control Matting	TBD	0
	2.01 A	Silt Fence	TBD	0
	2.01 B	Mulch	TBD	0
	2.01 E	Seed for Erosion Control	TBD	0
	2.01 I	Filter Fabric Basin	TBD	0
DETAIL		Chain Link Fences and Gates	TBD	0
	1.4.1	Product data	TBD	0
02522		Groundwater Monitoring Wells	TBD	0
	1.04 A	Statements	TBD	0
	1.04 B	Test Reports	TBD	0
02526		Abandonment of Monitoring Wells and Piezometers	TBD	0
	1.03.A.1	Well Abandonment Completion Form	TBD	0
02921		Seeding and Soil Supplements	TBD	0
	1.04.A	Grass Seed Vendor's Certificate	TBD	0
	1.04.B	Fertilizer Product Data	TBD	0
	1.04.C	Hydraulic Seeding Method	TBD	0
DETAIL		Stone Wall	TBD	0
		Design	TBD	0

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02300	Earthwork		TBD	0
	1.04.A	Borrow Source(s)	TBD	0
	1.04.B	Subcontractors Quality Control Testing Laboratory	TBD	0
	1.04.C	Test Reports	TBD	0
02370	Erosion and Sedimentation Control			
	2.01 I.	Turbidity Curtain	TBD	0
	2.01 F.	Erosion Control Matting	TBD	0
	2.01 A.	Silt Fence	TBD	0
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**Revision**    **Rev.**  
Date        No.

## SECTION 01351

### SAFETY, HEALTH, AND EMERGENCY RESPONSE

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. This Section covers the health and safety requirements to be followed for the Parcel C-1 Phase 1 Cap (the Project), which includes the excavation of contaminated soil and capping of material on the western shore line along Mashapaug Pond and capping a 3 acre area along the Inner Cove of Mashapaug Pond. This Section provides requirements for preparing and submitting a Site Health and Safety Plan (HASP). The requirements shall apply to all work performed at the Site.
- B. Work at the Site will include clearing and grubbing existing vegetation, regarding to establish subgrade, installation of cap materials, stabilizing cap areas, and site restoration.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01110: Summary of Work
- B. Section 01330: Submittal Procedures

##### 1.03 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
  - 1. CODE OF FEDERAL REGULATIONS (CFR)
    - a. 29 CFR 1910 Occupational Safety and Health Standards
    - b. 29 CFR 1926 Safety and Health Regulations for Construction

##### 1.04 SUBMITTALS

- A. The following shall be submitted in accordance with Section 01340, Submittal Procedures:
  - 1. The HASP shall detail the health and safety procedures to be followed during completion of the work and shall be developed in accordance with this specification. The Contractor shall periodically review the plan during work operations to keep it current and technically correct. The HASP shall include, but not be limited to, the following:
    - a. Activity Hazard Analyses for each task scheduled to be completed as part of the work. Analysis shall detail anticipated or potential safety concerns and provide specific actions or engineering controls to mitigate potential hazards.
    - b. Emergency Response Plan.
    - c. Spill Control Measures and Abatement Plan.
    - d. Material Safety Data Sheets (MSDS) for materials identified for on-site use.

##### 1.05 REGULATORY REQUIREMENTS

- A. Work performed under this contract shall comply with applicable Federal, state, and local safety and occupational health laws and regulations. This includes, but is not limited to, Occupational Safety and Health Administration (OSHA) standards, 29 CFR 1910.

#### 1.06 PRE-CONSTRUCTION CONFERENCE

- A. As part of the Pre-construction Conference the Contractor, or his/her representative, the on-site construction superintendent and designated Site Safety and Health Officer (SSHO) will provide general details of the Contractor's HASP.
  - 1. Recommended discussion topics include:
    - a. Discussion and review of the Contractor's accident prevention plan.
    - b. Review of any specific local health and safety requirements.
    - c. Review of the Contractor's list of anticipated phases of work requiring an activity hazard analysis.
    - d. Review of accident investigation and reporting requirements.
  - 2. The discussions at the pre-construction safety conference shall become a matter of record and shall be included as amendments to the Contractor's accident prevention plan.

#### 1.07 SAFETY AND HEALTH PROGRAM

- A. The site-specific program requirements of the OSHA Standards shall be integrated into one site-specific document. The HASP shall interface with the employer's (Contractor's) overall Safety and Health Program. Any portions of the overall Safety and Health Program that are referenced in the HASP shall be included as appendices to the HASP.

#### 1.08 SITE HEALTH AND SAFETY PLAN

- A. Preparation and Implementation. A HASP shall be prepared covering on-site work to be performed by the Contractor and all their sub-contractors. The Contractor's SSHO shall be responsible for the development, implementation and oversight of the HASP. The HASP shall establish, in detail, the protocols necessary for the anticipation, recognition, evaluation, and control of hazards associated with each phase of the work. The HASP shall address site-specific safety and health requirements and procedures based upon site-specific conditions. The level of detail provided in the HASP shall be tailored to the type of work, complexity of operations to be performed, and hazards anticipated. Details about some activities may not be available when the initial HASP is prepared and submitted. Therefore, the HASP shall address, in as much detail as possible, anticipated tasks, their related hazards, and anticipated control measures. Additional details shall be included in the activity hazard analyses as described in Section 1.09 Hazard/Risk Analysis.
- B. Acceptance and Modifications. Prior to submittal, the HASP shall be signed by the SSHO and the Site Superintendent. The HASP shall be submitted for review 7 days prior to execution of work at the site. On-site work shall not begin until the plan has been accepted. A copy of the written HASP shall be maintained on site. As work proceeds, the HASP shall be adapted to new situations and new conditions. Changes and modifications to the accepted HASP shall be made with the knowledge and concurrence of the SSHO, the Site Superintendent, and the Engineer. Disregard for the provisions of this specification or the accepted HASP shall be cause for stopping of work until the matter has been resolved.

#### 1.09 HAZARD/RISK ANALYSIS

- A. The HASP shall include a safety and health hazard/risk analysis for site tasks and operations to be performed as part of the contract. The hazard/risk analysis shall provide information necessary for determining safety and health procedures, equipment, and training to protect on-site personnel, the environment, and the public. The following elements, at a minimum, shall be addressed.

1. Site Tasks and Operations (Work Plan). The HASP shall summarize the tasks and objectives of the site operations of this project, and the logistics and resources required to achieve those tasks and objectives safely.
2. Hazards. The following potential hazards may be encountered during site work. They are not complete lists; therefore, they shall be expanded and/or revised as necessary during preparation of the HASP.
  - a. Safety Hazards. Potential safety hazards associated with the work could be related to operation of heavy construction equipment.
  - b. Chemical Hazards. Potential chemical hazards that may be encountered during Site work shall be discussed in the HASP. The Hazard/Risk Analysis section of the HASP shall describe the chemical, physical, and toxicological properties of contaminants, sources and pathways of employee exposures, anticipated on-site and off-site exposure level potentials, and regulatory (including Federal, state, and local) or recommended protective exposure standards. The HASP shall also address employee exposure to hazardous substances brought on site, and shall comply with the requirements of 29 CFR 1910, Section 1910.1200 and 29 CFR 1926, Section 1926.59, Hazard Communication.
  - c. Physical Agents. Potential physical hazards during work on the Site could include: heat stress and cold stress; noise related hazards; physical strain from heavy lifting; and slips, trips, and falls.
  - d. Biological Hazards. Potential biological hazards associated with the work on the Site could include poison ivy and insect and animal bites.
3. Action Levels. Action levels shall be established in the HASP for situations anticipated or potential at the Site.

#### 1.10 ACTIVITY HAZARD ANALYSES

- A. Prior to beginning work, Activity Hazard Analyses shall be prepared for each anticipated activity, by the Contractor or Subcontractor performing that work. Analyses shall define the activities to be performed and identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. The activity hazard analyses shall be continuously reviewed and when appropriate modified to address changing site conditions or operations, with the concurrence of the SSHO, and the Site Superintendent. Activity hazard analyses shall be attached to, and become a part of, the HASP.

#### 1.11 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

- A. An organizational structure shall be developed that sets forth lines of authority (chain of command), responsibilities, and communication procedures concerning site safety, health, and emergency response.

#### 1.12 TRAINING

- A. Personnel shall receive training in accordance with the Contractor's written safety and health training program and 29 CFR 1910 Section 1910.120, 29 CFR 1926 Section 1926.65, and 29 CFR 1926 Section 1926.21.
  1. Site-specific Training. Site-specific training sessions shall be documented, scheduled in advance, and attendance shall be mandatory and shall be extended to the Engineer.
    - a. Initial Session (Pre-entry Briefing). Prior to commencement of on-site field activities, all site employees, including those assigned to non-hazard areas, shall attend a site-specific safety and health training session

of appropriate duration. Training shall be conducted by the SSHO or other qualified individual to ensure that all personnel are familiar with requirements and responsibilities for maintaining a safe and healthful work environment.

- b. Periodic Sessions. Periodic on-site training shall be conducted by the SSHO at least weekly for personnel assigned to work at the Site during the following week. The training shall address safety and health procedures, work practices, any changes in the HASP, activity hazard analyses, work tasks, or schedule; results of previous week's monitoring; review of safety discrepancies; and accidents.

#### 1.13 PERSONAL PROTECTIVE EQUIPMENT

- A. PPE Program. In accordance with 29 CFR 1910 Section 1910.120 (g)(5) and 29 CFR 1926 Section 1926.65 (g)(5), a written Personal Protective Equipment (PPE) program which addresses the elements listed in that regulation is to be included in the Contractor's Safety and Health Program. The HASP shall detail the minimum PPE ensembles (including any necessary respiratory protection) and specific materials from which the PPE components are constructed for each site-specific task and operation to be performed. On-site personnel shall be provided with appropriate personal protective equipment. Protective equipment and clothing shall be kept clean and well maintained. The PPE Section of the HASP shall include site-specific procedures to determine PPE program effectiveness and for cleaning, maintenance, inspection, and storage of PPE.
- B. Levels of Protection. The SSHO shall establish appropriate levels of protection for each work activity based on review of historical site information, existing data, an evaluation of the potential for exposure (inhalation, dermal, ingestion) during each phase of the work.

#### 1.14 MEDICAL SURVEILLANCE

- A. The Contractor's medical surveillance program shall be detailed in the HASP.
- B. A medical examination statement shall be obtained for all employees conducting work at the site similar to the one provided at the end of this specification.

#### 1.15 HEAT AND COLD STRESS MONITORING

- A. The Site SSHO shall develop a heat stress and cold stress monitoring program for on-site activities. Schedules for work and rest, and physiological monitoring requirements, shall be described in the HASP. Details regarding the monitoring program shall be included in the HASP only as changes to the program are anticipated. Personnel shall be trained to recognize the symptoms of heat and cold stress. The SSHO and an alternate person shall be designated to be responsible for the heat and cold stress monitoring program.

#### 1.16 SAFETY PROCEDURES, ENGINEERING CONTROLS AND WORK PRACTICES

- A. The HASP shall describe the standard operating safety procedures, engineering controls, and safe work practices to be implemented for the work. Possible procedures may include, but shall not be limited to, the following:
  - 1. General Site Rules/Prohibitions,
  - 2. Material Handling Procedures, and
  - 3. Spill and Discharge Control

1.17 PERSONNAL HYGENE

- A. Personnel, equipment, and material entering the Site shall adhere to the personal hygiene provisions identified in the HASP. A discussion of personal hygiene and procedures to be followed by site workers shall be submitted as part of the HASP.

1.18 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

- A. The HASP shall describe the emergency and first aid equipment to be available on site, the specific locations of the equipment and identification of individuals trained in the use of such equipment who are first aid and/or CPR certified by a recognized training organization (e.g., American Red Cross).

1.19 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

- A. An Emergency Response Plan that meets the requirements of 29 CFR 1910 Section 1910.120 (l) and 29 CFR 1926 Section 1926.65 (l), shall be developed and implemented as a Section of the HASP. This Plan/Section shall be formatted as a stand alone document.
- B. In the event of any emergency associated with closure activities, the Contractor shall, without delay, alert all on-site employees that there is an emergency situation; take action to remove or otherwise minimize the cause of the emergency; alert the Engineer, and institute measures necessary to prevent repetition of the conditions or actions leading to, or resulting in, the emergency. Employees that are required to respond to hazardous emergency situations shall be trained in how to respond to such expected emergencies.
- C. The Contractor shall alert local emergency response personnel and dispatchers of the work in progress.

1.20 INSPECTIONS

- A. The SSHO shall perform inspections of the jobsite and the work in progress to ensure compliance with the Safety and Health Program, and other occupational health and safety requirements of the contract. Procedures for correcting deficiencies should be included.
- B. Safety inspection logs shall be used to document the inspections, noting safety and health deficiencies, and corrective actions taken. The SSHO's Daily Inspection Logs shall be attached to and submitted with the Daily project reporting and shall include the date, work area checked, employees present in work area, PPE and work equipment being used in each area, special safety and health issues and notes, and signature of preparer. In the event of an accident, the Engineer shall be notified immediately of any reportable accident; an appropriate Accident Report shall be completed and submitted by the Contractor within 24 hours of the accident.

EMPLOYEE MEDICAL EXAMINATION STATEMENT:

I have had a medical examination within the last twelve months which was paid for by my employer. The examination included: health history, pulmonary function tests, and may have included an evaluation of a chest x-ray. A physician made determination regarding my physical capacity to perform work tasks on the project while wearing protective equipment including a respirator. I was personally provided a copy and informed of the results of that examination. My employer's industrial hygienist evaluated the medical certification provided by the physician and checked the appropriate blank below. The physician determined that there:

Were no limitations to performing the required work tasks. ( )

Were identified physical limitations to performing the required work tasks. ( )

Date medical exam completed \_\_\_\_\_

[Employee's][Visitor's] Signature \_\_\_\_\_

Date \_\_\_\_\_

Printed Name \_\_\_\_\_

Contractor's Site Safety and Health Officer Signature \_\_\_\_\_

Date \_\_\_\_\_

Printed Name \_\_\_\_\_

END OF SECTION

## SECTION 01352

### ENVIRONMENTAL PROTECTION PROCEDURES

#### PART 1 – GENERAL

##### 1.01 DESCRIPTION

Contractor shall perform the Work minimizing environmental pollution or damage as the result of construction operations. Environmental pollution or damage results from the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; the unfavorable altering of ecological balances of importance to human life; affecting other species of importance to humankind; or degrading the utility of the environment for aesthetic, cultural and/or historical purposes. The control of environmental pollution or damage requires consideration of land, water, and air, and includes management of visual aesthetics, noise, solid waste, and dust, as well as other pollutants. The environmental resources within the project limit of work and those affected beyond shall be protected during the entire duration of this Contract.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01351 – Health, Safety and Emergency Response
- B. Section 01500 – Temporary Facilities and Controls
- C. Section 01560 – Dust and Odor Control
- D. Section 02110 – Waste Removal, Handling, and Storage
- E. Section 02120 – Off-Site Transportation and Disposal
- F. Section 02370 – Erosion and Sedimentation Control

##### 1.03 DEFINITIONS

- A. Sediment: soil and other debris that has eroded and has been transported by runoff water or wind.
- B. Solid Waste: typical municipal household and/or commercial/ industrial waste in solid form and not classified as bulky waste or hazardous waste, including rubbish/trash, garbage, other miscellaneous discarded material/debris, soil, sediment, sludge, and/or ash.
- C. Construction Water: wastes in liquid form collected during construction that may include construction water from dewatering activities, groundwater monitoring well development water, leachate, sediment laden stormwater runoff, and/or decontamination fluids.
- D. Leachate: waste generated from the percolation of liquids (usually stormwater) through or contact of liquids with solid waste or contaminated soils, sediment, or sludge.
- E. Sanitary Wastes: wastes characterized as sanitary sewage. Refer to Section 01500 – Temporary Facilities and Controls.

- F. Oily Waste: wastes generated from petroleum products and bituminous materials.

## PART 2 - PRODUCTS

Not Applicable

## PART 3- EXECUTION

### 3.01 PROTECTION OF NATURAL RESOURCES

- A. Preserve the natural resources within the limit of work and outside the project limit of disturbance. Restore to an equivalent or improved condition upon completion of Work. Confine construction activities to within the limit of disturbance indicated on the Contract Drawings.
- B. The Contractor shall provide means, methods, and facilities to prevent contamination of soil, water, and atmosphere from waste discharges due to spills and releases as a result of the Contractor's operation.
- C. Land Resources:
  - 1. Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the Engineer's permission. Do not fasten or attach ropes, cables, or guys to existing trees for anchorages unless authorized by the Engineer. Where such use of attached ropes, cables, or guys is authorized, the Contractor shall be responsible for any resultant damage.
  - 2. Protect existing trees and shrubs which are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations. Cut off vegetation to be cleared flush with or as close as practical to the original ground surface in areas to be cleared, except for trees and vegetation indicated or directed to be left standing.
  - 3. Remove traces of temporary construction facilities such as haul roads, work areas, stockpiles of excess or waste materials, and other signs of construction. Grade temporary roads and similar temporary areas to blend with surrounding conditions.
- D. Water Resources:
  - 1. Oily Wastes - Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water.
  - 2. Sediments - Prevent sediment migration outside the limit of disturbance
  - 3. Leachate – minimize the generation of leachate and prevent migration of leachate to surface drainages beyond the limit of disturbance.
- E. Fish and Wildlife Resources - Do not disturb fish and wildlife. 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 indicated or specified as part of the work

### 3.02 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

- A. Carefully protect in-place any historical and archaeological items or human skeletal remains discovered in the course of work and report immediately to the Engineer.
- B. Stop work in the immediate area of the discovery until directed by the Engineer to resume work.

### 3.03 EROSION AND SEDIMENT CONTROL MEASURES

- A. Refer to the Construction Contract Drawings and Section 02370 - Erosion and Sedimentation Control for additional requirements.
- B. Burnoff of the ground cover is not permitted.
- C. Protection of Erodible Soils  
Immediately finish the earthwork brought to a final grade, as indicated or specified. Immediately protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.
- D. Temporary Protection of Erodible Soils  
Use the methods prescribed in Section 02370 – Erosion and Sedimentation Control to prevent erosion and control sedimentation.

### 3.04 CONTROL AND DISPOSAL OF WASTES

- A. Existing solid waste to be consolidated and capped on-site shall be managed in accordance with the requirements of Section 02110 – Waste Excavation, Removal, and Handling.
- B. Liquid waste generated and captured during the course of the project shall be managed in accordance with the requirements of Section 02110 – Waste Excavation, Removal, and Handling and Section 02120 – Off-Site Transportation and Disposal.
- C. Pick up site trash, and place in containers which are regularly emptied. Do not prepare, cook, or dispose of food on the project Site. Prevent contamination of the Site or other areas when handling and disposing of wastes. Upon project completion, leave the Site clean. Control and properly handle and dispose of waste in accordance with Section 02110 – Waste Excavation, Removal, and Handling and Section 02120 – Off-Site Transportation and Disposal.
- D. Temporary sanitary facilities shall be managed in accordance with Section 1500 – Temporary Facilities and Controls. Include provisions for pest control and elimination of odors. Upon completion of the work, the facilities shall be removed by the Contractor from the premises, leaving the premises clean and free from nuisance.

### 3.05 DUST CONTROL

- A. Provisions shall be taken during all construction activities to keep airborne dust levels low, including during non-working periods. Dust control measures shall be implemented when visible air-borne dust becomes noticeable and is carried out of immediate work/disturbed areas.
- B. Contractor shall treat the soil stockpiles, haul roads, and other areas disturbed areas as directed in Section 01560 – Dust and Odor Control.
- C. Contractor shall adhere to the requirements of Section 01351 –Safety, Health and Emergency Response.

### 3.06 NOISE

- A. Make the maximum use of low-noise emission equipment according to USEPA regulations.

### 3.07 DIESEL EMISSIONS REDUCTION

- A. The Contractor shall comply with the Rhode Island Diesel Emissions Reduction Act, Public Laws 07177 (H 5574A) and 07219 (S 0566A) when using heavy duty vehicles.

END OF SECTION

SECTION 01354

DECONTAMINATION

PART 1 – GENERAL

1.01 SECTION INCLUDES:

- A. Submittals

1.02 SUBMITTALS:

- A. Contractor shall prepare and submit proposed decontamination procedures. Provide the following information:

1. The number and location(s) of decontamination stations.
2. The decontamination methods and equipment which will be used in accordance with USEPA Region 1 requirements.
3. Procedures to prevent contamination of clean areas.
4. Methods and procedures to minimize worker contact with contaminants during removal of personal protective clothing and equipment.
5. Procedures for decontamination of vehicles leaving the Project site.
6. Procedures for disposal of personal protective clothing and equipment.
7. Procedures for the collection, treatment, and disposal of all decontamination water and residuals.
8. Procedures for minimizing generation of wastewater.

- B. Contractor shall submit Vehicle Inspection Logs to Engineer on a daily basis, or as otherwise requested by Engineer.

1.03 RELATED SECTIONS:

- A. Section 01351 – Safety, Health and Emergency Response
- B. Section 02120 – Off-Site Transportation and Disposal

1.04 DEFINITIONS:

- A. Exclusion Zone (or hot zone) is the area with actual or potential contamination and the highest potential for exposure to hazardous substances.
- B. Support Zone (or cold zone) is the area of the site that is free from contamination and that may be safely used as a planning and staging area.

PART 2 – PRODUCTS

2.01 SECTION INCLUDES:

- A. Decontamination Facilities

2.02 DECONTAMINATION FACILITIES:

- A. Contractor shall construct and maintain decontamination facilities as shown on the Drawings or as otherwise proposed by Contractor and approved by Engineer.

PART 3 – EXECUTION

3.01 SECTION INCLUDES:

- A. Decontamination of Vehicles and Equipment
- B. Personnel Decontamination
- C. Decontamination Methods
- D. Management of Decontamination Residuals

3.02 DECONTAMINATION OF VEHICLES AND EQUIPMENT:

- A. Contractor shall decontaminate all vehicles and equipment, which have entered the Exclusion Zone(s) prior to movement of vehicles or equipment off-site or to the Support Zone. Decontamination shall include removal of soil from the chassis (which includes undercarriage, suspension, and tires tracks) and other parts of the vehicle known to have been contaminated or visually appearing to be contaminated.
- B. Extreme care shall be taken while decontaminating vehicles to avoid contaminating personnel, other parts of the vehicle or equipment, or the surroundings. Personnel involved in vehicle and equipment decontamination shall be dressed in the appropriate level of Personal Protective Equipment (PPE) as determined by the SSO. All personnel shall follow all applicable safety procedures according to specification Section 01351 – Safety, Health and Emergency Response.
- C. Contractor shall be responsible for decontaminating haul trucks after loading, and ensuring that all haul trucks exit the Secured Zone through the Decontamination Zone and receive proper decontamination and inspection.
- D. Contractor shall maintain a Vehicle Decontamination Inspection Log to document that all trucks leaving the Project site have been properly decontaminated and inspected prior to operating on public streets.

3.03 PERSONNEL DECONTAMINATION:

- A. Contractor shall ensure personnel who have entered the Exclusion Zone perform decontamination as required in specification Section 01351 – Safety, Health and Emergency Response.

3.04 DECONTAMINATION METHODS:

- A. In addition to other physical extraction techniques, Contractor may use brushing, high-pressure steam, and water sprays to decontaminate materials and wastes. Contractor shall obtain approval of all techniques from Client's Representative prior to use.
- B. Brushing shall consist of removal of loose materials with the use of a broom and/or brushes.
- C. High-pressure steam and water sprays shall consist of application of water or steam sprays of sufficient temperature, pressure, residence time, and agitation surfactant and detergents to remove impacted materials. All high-pressure steam and water sprays shall be performed in a bermed and lined area. The decontamination area shall have a sump to collect decontamination water and be equipped with pumps to transfer the decontamination water to haul trucks for off-site disposal.

3.05 MANAGEMENT OF DECONTAMINATION RESIDUALS:

- A. Contractor shall collect decontamination water and containerize for characterization by the Contractor for off-site disposal by the Client per Section 02120 Off-Site Transportation and Disposal.
- B. Contractor shall consolidate all impacted materials within the capping system and/or dispose of impacted materials per Section 02120 – Off-Site Transportation and Disposal.
- C. Contractor shall load contaminated PPE along with impacted soil and debris for appropriate disposal.

END OF SECTION

## SECTION 01410

### REGULATORY REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

Comply with local, state, and federal regulations appropriate or applicable to the proposed work.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01352: Environmental Protection Procedures
- B. Section 02120: Off-Site Transportation and Disposal
- C. Section 02236: Dewatering
- D. Section 02370: Erosion and Sedimentation Control

##### 1.03 GENERAL REQUIREMENTS

Regulations applicable to remediation activities will include but not necessarily be limited to those promulgated by the following regulating authorities:

- A. Environmental Protection Agency (USEPA)
  - 1. Clean Air Act (CAA);
  - 2. Clean Water Act (CWA); and
- B. United States Department of Labor
  - 1. Occupational Safety and Health Act (OSHA).
- C. Rhode Island Department of Environmental Management (the Department)
  - 1. Rules and Regulations for the Investigation of Hazardous Material Releases (Remediation Regulations, DEM-DSR-01-93);
  - 2. Rules and Regulations for Hazardous Waste Management (Hazardous Waste Regulations, DEM OWM-HW10-01);
  - 3. Rhode Island Stormwater Design and Installation Standards Manual;
  - 4. Regulations for the Rhode Island Pollutant Discharge Elimination System (RIPDES); and
  - 5. Rhode Island Soil Erosion and Sediment Control Handbook.

#### 1.04 PERMIT APPLICATION BY CONTRACTOR

Permits that must be applied for by Contractor and approved by regulating authority prior to commencing associated work.

- A. Rhode Island Department of Environmental Management – Rhode Island Pollutant Discharge Elimination System (RIPDES) for stormwater discharge from a construction activity. Notice of Intent to be filed by the Contractor (as the Operator) in compliance with a site Stormwater Pollution Prevention Plan (SWPPP – to be prepared by the Engineer).
- B. General - Other permits as necessary to perform the work as described in the Contract Documents.

#### 1.05 ACCESS PERMISSIONS

- A. The Client will secure access to the eastern staging area from Amtrak. Contractor will have to coordinate work and access during construction.

#### PART 2 - PRODUCTS

Not Applicable

#### PART 3 - EXECUTION

Not Applicable

END OF SECTION

## SECTION 01420

### DEFINITIONS, STANDARDS AND REFERENCES

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Not Used

##### 1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Engineer's action on Contractor's submittals, applications, and requests, "approved" is limited to Engineer's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Engineer. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Installer": An installer is the Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
- I. The term "experienced," when used with an entity, means having successfully completed a minimum of **5** previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
  - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name,

such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

- J. "Provide": Furnish and install, complete and ready for the intended use.
- K. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

### 1.3 INDUSTRY STANDARDS

- A. **Applicability of Standards:** Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. **Publication Dates:** Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. **Conflicting Requirements:** If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Engineer for a decision before proceeding.
  - 1. **Minimum Quantity or Quality Levels:** The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.
- D. **Copies of Standards:** Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

### 1.4 ABBREVIATIONS AND ACRONYMS

- A. **Industry Organizations:** Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. **Industry Organizations:** Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org	(703) 358-2960
AAADM	American Association of Automatic Door Manufacturers www.aaadm.com	(216) 241-7333
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141
ABAA	Air Barrier Association of America www.airbarrier.org	(866) 956-5888
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	American Concrete Institute www.concrete.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AHA	American Hardboard Association (Now part of CPA)	
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AI	Asphalt Institute	(859) 288-4960

	<a href="http://www.asphaltinstitute.org">www.asphaltinstitute.org</a>	
AIA	American Institute of Architects (The) <a href="http://www.aia.org">www.aia.org</a>	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction <a href="http://www.aisc.org">www.aisc.org</a>	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute <a href="http://www.steel.org">www.steel.org</a>	(202) 452-7100
AITC	American Institute of Timber Construction <a href="http://www.aitc-glulam.org">www.aitc-glulam.org</a>	(303) 792-9559
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)	
ALSC	American Lumber Standard Committee, Incorporated <a href="http://www.alsc.org">www.alsc.org</a>	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. <a href="http://www.amca.org">www.amca.org</a>	(847) 394-0150
ANSI	American National Standards Institute <a href="http://www.ansi.org">www.ansi.org</a>	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. <a href="http://www.aosaseed.com">www.aosaseed.com</a>	(405) 780-7372
APA	Architectural Precast Association <a href="http://www.archprecast.org">www.archprecast.org</a>	(239) 454-6989
APA	APA - The Engineered Wood Association <a href="http://www.apawood.org">www.apawood.org</a>	(253) 565-6600
APA EWS	APA - The Engineered Wood Association; Engineered Wood Systems (See APA - The Engineered Wood Association)	
API	American Petroleum Institute <a href="http://www.api.org">www.api.org</a>	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute <a href="http://www.ari.org">www.ari.org</a>	(703) 524-8800
ARMA	Asphalt Roofing Manufacturers Association <a href="http://www.asphaltroofing.org">www.asphaltroofing.org</a>	(202) 207-0917
ASCE	American Society of Civil Engineers <a href="http://www.asce.org">www.asce.org</a>	(800) 548-2723 (703) 295-6300

ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500
AWCI	Association of the Wall and Ceiling Industry www.awci.org	(703) 534-8300
AWCMA	American Window Covering Manufacturers Association (Now WCMA)	
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association) www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963

BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
BWF	Badminton World Federation (Formerly: IBF - International Badminton Federation) www.internationalbadminton.org	6-03-9283 7155
CCC	Carpet Cushion Council www.carpetcushion.org	(610) 527-3880
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.canelect.ca	(613) 230-9263
CEA	Consumer Electronics Association www.ce.org	(866) 858-1555 (703) 907-7600
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CPA	Composite Panel Association www.pbmdf.com	(301) 670-0604
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRI	Carpet and Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRSI	Concrete Reinforcing Steel Institute	(847) 517-1200

	<a href="http://www.crsi.org">www.crsi.org</a>	
CSA	Canadian Standards Association	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) <a href="http://www.csa-international.org">www.csa-international.org</a>	(866) 797-4272 (416) 747-4000
CSI	Cast Stone Institute <a href="http://www.caststone.org">www.caststone.org</a>	(717) 272-3744
CSI	Construction Specifications Institute (The) <a href="http://www.csinet.org">www.csinet.org</a>	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau <a href="http://www.cedarbureau.org">www.cedarbureau.org</a>	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) <a href="http://www.cti.org">www.cti.org</a>	(281) 583-4087
DHI	Door and Hardware Institute <a href="http://www.dhi.org">www.dhi.org</a>	(703) 222-2010
EIA	Electronic Industries Alliance <a href="http://www.eia.org">www.eia.org</a>	(703) 907-7500
EIMA	EIFS Industry Members Association <a href="http://www.eima.com">www.eima.com</a>	(800) 294-3462 (770) 968-7945
EJCDC	Engineers Joint Contract Documents Committee <a href="http://www.ejdc.org">www.ejdc.org</a>	(703) 295-5000
EJMA	Expansion Joint Manufacturers Association, Inc. <a href="http://www.ejma.org">www.ejma.org</a>	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) <a href="http://www.esda.org">www.esda.org</a>	(315) 339-6937
ETL SEMCO	Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA) <a href="http://www.intertek.com">www.intertek.com</a>	(800) 967-5352
FIBA	Federation Internationale de Basketball (The International Basketball Federation) <a href="http://www.fiba.com">www.fiba.com</a>	41 22 545 00 00
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation)	41 21 345 35 35

	www.fivb.ch	
FM Approvals	FM Approvals LLC www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FMRC	Factory Mutual Research (Now FM Global)	
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridarroof.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GRI	(Part of GSI)	
GS	Green Seal www.greenseal.org	(202) 872-6400
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydraulic Institute www.pumps.org	(973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550

IAS	International Approval Services (Now CSA International)	
IBF	International Badminton Federation (Now BWF)	
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 255-1561
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
	Available from ANSI www.ansi.org	(202) 293-8020
ISSFA	International Solid Surface Fabricators Association www.issfa.net	(877) 464-7732 (702) 567-8150
ITS	Intertek Testing Service NA (Now ETL SEMCO)	
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690

LMA	Laminating Materials Association (Now part of CPA)	
LPI	Lightning Protection Institute <a href="http://www.lightning.org">www.lightning.org</a>	(800) 488-6864
MBMA	Metal Building Manufacturers Association <a href="http://www.mbma.com">www.mbma.com</a>	(216) 241-7333
MFMA	Maple Flooring Manufacturers Association, Inc. <a href="http://www.maplefloor.org">www.maplefloor.org</a>	(888) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc. <a href="http://www.metalframingmfg.org">www.metalframingmfg.org</a>	(312) 644-6610
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America <a href="http://www.mhia.org">www.mhia.org</a>	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America <a href="http://www.marble-institute.com">www.marble-institute.com</a>	(440) 250-9222
MPI	Master Painters Institute <a href="http://www.paintinfo.com">www.paintinfo.com</a>	(888) 674-8937 (604) 298-7578
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. <a href="http://www.mss-hq.com">www.mss-hq.com</a>	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers <a href="http://www.naamm.org">www.naamm.org</a>	(630) 942-6591
NACE	NACE International (National Association of Corrosion Engineers International) <a href="http://www.nace.org">www.nace.org</a>	(800) 797-6623 (281) 228-6200
NADCA	National Air Duct Cleaners Association <a href="http://www.nadca.com">www.nadca.com</a>	(202) 737-2926
NAGWS	National Association for Girls and Women in Sport  <a href="http://www.aahperd.org/nagws/">www.aahperd.org/nagws/</a>	(800) 213-7193, ext. 453
NAIMA	North American Insulation Manufacturers Association <a href="http://www.naima.org">www.naima.org</a>	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. <a href="http://www.nbgqa.com">www.nbgqa.com</a>	(800) 557-2848

NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(262) 248-9094
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 775-2300
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (269) 488-6382
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NGA	National Glass Association www.glass.org	(866) 342-5642 (703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association) www.nofma.com	(901) 526-5016
NOMMA	National Ornamental & Miscellaneous Metals Association	(888) 516-8585

	<a href="http://www.nomma.org">www.nomma.org</a>	
NRCA	National Roofing Contractors Association <a href="http://www.nrca.net">www.nrca.net</a>	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association <a href="http://www.nrmca.org">www.nrmca.org</a>	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) <a href="http://www.nsf.org">www.nsf.org</a>	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association <a href="http://www.nssga.org">www.nssga.org</a>	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) <a href="http://www.ntma.com">www.ntma.com</a>	(800) 323-9736 (540) 751-0930
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)	
NWWDA	National Wood Window and Door Association (Now WDMA)	
OPL	Omega Point Laboratories, Inc. (Now ITS)	
PCI	Precast/Prestressed Concrete Institute <a href="http://www.pci.org">www.pci.org</a>	(312) 786-0300
PDCA	Painting & Decorating Contractors of America <a href="http://www.pdca.com">www.pdca.com</a>	(800) 332-7322 (314) 514-7322
PDI	Plumbing & Drainage Institute <a href="http://www.pdionline.org">www.pdionline.org</a>	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute <a href="http://pgi-tp.ce.uiuc.edu">http://pgi-tp.ce.uiuc.edu</a>	(217) 333-3929
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America) <a href="http://www.landcarenetwork.org">www.landcarenetwork.org</a>	(800) 395-2522 (703) 736-9666
PTI	Post-Tensioning Institute <a href="http://www.post-tensioning.org">www.post-tensioning.org</a>	(602) 870-7540
RCSC	Research Council on Structural Connections <a href="http://www.boltcouncil.org">www.boltcouncil.org</a>	
RFCI	Resilient Floor Covering Institute	(301) 340-8580

	www.rfci.com	
RIS	Redwood Inspection Service www.redwoodinspection.com	(888) 225-7339 (415) 382-0662
SAE	SAE International www.sae.org	(877) 606-7323 (724) 776-4841
SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(877) 294-5424 (516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SGCC	Safety Glazing Certification Council www.sgcc.org	(315) 646-2234
SIA	Security Industry Association www.siaonline.org	(866) 817-8888 (703) 683-2075
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)	
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association www.smacentral.org	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611

SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWRI	Sealant, Waterproofing, & Restoration Institute www.swrionline.org	(816) 472-7974
TCA	Tile Council of America, Inc. (Now TCNA)	
TCNA	Tile Council of North America, Inc. www.tileusa.com	(864) 646-8453
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute, Inc. www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrassod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tilerroofing.org	(312) 670-4177
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747

USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association) www.windowcoverings.org	(800) 506-4636 (212) 297-2109
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WIC	Woodwork Institute of California (Now WI)	
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 570-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, Inc.	(800) 423-6587

www.icc-es.org

(562) 699-0543

UBC Uniform Building Code  
(See ICC)

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE Army Corps of Engineers (202) 761-0011  
www.usace.army.mil

CPSC Consumer Product Safety Commission (800) 638-2772  
www.cpsc.gov (301) 504-7923

DOC Department of Commerce (202) 482-2000  
www.commerce.gov

DOD Department of Defense (215) 697-6257  
http://.dodssp.daps.dla.mil

DOE Department of Energy (202) 586-9220  
www.energy.gov

EPA Environmental Protection Agency (202) 272-0167  
www.epa.gov

FAA Federal Aviation Administration (866) 835-5322  
www.faa.gov

FCC Federal Communications Commission (888) 225-5322  
www.fcc.gov

FDA Food and Drug Administration (888) 463-6332  
www.fda.gov

FRA Federal Railroad Administration (202) 493-6052  
[www.fra.dot.gov](http://www.fra.dot.gov)

GSA General Services Administration (800) 488-3111  
[www.gsa.gov](http://www.gsa.gov)

HUD Department of Housing and Urban Development (202) 708-1112  
www.hud.gov

LBL Lawrence Berkeley National Laboratory (510) 486-4000  
www.lbl.gov

NCHRP National Cooperative Highway Research Program  
(See TRB)

NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PBS	Public Buildings Service (See GSA)	
PHS	Office of Public Health and Science www.osophs.dhhs.gov/ophs	(202) 690-7694
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
SD	State Department www.state.gov	(202) 647-4000
TRB	Transportation Research Board http://gulliver.trb.org	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
USPS	Postal Service www.usps.com	(202) 268-2000

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA)	(800) 872-2253
	Architectural Barriers Act (ABA)	(202) 272-0080
	Accessibility Guidelines for Buildings and Facilities Available from U.S. Access Board www.access-board.gov	
CFR	Code of Federal Regulations	(866) 512-1800
	Available from Government Printing Office	(202) 512-1800
	www.gpoaccess.gov/cfr/index.html	
DOD	Department of Defense Military Specifications and Standards	(215) 697-2664
	Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	

DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification	(215) 697-2664
	Available from Department of Defense Single Stock Point <a href="http://dodssp.daps.dla.mil">http://dodssp.daps.dla.mil</a>	
	Available from Defense Standardization Program <a href="http://www.dps.dla.mil">www.dps.dla.mil</a>	
	Available from General Services Administration  <a href="http://www.gsa.gov">www.gsa.gov</a>	(202) 619-8925
	Available from National Institute of Building Sciences  <a href="http://www.wbdg.org/ccb">www.wbdg.org/ccb</a>	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
MIL	(See MILSPEC)	
MIL-STD	(See MILSPEC)	
MILSPEC	Military Specification and Standards	(215) 697-2664
	Available from Department of Defense Single Stock Point <a href="http://dodssp.daps.dla.mil">http://dodssp.daps.dla.mil</a>	
UFAS	Uniform Federal Accessibility Standards	(800) 872-2253
	Available from Access Board  <a href="http://www.access-board.gov">www.access-board.gov</a>	(202) 272-0080
F.	State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.	
RIDEM	Rhode Island Department of Environmental Management  <a href="http://www.dem.ri.gov">www.dem.ri.gov</a>	(401) 222-6800

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

## SECTION 01450

### CONTRACTOR QUALITY CONTROL

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

This section covers quality control procedures and testing to be completed during Work. Prior to commencement of Work, the Contractor shall prepare a Contractor Quality Control (CQC) Plan detailing the procedures to be followed and testing to be completed. Quality control testing shall be executed as required in this Specification.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01330: Submittal Procedures
- B. Section 01770: Project Closeout Procedures

##### 1.03 SUBMITTALS

- A. Pre-construction Submittals:
  - 1. Contractor Quality Control (CQC) Plan – shall identify personnel, procedures, instructions, records and forms to be used in carrying out the requirements of this project. The CQC Plan shall provide the Contractor with a means to provide and maintain effective Quality Control for construction, sampling and testing activities. No work on-site shall be permitted until comments received are adequately addressed by the Contractor and the CQC Plan is approved by the Engineer.
- B. Weekly CQC Reports, Test Reports, Deficiency Reports, and Project Summary.

##### 1.04 CONSTRUCTION QUALITY ASSURANCE

- A. The Engineer on behalf of the Client is responsible for providing Construction Quality Assurance (CQA) services during the execution of the Work in accordance with applicable regulations.
- B. The Contractor's Quality Control procedures shall include coordinating and assisting the Engineer in conducting CQA services as required.

#### PART 2 - PRODUCTS

Not applicable.

## PART 3 - EXECUTION

### 3.01 GENERAL REQUIREMENTS

- A. The quality of all Work shall be the responsibility of the Contractor.
- B. Perform sufficient inspections and tests of all items of work, on a continuing basis, including that of sub-contractors, to ensure conformance to applicable specifications and drawings with respect to the quality of materials, workmanship, construction, and functional performance.
- C. Provide qualified personnel, appropriate facilities, instruments, and testing devices necessary for the performance of the quality control function.
- D. Controls shall be adequate to cover all construction operations, shall be keyed to the proposed construction sequence, and shall be coordinated by the Contractor's quality control personnel.

### 3.02 CONTRACTOR QUALITY CONTROL (CQC) PLAN

- A. Prepare and submit a CQC Plan to the Engineer for approval.
- B. Comments or approval from the Engineer will be submitted to the Contractor within 14 calendar days following receipt of the plan. Contractor shall adequately respond to comments to the satisfaction of the Engineer within 7 calendar days following receipt of any comments from the Engineer.
- C. No work on site shall be permitted until the comments received are adequately addressed by the Contractor and the CQC Plan is approved by the Engineer.
- D. The CQC Plan, at a minimum, shall include the following:
  - 1. A description of the Quality Control Organization, including charts showing lines of internal Contractor authority, and external Contractor, subcontractor, and Owner's Representative relationships. The Quality Control Organization shall include the names, qualifications, duties, and responsibilities of each person assigned to a quality control function. The Quality Control Organization chart shall identify a Contractor's Quality Control Manager whose responsibilities and qualifications are described in the Article entitled "Contractor Quality Control Organization" in this section.
  - 2. Method of performing, documenting and enforcing quality control operations of both Contractor and subcontract work including inspection and testing.
  - 3. Inspections as described in the article entitled, "Inspections" in this section.
  - 4. Provide a list of analytical or testing laboratories to be used by the Contractor for testing required by these technical specifications with specific test methods to be performed by each laboratory indicated.
  - 5. Protocol describing corrective actions to be taken by the Contractor with specifically defined feedback systems. The Engineer will then decide what further corrective action, if any, shall be taken by the Contractor. Personnel responsible for initiating and carrying out corrective action shall be indicated in the protocol.
- E. Submit Weekly CQC Reports, Test Reports, Deficiency Reports and Project Summary as required by this specification.

### 3.03 NOTIFICATION OF CHANGE

- A. After submittal and approval of the CQC Plan, the Engineer shall be notified in writing of any proposed changes to the CQC Plan.

### 3.04 CONTRACTOR QUALITY CONTROL ORGANIZATION

- A. CQC Manager:
  - 1. Identify an individual, within the Contractor's organization at the work site, who shall be responsible for overall management of the CQC Plan and have the authority to act in all CQC matters for the Contractor.
  - 2. The CQC Manager for this contract shall be a qualified construction manager/engineer or comparable individual with a minimum of 2 years of applicable experience, at the Project Manager, Project Engineer, Superintendent or CQC Manager level, whose responsibility is to ensure compliance with the contract plans and specifications. The CQC Manager shall be independent of the Project Superintendent.
  - 3. The CQC Manager shall be on-site whenever work is in progress so that he/she may be in charge of the CQC Plan for the project.
  - 4. All submittals for approval shall be reviewed and modified or corrected as needed by the CQC Manager the authorized assistants prior to forwarding each submittal to the Engineer.

### 3.05 INSPECTIONS

- A. The CQC Plan shall include the following inspections and tests:
  - 1. The Contractor shall perform preparatory inspections prior to beginning each feature of work on any on-site construction work conducted by the Contractor or a subcontractor. Preparatory inspections for the applicable feature of work shall include:
    - a. review of submittal requirements and all other Contract requirements with the performance of the work;
    - b. check to assure that provisions have been made to provide required field work control testing;
    - c. examine the work area to ascertain that all preliminary work has been completed;
    - d. verify all field dimensions and advise the Engineer of any discrepancies;
    - e. perform a physical examination of materials and equipment to assure that they conform to approved shop drawings or submittal data and that all required materials and/or equipment are on hand and comply with the contract requirements.
  - 2. Perform initial inspection as soon as work begins on a representative portion of the particular feature of work, and include examination of the quality of workmanship as well as review of control testing for compliance with control requirements.
  - 3. Perform follow-up inspections continuously as any particular feature of work progresses to ensure compliance with Contract requirements, including control testing, until completion of that feature of work.

### 3.06 TESTING

- A. The Contractor shall be responsible for all required testing, documentation, and corrective measures. The Contractor shall perform tests specified or required to verify that control measures are adequate to provide a product which conforms to contract requirements.

END OF SECTION

## SECTION 01460

### FIELD ENGINEERING AND SURVEY CONTROL

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. Established survey control points are available on site for construction purposes. The Contractor shall verify locations of survey control points prior to starting work. The Contractor shall safeguard all survey control points. Should any of these points be damaged or destroyed, the Contractor shall replace the control point at no cost to the Client. The Contractor shall assume the entire expense of rectifying work improperly constructed due to failure to maintain and protect such established survey control points.
- B. The Contractor shall be responsible for the layout of the proposed work as shown on the Drawings and any additional survey control points, grid coordinate locations, lines, grades, and levels necessary for the proper construction and testing of the work required in the Contract Documents. Survey control shall include, but not be limited to, maintaining appropriate slopes and specified thicknesses.
- C. The Subcontractor shall employ a surveyor using standard practices and datum for the State of Rhode Island to provide the surveying functions necessary for the proper execution of the work, and to document and record the completed work.
- D. The Contractor is responsible for scheduling the surveys to coincide with his construction activities. If the survey documentation shows improper slopes, elevations, locations, or lift thicknesses, the Contractor shall correct the deficiency and re-survey the re-work. Phases of survey layout and documentation may include, but not be limited to:
  - 1. Initial field verification survey, see paragraph 1.06;
  - 2. Construction layout of excavation area limits, capping system limits and grades, and other proposed features
  - 3. Measurement for material or work quantity calculations to support unit price contract payments.
  - 3. Subsurface location and elevation of utilities and storm drain features abandoned in place, installed, or re-located as part of the work;
  - 4. As-built topographic survey of surficial features, including all capped and restored areas associated with the Phase I remedial action to be incorporated into Project Record documentation.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01110: Summary of Work
- B. Section 01330: Submittal Procedures
- C. Section 01770: Project Closeout Procedures

##### 1.03 SUBMITTALS

- A. On request, submit data demonstrating qualifications of persons providing field engineering and survey services.
- B. On request, submit documentation verifying accuracy of survey work.
- C. The Contractor shall perform a field verification of survey of all proposed work areas as part of the work prior to the start of construction activities to verify/establish current conditions. The Contractor shall then compare the existing condition information shown on the Contract Drawings to the current conditions determined during the field verification activities. Where discrepancies exist, the Contractor shall submit to the

Engineer the results of the field verification survey and results of the comparison with the Contract Drawings. All discrepancies shall be resolved by the Engineer prior to initiation of construction activities affected by discrepancies.

- D. Maintain a complete and accurate log of control and survey work as it progresses. Submit Record Documents specified in Section 01770, "Project Closeout Procedures".

#### 1.04 FIELD ENGINEERING AND SURVEY REQUIREMENTS

- A. Provide field engineering and survey services using appropriate construction practices. Use skilled persons, trained and experienced in the necessary tasks and techniques for the proper execution of the work. Locate and layout the work by survey instrumentation and similar appropriate means.
- B. The Contractor shall perform the layout and shall document completed construction on Record Drawings, including the features listed in this Specification.
- C. The Contractor shall sufficiently establish the existing ground elevations before earthwork is started. Survey constructed final grades subsequent to excavation and filling existing grades. The Contractor shall sufficiently survey to verify quantities included in requests for payment.
- D. Vertical and horizontal control shall be sufficient to assure work is constructed within 0.1 foot of proposed fill thickness requirements (or proposed grades as indicated where settlement is not a concern) and location.
- E. Verification surveys, surveys for measurement and payment, and Project Record documentation shall be provided in electronic file format compatible with AutoCAD 2004.

#### 1.05 TECHNICAL REQUIREMENTS OF SURVEY

- A. Horizontal ground control shall originate and terminate on Rhode Island State Plane NAD 83. Vertical control shall be tied to Rhode Island State Plane NGVD 1929.
- B. Vertical Control: Permanent project benchmarks for vertical control have been set and are shown on the Drawings. Additional project benchmarks shall be based on the existing site benchmark.
- D. **Horizontal Control:** Several existing horizontal control points are shown on the Drawings.
- E. Spot Elevations: Survey shall be constructed to provide an accuracy of 0.1 feet vertically. No grade shots exceeding 500 feet shall be taken. Ninety percent of all spot elevations placed on the maps shall have an accuracy of at least 1 foot, and the remaining 10 percent shall not be in error by more than one-half (1/2) of the contour interval (0.5').
- E. Accuracy - Accuracies and accuracy tests apply to the stereo compilation scale of the original manuscript (i.e., if the manuscript is compiled at a scale of 1" = 100' and then reduced to 1"=200', then the accuracies will apply to the original 1"=100' scale). This is also true if the manuscript is enlarged to 1"=50' or some larger scale.

Comment [d1]: add

#### 1.06 FIELD VERIFICATION SURVEY

- A. The existing conditions depicted on the Drawings are based on an existing survey prepared by CABCO Consult (2007).

END OF SECTION

## SECTION 01510

### TEMPORARY FACILITIES AND CONTROLS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

###### A. Work Included:

1. Provide such temporary enclosure facilities and controls as the work may warrant. General locations as depicted on the Contract Drawings may be modified as required by the Contractor upon approval of the Engineer and Client.
2. Required facilities include:
  - a. Contractor's office (construction trailer) and storage facilities. Include adequate facilities for the Engineer (in the Contractor's trailer or separate), which shall include lighting, one desk, one metal five-drawer file storage cabinet, and two padded folding chairs.
  - b. Sanitary facilities (self-contained toilet units) conforming to local codes and OSHA requirements.
  - b. Fire protection.
  - c. Safety equipment.
  - d. Site security fence (as required).
  - e. Soil stockpile areas (see Section 02300, "Earthwork", for information).
  - f. Decontamination pad.
  - g. construction laydown/staging/decontamination areas.
  - h. Temporary gravel access road.
3. Other facilities that may be necessary or provided, depending on the Contractor's approach to the work and the preference of the Contractor, include, but are not limited to:
  - a. Construction warning, protection, and control devices for maintenance and safety of vehicular and pedestrian traffic (if necessary).
4. Completely remove all temporary equipment and materials upon completion of the work and repair all damage caused by the installation of temporary utilities.
5. Make all necessary applications and arrangements for electric power, light, water and other utilities with the property owner and/or tenants. Notify the local electric power company if unusually heavy loads, such as welders, will be connected.

###### B. Other Requirements:

1. Obtain permits as required by local governmental authorities.
2. Obtain easements, when required, across private property other than that of the Owner for temporary power service.
3. Comply with the latest National Electrical Code.
4. Comply with all local, State and Federal codes, laws, and regulations.

5. Allow access to and use of facilities provided by the Contractor to the Engineer and Owner.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Contractor's facilities shall be of size and content for adequate administration of the contract, storage of materials required, and provision for personnel shelter.
- B. Equipment required for personal safety of workmen shall be furnished in full compliance with specific safety requirements of local, state, and Federal agencies, including OSHA.
- C. Signs, barricades, warning lights, and all necessary equipment for the protection of the traveling public shall be furnished and maintained as specified in the Manual on Uniform Traffic Control Devices (Part VI).

## PART 3 - EXECUTION

### 3.01 PERFORMANCE

- A. Field Office and Storage Trailers: Site in locations approved by the Engineer and properly set up for all anticipated weather conditions.
- B. All structures other than storage trailers installed under this Section shall be provided with, as a minimum, the following services:
  1. Fire Extinguisher: Non-toxic, dry chemical, fire extinguisher meeting Underwriters Laboratories, Inc. approval for Class A, Class B, and Class C fires with a minimum rating of 2A, 10B, 10C.
  2. One 36 unit industrial quality first aid kit
- C. Sanitary Conveniences for Project Personnel:
  1. Provide and maintain in sufficient numbers, for the use of all persons employed on the work, and properly screen from public observation, at suitable locations, in accordance with State and local ordinances.
  2. Rigorously enforce the use of the approved sanitary facilities provided.
  3. When no longer required, remove from the site and dispose of the contents in a satisfactory manner.
- D. Obey and enforce other local sanitary regulations and orders, taking such precautions against infectious diseases as may be deemed necessary.
- E. Provide sufficient drinking water for all employees from approved sources.
- F. Conduct operations in a manner which, with the use of proper equipment provides maximum safety for workmen and the traveling public.
- G. Vehicles leaving the Site shall be inspected by the Contractor to ensure that no soil adheres to its wheels, tracks, undercarriage, or bucket.
- H. Remove all soil using high pressure water, steam, or other appropriate method.
- I. Decontamination Pad:
  1. A decontamination (decon) pad will be constructed to facilitate the cleaning of equipment and trucks prior to leaving the Site.
  2. The decon pad shall consist of an impermeable liner, a collection sump, and an aggregate (stone/gravel) working base.

- a. The subgrade surface for the liner shall be free of stones, debris, or other objects greater than ½ inch in size.
3. Aqueous waste collected from the sump shall be collected in a portable storage tank adjacent to the decon pad.
4. Following characterization, the Contractor shall containerize and stage the liquids for the Client coordination of transportation and disposal in accordance with Section 02120, “Off-Site Transportation and Disposal”.
5. Upon completion of the project, the Contractor shall demolish the decon pad and dispose off-site in accordance with all applicable regulations.

END OF SECTION

## SECTION 01560

### DUST AND ODOR CONTROL

#### PART 1 - GENERAL

Dust and odor control will be extremely important throughout the construction period due to the urban nature of the parcel and the surrounding receptors. The site is within close proximity to the City High School, a retail center and densely populated neighborhoods. The public is concerned about the project and dust and odor control has been considered a high priority among the surrounding community. The remediation work must take place with a sensitivity to dust and odor control.

#### 1.01 DESCRIPTION

- A. The Contractor shall execute the work by methods that minimize the generation of dust and nuisance odors. The Contractor shall employ dust control measures to minimize the creation of airborne dust during execution of the work. At a minimum, standard dust control techniques shall be employed in areas of heavy equipment traffic such as watering down the site. The dust control measures will be such that, at a minimum, air quality is in compliance with applicable OSHA regulations.
- B. Real time air monitoring shall be implemented during all excavation, filling and regrading activities to be performed by the Engineer. All reports and data will be collected and analyzed hourly for potential exceedence of OSHA criteria. Client will, based on the Engineers recommendation, inform the Contractor of potential response actions and corrective measures.
- C. The Contractor shall provide an odor control system to control odors as necessary to address complaints from the adjacent properties (high school and retail buildings) and the local community. Odor control agents such as an odor-control foam, misting system, or other method selected by the Contractor and approved by the Engineer shall be available on site and shall be applied as needed to control nuisance odors. At a minimum, an odor control foam system shall be available on site. Other systems may be required as necessary to meet the performance objectives.
- D. The performance objective for odor control will be to control, eliminate, or mask any odors that generate complaints, from neighboring residents, the public, state or local officials, or the Engineer.
- E. No additional payments will be made due to shutdowns as a result of emissions whether exceeding standards or posing a nuisance. If the initial emission controls are found to be inadequate, the Contractor shall provide additional measures at no additional cost.
- F. Dust and odor control systems shall be implemented as necessary to meet local, state, and/or federal regulations for air emissions and dust and to control nuisance odors.
- G. Sufficient volumes of water and/or odor control foam shall be readily available or stored on site to address continuous application as necessary.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01110: Summary of Work

#### PART 2 - PRODUCTS

## 2.01 MATERIALS

- A. Water: Shall be free from oil, acid, and injurious alkali or vegetable matter, and other deleterious materials or contaminants. Water shall not be brackish.
- B. Odor control foam. Odor control foam shall be a biodegradable, non-flammable, and non-toxic water-based material designed for the control of VOCs, dust, and odor. It shall be capable of being spray applied to form a uniform encapsulating layer between contaminated materials and the environment, suppressing VOCs, dust, odors, and gas.

## 2.02 EQUIPMENT

- A. Equipment for dust and odor control shall include appropriate measures (e.g., heat tape, tank heaters) to prevent freezing or impair operation due to temperatures below freezing.

## PART 3 - EXECUTION

### 3.01 SPRINKLING WATER

- A. Apply by approved methods and with equipment including a tank with gauge-equipped pressure pump and a nozzle-equipped spray bar.
- B. Disperse through the nozzle under a minimum pressure of 20 pounds per square inch, gauge pressure.
- C. Apply water until the surface is wet, but avoid ponding, run off, or muddy conditions.

### 3.02 TESTING

- A. All equipment, if not in regular use, shall be tested as requested by the Engineer.

END OF SECTION

## SECTION 01770

### PROJECT CLOSEOUT PROCEDURES

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. Keep accurate record documents for all additions, substitutions of material, variations in work, and any other revisions to the Contract Documents.
- B. Provide a final survey of project site and as-built drawings of the completed work within 14 days of final completion.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01330: Submittal Procedures
- B. Section 01720: Field Engineering and Survey

##### 1.03 PROJECT CLOSEOUT

- A. The Contractor shall comply with the procedures stated in the General Conditions of the Contract for issuance of Certificate of Substantial Completion.
- B. The Contractor shall submit written certification that that the Work is complete in accordance with Contract Documents and ready for the Engineer's inspection/review.
- C. Provide submittals as required by these Specifications.

##### 1.04 FINAL CLEANING

- A. Execute final cleaning of Site prior to final project inspection.
  - 1. Clean and remove debris from drainage systems.
  - 2. Clean project site areas, including sweeping paved areas and raking landscaped surfaces.
  - 3. Remove waste and surplus materials, rubbish, and construction facilities from the Site.

##### 1.05 WARRANTIES

- A. Provide duplicate notarized copies of all warranties associated with the work.
- B. Execute and assemble transferable warranty documents from sub-contractors, suppliers, and manufacturers.
- C. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 14 business days after acceptance, listing the date of acceptance as start of warranty period.

##### 1.06 MAINTENANCE OF RECORD DOCUMENTS

- A. Record documents shall be stored in a dry, safe place apart from construction documents, and be available for inspection by the Engineer. The record documents shall not be used for construction purposes.
- B. Clearly label each document "Project Record." During the execution of the work, keep

- record documents current.
- C. Provide files and racks for storage of documents.
  - D. Maintain one copy of the following documents at the job site:
    - 1. Drawings showing progress of work;
    - 2. Specifications;
    - 3. Addenda;
    - 4. Reviewed submittals;
    - 5. Change Orders;
    - 6. Other modifications to the Contract;
    - 7. Health and Safety Plan;
    - 8. Construction Quality Control Plan
    - 9. Work Plan(s);
    - 10. Applicable permit documents;
    - 11. Contractor's certifications;
    - 12. Shop drawings and product data;
    - 13. Daily reports, including:
      - a. Records of all site work;
      - b. Inspection records; and
      - c. Reports on any emergency response actions.
    - 14. Construction photographs;
    - 15. Deficiency reports;
    - 16. Sampling documentation and chain of custody forms;
    - 17. All analytical laboratory testing data;
    - 18. All geotechnical laboratory testing data and construction materials field/laboratory testing reports;
    - 19. Quality Control Project Summary, compiled upon project completion;
    - 20. Field notes and records of quantities for progress payments;
    - 21. All survey data required for measurement and payment; and
    - 23. As-Built Drawings: Legibly mark on Drawings to record actual construction during work.
      - a. Horizontal and vertical surveyed locations of buried features.
      - b. Field changes of dimension and detail;
      - c. Details not on original Drawings; and
      - d. Additional equipment installed.
  - E. Specifications and addenda shall be legibly marked up to record changes made by Change Order or Field Order, or other method.

#### 1.07 SUBMITTALS

- A. At the completion of construction, the Contractor shall deliver one electronic set (on dvd) of project record documents to the Engineer as a condition of final payment. Submit project record documents in accordance with Section 01330, "Submittal Procedures", and as specified herein.
- B. Accompany the project record documents with a transmittal letter containing the following:
  - 1. Date;
  - 2. Project title and number;
  - 3. Contractor's name and address;
  - 4. Title and number of each record;
  - 5. Certification that each document as submitted is complete and accurate; and
  - 6. Signature of the Contractor or his authorized representative.

- C. For each set of project record documents include a directory listing the names, addresses, and telephone numbers of the Contractor, sub-contractors, and major suppliers. Also, include operation and maintenance instructions for installed materials.

1.08 FINAL SURVEY

- A. The Contractor shall perform a topographic survey of the Site within the limit of disturbance at the completion of field operations as describe in Section 01720 Field Engineering and Survey. The survey shall be performed by a Land Surveyor licensed in the State of Rhode Island. The survey shall consist of a ground control survey and shall include the following:
  - 1. Topographic elevations of final constructed grade on a 5 foot maximum horizontal grid pattern within the limit of disturbance and the associated interpolated 1-foot contours;
  - 2. Establish appropriate horizontal and vertical control at the site (i.e., locating existing/new benchmarks); and
  - 3. All constructed features.
- B. Provide electronic files of digital mapping data on CD. Data shall be compatible with AutoCAD Civil 3D 2010 computer software.

END OF SECTION

TEXTRON, INC.  
FORMER GORHAM MANUFACTURING FACILITY, PROVIDENCE, RI  
REMEDIAL ACTION WORK PLAN – PHASE I SOIL CAPPING: PARCEL C-1

**APPENDIX B**  
**SPECIFICATIONS**  
**(Division 2)**

## SECTION 02072

### GEOMEMBRANE

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. Work provided in this Section includes furnishing labor, equipment, materials, testing, and incidentals required to install a 40-mil textured (both sides) Linear Low Density Polyethylene (LLDPE) geomembrane as shown on the Drawings and as specified herein as part of the multi-layer cap construction in the former Slag Area.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02300: Earthwork  
Section 02074: Drainage Geocomposite

##### 1.03 REFERENCES

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

- A. American Society for Testing and Materials (ASTM):
  1. ASTM D 638, Standard Test Method for Tensile Properties of Plastics
  2. ASTM D 792, Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
  3. ASTM D 1004, Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting
  4. ASTM D 1238, Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
  5. ASTM D 1505 Standard Test Method for Density of Plastics by the Density-Gradient Technique
  6. ASTM D 1603 Standard Test Method for Carbon Black in Olefin Plastics
  7. ASTM D 4437 Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes
  8. ASTM D 5321 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
  9. ASTM D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
  10. ASTM D 5994 Standard Test Method for Measuring the Core Thickness of Textured Geomembrane
- B. Geosynthetic Research Institute (GRI):
  1. GM11 Accelerated Weathering of Geomembranes Using a Fluorescent UVA-Condensation Exposure Device
  2. GM12 Asperity Measurement of Textured Geomembranes Using a Depth Gage

##### 1.04 SUBMITTALS

Submit the following in accordance with Section 01330 – Submittal Procedures.

- A. Submittals relating to liner Manufacturer and liner material:
  1. List of material properties and samples of liner meeting the requirements herein with attached certified test results.
  2. Manufacturer's quality control program and manual including description of in-house laboratory facilities.

3. A list of ten completed facilities totaling a minimum of five million square feet, for which the Manufacturer has manufactured LLDPE geomembrane. The following information shall be provided for each facility.
  - a. Name and purpose of facility, its location and date of installation.
  - b. Name of Owner, Project Manager, Design Engineer and Installer.
  - c. Geomembrane thickness and surface area.
4. Qualifications statement in accordance with Sub-Part 1.07.
- B. The origin of the resin to be used in the manufacturing of geomembrane used on-site including the suppliers name and production plant, as well as brand name and tracking number.
- C. Copy of quality control certificates in conformance with Sub-Parts 2.01 and 2.02. Certification that the LLDPE geomembrane and extrudate produced for this project have compatible properties. Quality control reports for the time period materials were produced for this project.
- D. A "Sample Warranty" in accordance with Sub-Part 1.09.
- E. Prior to shipment of liner material to the Site, provide samples from rolls to be provided. Only ship to the Site, material that is approved by the Engineer.
- F. Submittals relating to the Installer:
  1. Information on equipment and personnel.
  2. Anticipated average daily production.
  3. Number of crews employed and number available for this work.
  4. Qualifications in accordance with Sub-Part 1.07
  5. A list of five completed facilities totaling 2 million square feet for which the Installer has installed 40 mil LLDPE geomembrane.. The following information shall be provided for each facility:
    - a. Name and purpose of facility, its location and date of installation.
    - b. Name of Owner, Design Engineer, Manufacturer and name and telephone number of Manufacturer's Representative at the facility who can discuss the project.
    - c. Surface area of the installed 40 mil LLDPE geomembrane.
    - d. Type of seaming, patching and tacking equipment.
    - e. A copy of the Manufacturer's certification or approval letter.
- G. Within 60 days prior to liner installation submit the following:
  1. Shop Drawings:
    - a. Proposed panel layout showing the installation layout identifying field seams as well as any variance or additional details which deviate from the Drawings.
    - b. Details of seaming the geomembrane, anchoring, connections, penetrations and other construction details, which deviate from these specifications.
- H. Installation Quality Control:
  1. A quality control manual that specifically defines the quality control program during installation for this project. The manual shall include daily procedures, welding techniques, field testing procedures, lab testing procedures, specific steps that are to be taken in the event of a failure or defect, personnel requirements, levels of authority and other information necessary to ensure a high quality geomembrane installation.
  2. Resume of the Installation Supervisor to be assigned to and on-site during the project.
  3. Resume of the Master Seamer to be assigned to the project.

4. A list of personnel performing field seaming operations along with pertinent experience information.
- I. Quality Control
1. In addition to Manufacturer and Installer requirements for qualifications and certification specified in Sub-Part 1.6, Quality Control consists of conformance testing of the material delivered to the site and field quality control during installation.
  2. Conformance testing requirements are specified in Sub-Part 2.02. The purpose of conformance testing is to verify that the supplied material conforms to the Specifications and to the Manufacturer's quality control certificates.
  3. Field quality control requirements are specified in Sub-Part 3.06. The purpose of field quality control procedures is to verify that the geomembrane has been installed in accordance with the specifications and Manufacturer's recommendations.
  4. Quality Control Forms:  
The forms supplied in Attachment A for geomembrane quality control documentation, shall be used for field installation documentation. Alternative forms may be used for documentation as submitted and approved by the Engineer.
- J. Geomembrane Quality Control Documentation:
1. Project Files:
    - a. Two duplicate project files shall be maintained. One shall be maintained by the Engineer and the other shall be maintained by the Contractor. The Contractor shall provide the Engineer with daily documentation by the end of the following work day. At the end of each work week, the Engineer and Contractor will update and check the files to assure that copies of pertinent project information are included in each file.
    - b. Blank copies of the following project forms shall be available onsite throughout the duration of the project and are included in attached Attachment B:

<u>Form No.</u>	<u>Title</u>
1	Material Delivery Inventory
2	Installation and Seaming Report
3	Field Seaming Destructive Testing Report
4	Non-Destructive Seam Testing Report

1.05 JOB CONDITIONS

- A. Section 00330 – Existing Conditions and Subsurface Information

1.06 DEFINITIONS

- A. Geonet:  
A net-like polymeric material formed from intersecting ribs integrally joined at the junctions manufactured for use as drainage media with foundation, soil, rock, earth, or any other geotechnical-related material as an integral part of a human-made project, structure, or system.
- B. Geotextile:  
A woven or nonwoven permeable synthetic textile used with geotechnical engineering-related materials.
- C. Drainage Geocomposite (DGC):

The DGC shall be composed of one layer of ribbed polyethylene geonet with a nonwoven polypropylene or polyester geotextile, thermally bonded to each side of the geonet.

- D. Minimum Average Roll Value (MinARV):  
Minimum of a series of average roll values representative of the product furnished.
- E. Maximum Average Roll Value (MaxARV):  
Maximum of a series of average roll values representative of the product furnished.
- F. Overlap:  
Distance measured perpendicular from overlapping edge of one sheet to underlying edge of adjacent sheet.

#### 1.07 QUALIFICATIONS

- A. Manufacturer:  
The Manufacturer of the lining material described hereunder shall have previously demonstrated its ability to produce this geomembrane by having at least 5 years continuous experience in the manufacturing of LLDPE geomembrane and successfully manufactured a minimum of 50 million square feet of similar material for hydraulic liner installations.
- B. Installer:  
The Installer shall be the Manufacturer or an approved Installer trained and certified to install the Manufacturer's geomembrane. Installation shall be performed under the constant direction of a single Installation Supervisor who shall remain on site and be in responsible charge, through the geomembrane installation, for geomembrane layout, seaming, patching, testing, repairs and other site activities required by the Installer. The Installer shall also provide a Master Seamer (who may also be the Installation Supervisor). The Installation Supervisor/Master Seamer shall have installed or supervised the installation and seaming of a minimum of two million square feet of 40 mil LLDPE and/or HDPE geomembrane liner.

#### 1.08 DELIVERY, STORAGE AND HANDLING

- A. The geomembrane rolls shall be packaged and shipped by appropriate means to prevent damage of the geomembrane rolls. Off-loading and storage of the geomembrane is the responsibility of the Installer. The Installer shall be responsible for replacing any damaged or unacceptable material at no additional cost to the Owner.
- B. Roll Identification:  
The Manufacturer shall provide geomembrane rolls marked or tagged with the following information:
  - 1. Manufacturer's name,
  - 2. Product identification;
  - 3. Thickness;
  - 4. Roll dimensions;
  - 5. Manufacturer's roll and lot number; and
  - 6. Date of manufacture.
- C. Damage during off-loading shall be documented by the Engineer. Damaged rolls must be separated from the undamaged rolls until the proper disposition of that material has been determined by the Engineer.
- D. The geomembrane rolls shall be stored so as to be protected from puncture, dirt, grease, water, mud, mechanical abrasions and excessive heat that may damage the geomembrane material. The rolls shall be stored on a prepared surface (not wooden pallets or hard abrasive surfaces) and shall not be stacked more than two rolls high.

#### 1.09 MATERIAL WARRANTY

The LLDPE geomembrane Manufacturer shall warrant the geomembrane against manufacturing defects and material degradation under outdoor or radiological exposure for a period of 10 years on a prorated basis from the date of final payment and acceptance. The Manufacturer shall repair or replace, at no expense to the Owner, any material which fails from the above causes within the warranty period. The Manufacturer shall furnish a written warranty covering the requirements of this Sub-Part.

#### 1.10 GUARANTEE

The Installer shall guarantee the LLDPE geomembrane against defects in installation and workmanship for the period of 1 year commencing with the date of final payment and acceptance by the Engineer. The guarantee shall include the services of qualified personnel, all materials required for the repairs and testing at no expense to the Client.

#### 1.11 DEFINITIONS AND RESPONSIBILITIES

##### A. Contractor:

The Contractor is the firm or corporation with whom the Client has entered into agreement to construct the project. The Contractor is responsible for submittals by the Manufacturer and the Installer as required by the Specifications. The Contractor is also responsible for scheduling and coordination of the required work with the Manufacturer and the Installer to complete the project.

##### B. Engineer:

The Engineer or Engineer's field representative shall oversee the installation of the geomembrane by the Installer. The Engineer will be responsible for inspections and reviewing testing results for conformance with the specified requirements. The Engineer will compile QC test results daily and document all QA/QC activities in weekly reports..

##### C. Manufacturer:

The Manufacturer is the firm or corporation contracted by the Contractor for production of the geomembrane material to be used in the project. The Manufacturer shall produce a consistent product meeting the project specifications and shall provide quality control documentation for the product specified herein.

##### D. Installer:

The Installer is the firm or corporation contracted by the Contractor for installation of the geomembrane. The Installer shall be the Manufacturer or an approved Installer trained and certified to install the Manufacturer's geomembrane. The Installer shall be responsible for field handling, storing, placing, seaming, sampling, testing and other aspects of the geomembrane installation.

##### E. Quality Control Laboratory:

An independent Quality Control Laboratory (QCL) hired by the Engineer to perform conformance testing of the liner material. The QCL shall have GRI certification.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

##### A. General

1. The resin from which the geomembrane is made shall be in the density range of 0.932 g/ml or higher, and have a melt index value per ASTM D1238 of less than 1.0 g/10 min. Formulated sheet density shall be 0.939 g/ml or higher.
2. The blended resin shall contain two to three percent carbon black, anti-oxidants and heat stabilizer, but no fillers or extenders. The resin shall be virgin material, with no more than two percent rework. If rework is used, it must be of the same

formulation as the parent material. No post-consumer resin of any type shall be added to the formulation.

3. The geomembrane material shall be so produced as to be free of holes, blisters, thin areas, inconsistent texturing, undispersed raw materials, or any sign of contamination by foreign matter.
4. The sheets shall be manufactured in a minimum 22-ft seamless width.

B. Properties:

1. The geomembrane rolls shall be 40-mil textured LLDPE and shall meet the specified physical, mechanical, and chemical property requirements listed in Table 02072-2.
2. Interface Strength Requirements: In addition to the general material properties requirements, the Manufacturer shall provide geomembrane material meeting the minimum project-specific interface strength requirements listed in Table 02072-2.

C. Other Materials:

1. Extrudate welding rods (for fusion welds) shall be compatible and similar to the geomembrane and supplied by the Manufacturer and shall be delivered in the original sealed containers. Each container shall have a label bearing the brand name, Manufacturer's lot number and complete directions as to proper storage.
2. Boots and shrouds for pipe penetration shall fit snugly around the pipe. Prefabricated material shall be designed to fit site specific conditions for the intended slope and size of pipe and be made of compatible and similar materials as the geomembrane.

## 2.02 CONFORMANCE TESTING

A. Tests:

Conformance testing shall be performed by the independent Quality Control Laboratory (QCL) provided and paid for by the Engineer. The Manufacturer shall obtain the samples from the roll, mark the machine direction and identification number and ship the samples to the QCL. The following conformance tests shall be conducted at the laboratory prior to shipment to the site:

1. Thickness
2. Density
3. Tensile properties
4. Tear resistance
5. Carbon black content
6. Carbon black dispersion
7. Asperity height

B. Frequency:

These conformance tests shall be performed in accordance with Table 02372-1, at a frequency of one sample per lot or one sample per 100,000 square feet, whichever provides the largest number of tests.

C. Acceptance or Rejection:

Conformance test results shall be reviewed by the Engineer and accepted or rejected, prior to shipment of the geomembrane. Test results shall meet, or exceed, the property values listed in Table 02072-1. The course of action implemented for retesting failing tests shall be approved by the Engineer. In case of failing test results, the Manufacturer may request that another sample be retested by the independent laboratory with Manufacturer's technical representative present during the testing procedures. This

retesting shall be paid for by the Manufacturer. The Manufacturer may also have the sample retested at two different laboratories approved by the Engineer, paid for by the Manufacturer. If both laboratories report passing results, the material shall be accepted. If both laboratories do not report passing results, geomembrane material from the lot or bracketed square footage representing the failing sample will be considered out of specification and rejected.

## PART 3 - EXECUTION

### 3.01 SUBGRADE PREPARATION

- A. Preparation of the subgrade shall be as specified in Sections 02300 – Earthwork.
- B. The surface of the subgrade shall be smooth, uniform, relatively free from abrupt changes in grade, rocks and stones greater than 1-inch, sharp objects, debris and deleterious materials. During actual placing and seaming of the geomembrane, the subgrade surface shall be kept free of standing water. If the subgrade below the geomembrane becomes wet and unstable, it shall be recompacted in accordance with Section 02300 - Earthwork. Before the geomembrane installation begins, the Engineer and Installer shall verify and sign off that the surface area to be lined has been properly prepared.

### 3.02 ANCHOR TRENCH

- A. The anchor trench shall be constructed as shown on the Drawings and/or as specified herein.
- B. The anchor trench shall be adequately drained to prevent water ponding and softening of adjacent soils. The anchor trench shall be backfilled and compacted.
- C. Geosynthetic material in the anchor trench shall be temporarily anchored with sandbags or other suitable materials until final approvals are obtained.
- D. Backfilling of the anchor trench shall be conducted when the geomembrane is in its most contracted (taut) state.
- E. Care shall be taken when backfilling and compacting the trenches to prevent any damage to the lining materials.

### 3.03 GEOMEMBRANE PLACEMENT

- A. Weather Conditions:  
Geomembrane placement shall not proceed at an ambient temperature below 32 degrees F or above 104 degrees F unless otherwise authorized, in writing, by the Engineer. Geomembrane placement shall not be performed during precipitation, excessive moisture, in an area of ponded water, or excessive winds that adversely affect the geomembrane placement.
- B. Method of Placement
  - 1. Each panel of the geomembrane shall be rolled out and installed in accordance with the approved shop drawings prepared by the Installer. The layout shall be designed to keep field seams of the LLDPE geomembrane liner to a minimum and consistent with proper methods of LLDPE geomembrane installation. Panel layout and deployment shall be such that seams run down slope (i.e., perpendicular to top of slope). End seams across slopes greater than 25 percent shall be avoided. See additional seam requirements in Sub-Part 3.4.
  - 2. Geomembrane rolls shall be placed in a manner to prevent the material from being stretched during deployment and disturbing the underlying sand cushion layer. If a sheet must be placed a distance greater than its width over the sand, a slip sheet shall be used.

3. The Engineer shall inspect each panel, after placement and prior to seaming, for damage and/or defects. Also, inspect geomembrane prior to geocomposite drainage layer installation. Defective or damaged panels shall be replaced or repaired, in accordance with Sub-Part 3.7.7 of the specifications.
4. The Installer shall avoid dragging the geomembrane sheets on rough soil subgrade.
5. Geomembrane shall be anchored as shown on the Drawings and/or consistent with Manufacturer's recommendations.
6. Personnel working on the geomembrane shall not smoke, wear damaging shoes or involve themselves in any activity that may damage the geomembrane.
7. Edges and large exposed areas of the geomembrane shall be properly weighted to avoid uplift due to wind.
8. Vehicular traffic except for proper installation vehicles (ATVs) across the geomembrane shall not be allowed. Any vehicle used prior to or after liner placement shall be first approved by the Engineer.
9. Repaired areas and destructive sample locations shall be recorded and indicated on the as-built drawings.
10. When tying into previously installed geomembrane, excavation, if required, adjacent to installed liner shall be performed by hand to prevent damage.
11. The geomembrane shall be kept free of debris, unnecessary tools and materials. In general, the geomembrane area shall remain neat in appearance.
12. Equipment necessary to perform the installation (generators, compressors, etc.) at a minimum shall have a scrap geomembrane sheet placed underneath to protect the installed geomembrane from possible damage.
13. No welder or testing equipment shall be allowed to remain on top of the installed geomembrane overnight. Equipment must be removed and stored off the installed geomembrane.
14. No fueling of equipment will be allowed on top of the installed geomembrane. No fuel containers shall be allowed on the geomembrane.

#### 3.04 FIELD SEAMS

- A. Individual panels of geomembrane shall be laid out and overlapped by a minimum of 4-inches prior to welding. The area to be welded shall be cleaned and prepared in accordance with the quality control welding procedures approved by the Engineer.
- B. Double track hot wedge fusion welds shall be used for straight long seams to the maximum extent possible.
- C. Extrusion welds shall be used in areas inaccessible for double track hot wedge fusion welding, including patches, repairs and penetration boots.
- D. The welding equipment used shall be capable of continuously monitoring and controlling the temperatures in the zone of contact where the machine is actually fusing the geomembrane material so as to ensure that changes in environmental conditions will not affect the integrity of the weld.
- E. No "fish mouths" or wrinkles will be allowed within the seam area. Where "fish mouths" or wrinkles occur, the material shall be cut, overlapped and an extrusion weld patch shall be applied. Welds upon completion of the work shall be tightly bonded. Any geomembrane area showing injury due to excessive scuffing, puncture, or distress from any cause shall be replaced or repaired with an additional piece of geomembrane. The number of patches per 100-ft length of seam length shall not exceed five. If more than five patches per 100-ft length are necessary, then the entire 100-ft length of seam shall be removed. Further welding will cease at this time and the Engineer shall be notified.

- F. Seams shall have a seam number that corresponds with the panel layout numbers. The numbering system shall be used in the development of the as-built drawings. Seam numbers shall be derived from the combination of the two panel numbers that are to be welded together. Patches, boots and repairs shall be numbered using a system that includes the panel number where the patch, boot or repair is located.
- G. Fusion welded "T" seams (i.e., the result of the geomembrane panels placed perpendicular to each other) shall be double welded where possible. The extrusion process shall be used for the second weld.
- H. Extrudate shall be free of dirt, dry and protected from damage.
- I. If an extrusion welder is stopped for longer than one minute, it shall be purged to remove heatdegraded extrudate. Purged extrudate shall not be placed on the installed geomembrane.
- J. Seams constructed on sloped surfaces shall be perpendicular to the top and toe of the slope (vertical seams).
- K. Panels placed on sloped surfaces (steeper than 25%) shall extend a minimum of 5-ft inward (on the flat) from the top of slope or edge of trench.
- L. End seams shall be staggered a minimum of 5-ft in length between contiguous panels. No end seams are allowed on slopes 25 percent (4 horizontal and 1 vertical) or greater, unless otherwise approved by the Engineer.
- M. To prevent moisture buildup during fusion welding, it may be necessary to place a movable protective layer of plastic (skid sheet) directly below each overlap of geomembrane that is to be seamed.
- N. Seam welds shall extend the full extent into the anchor trench.
- O. Factory seams, field seams and repair welds shall meet seam strength requirements specified in Table 02072-1.

**Table 02372-1: Seam Properties of LLDPE Geomembrane, Textured on Both Sides**

Property	Unit	Test Method	Value
Shear Strength (min. avg.)	lb/in	ASTM D 4437	44
Peel Strength (min. avg.)	lb/in	ASTM D 4437	40 & FTB

- P. Seams shall be "shingled" or "rain-lapped."

### 3.05 SEAMING WEATHER CONDITIONS

- A. Normal Weather Conditions
  - 1. The normal required weather conditions for seaming are:
    - a. Ambient temperature higher than 32 degrees F and lower than 104 degrees F.
    - b. No precipitation or other excessive moisture, such as fog or dew.
    - c. No excessive winds.
  - 2. These weather conditions shall be fulfilled during seaming process.
- B. Cold Weather Conditions
  - 1. If the ambient air temperature is below 32 degrees F, the following procedures shall be implemented:
    - a. Preheating the surface of the geomembrane to achieve normal temperature range.
    - b. Preheating may be waived by the Engineer if the Installer demonstrates that satisfactory welds of equivalent quality may be obtained without preheating at the expected temperature of installation.
    - c. Preheating devices shall be approved by the Manufacturer.

- d. Care shall be taken to assure that surface temperatures are not lowered below the minimum required surface temperature for welding due to winds.
  - e. Additional destructive test samples shall be taken at the discretion of the Engineer.
  - f. Test seams, as described in Sub-Part 3.06.A, shall be performed under similar ambient temperature conditions as the actual seams.
- C. Warm Weather Conditions
- 1. If the ambient air temperature is above 104 degrees F, no seaming of geomembrane shall be permitted unless the Installer can demonstrate, to the satisfaction of the Engineer that geomembrane seam quality is not adversely impacted.
  - 2. Test seams shall be performed under similar ambient air temperature conditions as the actual seams.
  - 3. Additional destructive tests shall be taken at the discretion of the Engineer's field representative.

### 3.06 FIELD QUALITY CONTROL

#### A. Start-up Testing

- 1. A test weld 3-ft long from each welding machine shall be run upon the beginning of each shift and every four hours thereafter, under the same conditions as exist for the geomembrane welding. The test weld shall be marked with date, time of day, Seamer's initials, temperature and speed settings (for fusion welds) or temperature and preheat settings (for extrusion welds), and machine number. The Installer shall provide a calibrated tensiometer, on-site before and during geomembrane installation for the purpose of testing samples. Six 1-in wide specimens shall be cut from each test weld and tested on-site in the presence of the Engineer (three for peel and three for shear strength) in accordance with Table 02072-1.
- 2. Test seams shall be performed under the same conditions as the actual seams and shall be at least 3-ft long and 1-ft wide after seaming. Material for test seams shall be cut out of the approved geomembrane rolls.

#### B. Nondestructive Seam Testing

- 1. The Installer shall perform a nondestructive test on field seams over their full length. The purpose of this test is to assure continuity and integrity of the seams. Vacuum and air pressure tests shall be used for nondestructive testing. The vacuum test shall be used for extrusion welds. The air pressure test shall be used for double track fusion welds.
- 2. Vacuum Testing
  - a. Equipment for testing single wedge fusion seams and extrusion seams shall be comprised of the following:
    - 1) A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft rubber gasket attached to the bottom, port hole or valve assembly and a vacuum gauge.
    - 2) A vacuum tank and pump assembly equipped with a pressure controller and pipe connections.
    - 3) A rubber pressure/vacuum hose with fittings and connections.
    - 4) A plastic bucket and wide paint brush or mop.
    - 5) A soapy solution.
  - b. The following procedures shall be followed by the Installer:
    - 1) Excess sheet overlap shall be trimmed away.

- 2) Clean the window, gasket surfaces and check for leaks.
  - 3) Energize the vacuum pump and reduce the tank pressure to approximately 5 psi.
  - 4) Wet a strip of geomembrane approximately 12-in by 48-in (length of box) with the soapy solution.
  - 5) Place the box over the wetted area and compress.
  - 6) Close the bleed valve and open the vacuum valve.
  - 7) Ensure that a leak-tight seal is created.
  - 8) For a minimum period of 10 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.
  - 9) If no bubbles appear after 10 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum of 3-in overlap and repeat the process.
  - 10) Areas where soap bubbles appear shall be marked and repaired in accordance with Sub-Part 3.07G and then retested.
- c. If the seam is not accessible to vacuum box equipment and cannot be tested prior to final installation, the seaming operations shall be observed by the Engineer for uniformity and completeness.
3. Air Pressure Testing (for double track fusion seams only).
- a. The following procedures are applicable to those processes which produce a double seam with an enclosed space.
  - b. Equipment for testing double fusion seams shall be comprised of the following:
    - 1) An air pump equipped with pressure gauge capable of generating and sustaining a pressure between 25 and 30 psi and mounted on a cushion to protect the geomembrane.
    - 2) A manometer equipped with a sharp hollow needle, or other approved pressure feed device.
  - c. The following procedures shall be followed by the Installer:
    - 1) Seal both ends of the seam to be tested. The length of seam shall not exceed 500-ft without approval by the Engineer.
    - 2) Insert needle or other approved pressure feed device into the tunnel created by the double wedge fusion weld.
    - 3) Energize the air pump to a pressure between 25 and 30 psi. After allowing two minutes for relaxation, the pressure shall be monitored over a test period not less than five minutes.
    - 4) If the loss of pressure exceeds 4-psi or the pressure does not stabilize, the weld shall be considered faulty (unless the Installer can demonstrate that monitoring for an additional five minutes does not cause an additional loss in pressure in excess of 1 psi, and that the pressure stabilizes within the second monitoring period). Locate the faulty area, repair in accordance with Sub-Part 3.07.G and retest.
    - 5) If the pressure loss is less than 4 psi after five minutes, cut the air channel on the opposite end the pressure device to confirm there is no blockage and verify the length of the seam tested. Remove needle of other approved pressured feed device and seal both ends with an extrusion weld. Remove needle or other approved pressure feed device and seal.

- A. Purpose  
The purpose of the destructive testing is to evaluate seam strength properties. A minimum of one test sample shall be obtained per 500-ft of performed seam length. The location of samples shall be determined by the Engineer. Selection of such locations may be prompted by suspicion of overheating, contamination, or other potential cause that may adversely impact the welds. Location of samples shall not be revealed to Installer in advance. Sampling shall be performed by the Installer. Testing of field samples shall be performed by the Engineer's Quality Control Laboratory (QCL).
- B. Sampling Procedures
1. Samples shall be cut by the Installer at locations chosen by the Engineer as the seaming progresses.
  2. The seams shall not be covered by another material before they have been tested and accepted by Engineer.
  3. Upon obtaining each sample, assign a number to the sample and mark it accordingly.
  4. Record sample location on layout drawing.
  5. Record purpose of the sample, statistical routine or suspicious weld area.
  6. Holes in the geomembrane resulting from destructive seam testing shall be immediately repaired in accordance with Sub-Part 3.07G.
- C. Size and Disposition of Samples
1. Two samples, 12-inch wide by 18-inch shall be taken for field testing. Each of these samples shall be cut with a 1-in wide die, with the seam centered parallel to the width. The distance between these two samples shall be 36-in. If all samples pass the field test described in Sub-Part 3.06. A, a sample for laboratory testing shall be taken from the 36-inch portion.
  2. The laboratory sample shall be cut into three parts and distributed as follows:
    - a. One portion to the Installer for optional laboratory testing, 12-in by 12-in.
    - b. One portion for QCL testing, 12-in by 12-in.
    - c. One portion to the Engineer for archive storage, 12-in by 12-in.
- D. Field Testing  
The following shall be performed by the Installer in the presence of the Engineer:
1. The Installer shall cut six 1-in wide replicate specimens from the field testing samples to be tested for shear and peel strength, in accordance with the criteria set in Table 02072-1.
  2. The Installer shall test three specimens for shear seam strength and three for peel strength. Replicate test specimens shall pass for the seam to be acceptable.
  3. Samples shall be tested with a tensiometer equipped with a drive/pull apparatus adjusted to a pull rate of 2-in per minute for both peel and sheer testing. Each sample shall be tested until film tearing bond (FTB) is achieved.
  4. Any specimen that fails through the weld or through the fusion at the weld sheet interface is a non-FTB break and shall be considered a failure even if it achieves the acceptable strengths.
  5. A specimen that does not break at the full extent of the test apparatus will be considered a passing test.
  6. Alternate testing to evaluate both sides of dual wedge welds.
- E. Quality Control Laboratory Testing
1. The Installer shall package and ship destructive test samples to the Engineer's independent Quality Control Laboratory (QCL) as directed by the Engineer by overnight delivery service. Shipping costs and destructive tests are to be paid by the Contractor.

2. Laboratory testing shall include shear and peel strength tests performed in accordance with ASTM D 4437. The minimum acceptable values obtained in these tests shall be in accordance with Table 020723-1.
  3. At least five specimens shall be tested each for shear and peel strength. A passing test shall meet the minimum required values in the five specimens tested for each method.
  4. The QCL shall provide verbal test results to the Engineer no more than 24 hours after they receive the samples. The Engineer shall review the laboratory results as soon as they become available.
- F. Procedures for Destructive Test Failure
1. The following procedures shall apply whenever a sample fails a destructive test, whether that test is conducted in the field or by the QCL. The Installer has two options.
    - a. The Installer can repair the seam between (1/2 distance or as directed by the Engineer) any two passing test locations in accordance with Sub-Part 3.7.7.
    - b. The Installer can retrace the welding path to an intermediate location a minimum of 10 feet on each side of the failed sample. The sample shall be tested in the field. Subsequent failure of test samples shall cause the testing to move further down the seam until the extent of faulty seam has been determined.
  2. Acceptable repaired seams shall be bound by two passing locations on each side of the original sample. In cases where repaired seam exceeds 150-ft, a sample taken from the zone in which the seam has been repaired must pass destructive testing. Repairs shall be made in accordance with Sub-Part 3.7.7.
  3. The Engineer shall document all actions taken in conjunction with destructive test failures.
- G. Repair Procedures
1. Any portion of the geomembrane exhibiting signs of any kind of defect, or failing a destructive or a nondestructive test, shall be repaired. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be made by the Engineer.
  2. The repair procedures available include:
    - a. Patching, used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.
    - b. Spot welding or seaming, used to repair small tears, pinholes, or other minor, localized defects.
    - c. Capping, is used to repair large lengths of failed seams.
    - d. Removing bad seam and replacing with a strip of new material welded in place.
  3. For any repair method, the following provisions shall be satisfied:
    - a. Surfaces of the geomembrane which are to be repaired using extrusion methods shall be abraded no more than one hour prior to the repair.
    - b. Surfaces shall be clean and dry at the time of the repair.
    - c. Seaming equipment used in repairing procedures shall be qualified.
    - d. Patches and caps shall extend at least 4-inches beyond the edge of the defect.
    - e. Patches shall have rounded corners.
- H. Repair Verification
- Each repair shall be numbered and logged by the Installer. Each repair shall be nondestructively tested using the methods described in Sub-Part 3.6.2 as appropriate.

Repairs which pass the nondestructive test shall be taken as an indication of an adequate repair. Repairs more than 150-ft long may be of sufficient length to require destructive test sampling, at the discretion of the Engineer. A failed test of the repaired section indicates that the repair shall be redone and retested until passing test results are achieved. The Engineer shall observe nondestructive testing of repairs. The Installer shall record the number of each repair, date and test outcome.

I. Wrinkles

Large wrinkles that remain in the sheet as result of temperature expansion or uneven surface preparation may need removal as determined by the Engineer in consideration of applied loads on the wrinkle. Should the wrinkle need removing, the lower down-slope edge of the wrinkle shall be cut, overlapped and repaired as described in 3.7.6. Both ends of the wrinkle repair shall be patched. Caution must be taken in removing any wrinkles. Wrinkles are needed to allow for future contraction of the geomembrane liner, especially in cold weather.

3.08 DISPOSAL OF WASTE MATERIAL

Upon completion of installation, the Installer shall properly remove and dispose of all trash, waste material, tools, and equipment used in connection with the performed work and shall leave the premises in a neat and acceptable condition.

3.09 AS-BUILT DRAWINGS

The Installer shall prepare and submit to the Engineer an as-built drawing reflecting the actual installation of geomembrane liner, including the location of seams, the location of destructive samples, and the location of repair work. The as-built drawing shall be submitted to the Engineer within seven days of the completion of the geomembrane. In addition, a copy of the complete documentation package will accompany the as-built drawing.

**Table 02072-2: Material Properties, LLDPE Geomembrane, Textured Both Sides**

Property	Unit	Test Method	Value
Thickness – specified	mil	ASTM D 5994	40
Thickness – min. average	mil	ASTM D 5994	36
Asperity height (min. avg.)	mil	GRI GM12	18
Tensile Properties (min. avg.)		ASTM D 638(Type IV @ 2 in/min)	
1. Break Strength	lb/in		60
2. Break Elongation	%		250
Tear Resistance (min. avg.)	lb	ASTM D 1004	22
Puncture Resistance (min. avg.)	lb	FTMS 101 Method 2065	44
Density	g/cc	ASTM D 792 or ASTM D 1505	< 0.939
Carbon Black Content (range)	%	ASTM D 1603	2.0 to 3.0
Carbon Black Dispersion (10 different views, all 10 in Cat-1 or Cat-2)	N/A	ASTM D 5596	Cat-1 or Cat-2
Interface Friction	degrees	ASTM D 5321 <sup>1,2,3,4,5</sup>	25.5 peak 19.7 residual

(Interface Friction - Geomembrane to Drainage Geocomposite, 1; and Geomembrane to Buffer Sand)

1. Cohesion = 0 conditions
2. For Geomembrane/ Buffer Sand:perform test at normal stresses of 1, 2, and 3 psi with a displacement rate of at least 0.2 in/min, under inundated conditions, report peak and residual values.
3. Geomembrane to Drainage Geocomposite: perform test at normal stresses of 1, 2, and 3 psi with a displacement rate of at least 0.2 in/min, under saturated conditions, report peak and residual values.
4. The interface friction testing between the Geomembrane to Drainage Geocomposite and the Geomembrane to Buffer Sand used at the site shall be performed in accordance with the requirements of this Section. Both interfaces shall demonstrate adequate interface friction and cohesion to provide an acceptable factor of safety. The interface friction and cohesion values obtained by the Contractor from quality control testing, as described in this Section, shall be evaluated by the Engineer. Any materials that have been placed and do not provide an acceptable factor of safety shall be removed or reworked by the Installer at no additional cost to the Client.
5. Site-specific soils taken from samples used for borrow source testing in Specification 02300 will be provided to the QAL along with the Manufacturer provided geomembrane and geocomposite material. Buffer Sand shall be compacted to 90% of density, as percentage of the maximum dry density as determined by ASTM D 698 with the moisture content a maximum of 3% wet of optimum.

END OF SECTION

SECTION 02072 - ATTACHMENT A

PROJECT FORMS  
FOR  
INSTALLATION OF  
LINEAR LOW DENSITY POLYETHYLENE (LLDPE) GEOMEMBRANE

## Geomembrane Installation Field Seam Destructive Testing Report

### Construction Quality Control

#### PROJECT DETAILS

Name: \_\_\_\_\_ Description: \_\_\_\_\_ Contractor: \_\_\_\_\_ Reference No.: \_\_\_\_\_  
 Location: \_\_\_\_\_ Client: \_\_\_\_\_ Installer: \_\_\_\_\_ Project Start Date: \_\_\_\_\_

#### DESTRUCTIVE TEST RESULTS

					Coupon Test Results							
Date	Test No.	Time	Sample Location	Type of Seam	Peel Resistance	Peel Type of Break	Peel Pass/Fail	Shear Resistance	Shear Type of Break	Shear Pass/Fail	Sample No.	QC Inspector
Notes: _____ _____ _____					F							
					I							
					E							
					L							
					D							
					L							
					A							
					B							
Notes: _____ _____ _____					F							
					I							
					E							
					L							
					D							
					L							
					A							
					B							
Notes: _____ _____ _____					F							
					I							
					E							
					L							
					D							
					L							
					A							
					B							









# Trial Test Seam Weld Report

Sheet No. \_\_\_\_\_

Project:				Client:				Installer:											
Location:				QC Monitor:				Remarks:											
Trial Test Weld Results								Coupon Test Results											
Date	Test No	Time	Amb Temp	Equipment Tested				Peel Test				Shear Test			Tech Name	QC Inspector	Comments		
				Wedge No Operator ID	Extrus'n No Operator ID	Mach Temp	Mach Speed	Strength at Break		Type of Break		Pass / Fail		Strength at Break				Type of Break	Pass Fail
								Top	Bot	Top	Bot	Top	Bot						

Owner's Representative: \_\_\_\_\_

Date: \_\_\_\_\_

Peel requirements - 60 lbs/in & FTB (fusion); 52 lbs/in(extrusion)

RTD Representative: \_\_\_\_\_

Date: \_\_\_\_\_

Shear requirements - 80 lbs/in (min) (fusion and extrusion)

## SECTION 02073

### NONWOVEN GEOTEXTILE

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. Furnish and install nonwoven geotextile as shown on the Construction Contract Drawings and as specified in this Section.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01330: Submittal Procedures
- B. Section 02300: Earthwork

##### 1.03 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.

##### A. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1. ASTM D 4354 (1999) Standard Practice for Sampling of Geosynthetics for Testing
2. ASTM D 4355 (1999) Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
3. ASTM D 4491 (1999) Standard Test Methods for Water Permeability of Geotextiles by Permittivity
4. ASTM D 4533 (1996) Standard Test Method for Trapezoid Tearing Strength of Geotextiles
5. ASTM D 4595 (2001) Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method
6. ASTM D 4632 (1997) Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
7. ASTM D 4751 (1999) Standard Test Method for Determining Apparent Open Size of a Geotextile
8. ASTM D 4833 (2000) Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
9. ASTM D 4873 (1997) Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls
10. ASTM D 4884 (1996) Standard Test Method for Strength of Sewn or Thermally Bonded Seams of Geotextiles

##### 1.04 SUBMITTALS

- A. Product Data: Submit geotextile manufacturer’s specifications
- B. Manufacturer’s Quality Control Certifications: Provide quality control certifications for the same lot of material and production (day and shift) as rolls provided to the project verifying conformance with these specifications.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Geotextile:  
 Geotextile shall be composed of synthetic fibers formed into nonwoven fabric. Fibers used in manufacture of the geotextiles shall consist of polypropylene, polyvinyl chloride, nylon, polyolefins, polyamides, or polyester. The fibers shall be formed into network such that the filaments or yarns retain dimensional stability relative to each other, including selvages. The geotextile shall contain stabilizers and/or inhibitors to make the fibers resistant to deterioration resulting from exposure to sunlight, water, or heat. The geotextile shall be free of defects or flaws which will affect the physical properties. Provide a geotextile meeting the properties of Table 02073-1:

**Table 02073-1: Required Physical Properties of 6oz Nonwoven Geotextile**

Property	Test Method	Nonwoven
Mass per Unit Area (oz/yd <sup>3</sup> )	D 5261	6
Tensile Strength (lbs)	D 4632	160
Elongation (%)	D 4632	50
Puncture Strength (lbs)	D 4833	90
Trapezoid Tear (lbs)	D 4533	65
Permittivity (sec <sup>-1</sup> )	D 4491	1.50
Ultraviolet Stability (% for min. 500 hrs)	D 4355	70
Apparent Opening Size (AOS) (standard sieve)	D 4751	70

Table Notes:

1. All numerical values except AOS and ultraviolet stability represent minimum average roll values (MARV), in the weaker principal direction.
2. AOS value is a maximum average roll value or MaxARV.
3. Ultraviolet stability is measured as a minimum average percentage.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Geotextile shall be installed as shown on the Contract Drawings.

3.02 SURFACE PREPARATION

- A. Surfaces on which the geotextile will be placed shall be prepared to a relatively smooth surface condition. Surfaces shall be free from obstruction, debris, depressions, erosion feature, or vegetation. Any irregularities shall be removed so as to ensure continuous, intimate contact of the geotextile with the surface. Any loose material, soft or low density pockets of material, will be removed, filled with suitable subgrade fill, and compacted. Erosion features such as rills and gullies must be graded out of the surface before geotextile placement.

### 3.03 INSTALLATION

#### A. Geotextile Fabrics:

1. Place in the manner and at the locations shown on the Construction Drawings.
2. Prior to installation, fabric delivered to the site not meeting the requirements outlined in section 2.01 of this Specification shall be rejected.
3. At the time of installation, fabric shall be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation or storage.
4. Place with the long dimension parallel to the centerline of the underdrain pipes and lay smooth and free of tension, stress, folds, wrinkles, or creases.
5. Provide a minimum width of 12 in. of overlap for all applications.
6. In the presence of wind, weight the materials with sandbags until final covers are installed.
7. Care shall be taken to assure that any underlying materials are not damaged during placement of geotextiles.
8. Care shall be taken to assure that stones, mud, and dirt are not entrapped in the geotextile during placement and seaming operations.
9. Overlap joints and seams shall be measured as a single layer of cloth.
10. The fabric shall be turned down and buried a minimum of 2 feet at all exterior limits or as indicated on the Construction Drawings.
11. Place so that the upstream strip of fabric will overlap the downstream strip.
12. Protection of Fabrics:
  - a. Exercise necessary care while transporting, storing and installing the fabric to prevent damaging it.
  - b. Protect from prolonged direct exposure to sunlight.
  - c. Repair all damaged areas of the fabric by placing another piece of fabric of sufficient size to extend a minimum of 1.0 foot beyond the limits of the damage in all directions over the damaged area. Sew repairs as described below.
  - d. Do not leave exposed more than 45 days without being covered by backfill.
  - e. When required, sew overlaps and repairs to damaged fabric using a portable machine to provide a seam strength of at least 90 percent of the filter fabric strength.
  - f. Geotextile shall not be exposed to precipitation prior to being installed. Wrappings protecting geotextile rolls shall be removed less than one hour prior to unrolling the geotextile.
  - g. In no case shall any type of equipment be allowed on an unprotected geotextile.

13. Bridging of fabric is not allowed.

END OF SECTION

SECTION 02074

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DRAINAGE GEOCOMPOSITE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work provided in this Section includes furnishing labor, equipment, materials, testing, and incidentals required to install a Drainage Geocomposite (DGC) as shown on the Drawings and as specified herein as part of the multi-layer cap construction in the former Slag Area.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02072: Geomembrane
- B. Section 02300: Earthwork

1.03 REFERENCES

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

- A. American Society for Testing Materials (ASTM):
  - 1. ASTM D 1505, Standard Test Method for Density of Plastics by the Density-Gradient Technique (R 1990).
  - 2. ASTM D 1621, Standard Test Method for Compressive Properties of Rigid Cellular Plastics (R 1979).
  - 3. ASTM D 3776, Standard Test Methods for Mass Per Unit Area Weight of Woven Fabric (R 1990).
  - 4. ASTM D 3786, Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Tester Method.
  - 5. ASTM D 4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
  - 6. ASTM D 4595, Standard Test Method for Tensile Properties of Geotextiles by Wide-Width Strip Method.
  - 7. ASTM D 4632, Standard Method for Grab Breaking Load and Elongation of Geotextiles.
  - 8. ASTM D 4716, Standard Test Methods for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
  - 9. ASTM D 1593, Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.
  - 10. ASTM F 904, Standard Test Method for Comparison of Bond Strength of Ply Adhesion of Similar Laminates Made from Flexible Materials.
  - 12. ASTM G154, Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
- B. Geosynthetic Research Institute (GRI):
  - 1. GRI-GC8, Determination of the Allowable Flow Rate of a Drainage Geocomposite.

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1.04 SUBMITTALS

Submit to the engineer for approval the following in accordance with Section 1330 – Submittal Procedures.

A. Shop Drawings

1. Material specifications, descriptive drawings, and literature.
2. Description of method of tying or joining DGC materials.
3. Layout and installation drawings.
4. The manufacturer of the DGC shall submit documents to the Engineer for review that the DGC to be supplied to the project site has proven installation. As a minimum, the manufacturer shall certify that
  - (a) The proposed DGC has been installed at least 10 million square feet. The proposed DGC has been installed at least 10 projects that are in operations for a minimum two years.
  - (b) The proposed DGC has been installed at least 5 landfill projects.

B. Samples: Sewn or heat seamed joints of geotextile.

C. Quality Control Submittals:

1. Manufacturer's Certificate of Compliance.
2. Installation Procedures.
3. Interface Strength: Perform direct shear tests (ASTM D5321) on a sample of DGC and Protective Soil and DGC and Geomembrane using material selected for incorporation into the Work. Refer to Section 02072 – Geomembrane for interface strength testing requirements for interfaces including geomembrane material. For Geocomposite interfaces described herein, run the tests at confining stresses of 1, 2, and 3 psi and displacement rate of 0.02 in/min. The DGC/Protective Soil interface shall be saturated. The Protective Soil shall be compacted to 90% of density, as percentage of the maximum dry density as determined by ASTM D 698 with the moisture content a maximum of 3% wet of optimum. Demonstrate a minimum interface friction angle identified in Table 02074-3. Other combinations of shear strength parameters which can be shown by standard analytical techniques to provide adequate static and dynamic factors of safety against slope failure may be acceptable if approved by the Engineer.
4. Report of geocomposite transmissivity testing results in accordance with ASTM D4716. Testing shall be performed at gradients of 0.1 and 0.3 and at a normal load of 1,000 psf using Protective Soil as the upper contact surface.
5. Mill Certificate or Affidavit:
  - a. Signed by a legally authorized official from the company manufacturing the materials.
  - b. Attest that the geosynthetic materials for the project meet the chemical, physical, and manufacturing requirements stated in this Specification.
  - c. Provide certification and quantity of any patches applied in the manufacturing facility resulting from lamination burn through.

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1.05 JOB CONDITIONS:

- A. Section 00330 – Existing Conditions and Subsurface Information.

1.06 DEFINITIONS

A. Geonet:

Geonets are a net-like polymeric material formed from intersecting ribs integrally joined at the junctions manufactured for use as drainage media with foundation, soil, rock, earth, or any other geotechnical-related material as an integral part of a human-made project,

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- structure, or system.
- B. Geotextiles:  
Geotextiles are woven or nonwoven permeable man-made textile used with geotechnical engineering-related materials.
- C. Drainage Geocomposite (DGC):  
Drainage Geocomposite (DGC) is composed of one layer of ribbed polyethylene geonet with a nonwoven polypropylene or polyester geotextile, thermally bonded to each side of the geonet.
- D. Minimum Average Roll Value (MinARV):  
MinARV is the minimum of a series of average roll values representative of the product furnished.
- E. Maximum Average Roll Value (MaxARV):  
MaxARV is the maximum of a series of average roll values representative of the product furnished.
- F. Overlap:  
Overlap is the distance measured perpendicular from overlapping edge of one sheet to underlying edge of adjacent sheet.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver marked or tagged with the following:
  - 1. Manufacturer's name.
  - 2. Product identification.
  - 3. Lot number.
  - 4. Roll number.
  - 5. Roll dimensions.
- B. Materials shall be wrapped in original, unopened package during shipment and storage.
- C. Unload and store materials with minimum handling.
- D. Store materials on pallets such that the rolls or panels are protected from equipment, mud, soil, dust, debris, and direct rays of the sun.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Composite Drainage Net shall be Model TENFLOW 770-2 as manufactured by TENAX® Corporation or approved equal. Should the Contractor submit an alternate product, then transmissivity testing with 1,000 hours at the specified boundary conditions must be submitted prior to material being considered for use on the project.
- B. Geonet:
  - 1. Manufactured from domestic polyethylene resin extruded ribs manufactured to form a porous net of uniform pattern with distinct openings.
  - 2. The geonet shall conform to the requirements in Table 02074-1.

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**Table 02074-1: Geonet Physical Property Requirements**

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Property	Test Method	Requirement <sup>2</sup>
Tensile strength, lb/ft (minimum)	ASTM D4595	450
Reduction Factor for Compressive Creep @ 2,000 psf after 10,000 hours, (maximum) <sup>1</sup>	ASTM D1621	1.05
Density, g/cm <sup>3</sup> (minimum)	ASTM D1505	0.94
Melt Flow Index, g/10 min. (maximum)	ASTM D1238	1.0
Carbon Black content, %	ASTM D4218	2-3
Thickness, mils (minimum)	ASTM D5199	350

**Notes:**

<sup>1</sup> Properties prior to lamination.

<sup>2</sup> The creep reduction factor is determined from 10,000 hour test duration, extrapolated to 30 years and using a compressive load of 2,000 psf. SIM method is acceptable for confirmation only, but is not acceptable for baseline data to determine the creep reduction factor.

C. Nonwoven Geotextile:

1. Pervious sheet of polypropylene or polyester filaments oriented into a stable network so that the filaments retain their relative position with respect to each other.
2. Composed of continuous filaments held together by needle-punching.
3. The edges of the geotextile shall be salvaged or otherwise finished to prevent the other material from pulling away.
4. Geotextile continuous filament process shall allow increased UV resistance and ability to manufacture orange textile for use as visual warning barrier to delineate potential over-excavation of cap.
5. The geotextile shall be high UV resistant, continuous filament, needle punched, non-woven polypropylene geotextile. The geotextile color shall be orange to serve as a visual warning barrier. The strength retained after 500 hours of UV exposure shall be at least 95% per ASTM G154. The geotextile shall meet the property requirements listed in Table 02074-2.

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**Table 02074-2: Geotextile Physical Property Requirements**

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Property	Test Method	Units	Value
Color	Orange		
Serviceability Class	Class 2		
AOS (MaxARV)	ASTM D4751	US Sieve (mm)	70 (0.21)
Permittivity (MARV)	ASTM D4491 Falling head	sec <sup>-1</sup>	1.4
Grab Tensile Strength (MARV)	ASTM D4632	lbs	160
Trapezoid Tear (MARV)	ASTM D4533	lbs	60
Puncture Strength (MARV)	ASTM D4833	lbs	56
CBR Puncture Strength (MARV)	ASTM D6241	lbs	400
UV Resistance @500 Hours (MIN)	ASTM G154	%	70

D. Geocomposite:

- The geocomposite shall conform to the requirements in Table 02074-3

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**Table 02074-3: Geocomposite Physical Property Requirements**

Property	Test Method	Requirement
Ply Adhesion (avg), lb/in	ASTM D7005	0.5
Transmissivity 1,000 psf Load in Soil Boundary Condition and after 100 hours, and gradient: m <sup>2</sup> /sec	ASTM D4716	
0.1		7.0x10 <sup>-3</sup>
0.3		4.0x10 <sup>-3</sup>
Interface Friction Angle between DGC/Protective Soil, degrees	ASTM D5321	25.5 d peak 19.7 residual

2.02 SOURCE QUALITY CONTROL

- Contractor shall provide Certification of Compliance in accordance with SECTION 01330 – Submittal Procedures, showing test results for all physical properties specified at a minimum frequency of one test per 100,000 square feet.

PART 3 - EXECUTION

3.01 PLACEMENT OF DGC

- Place and anchor the DGC in the manner at the locations shown in the Drawings and as directed by the Engineer. At or before the time of installation, DGC shall be rejected if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transportation, or storage. Place DGC with the long dimensions downslope, with panel upslope overlying the panel downslope in a shingle fashion, unless otherwise directed by the Engineer. Install DGC smooth and free of tensions, stress, folds, wrinkles, or creases. DGC panels shall be laid smooth to provide a minimum width of 4 inches of geonet overlap along each joint and 1 foot at the end of rolls. DGC joints shall be tied at 5-foot intervals along edges and 2 foot along end using a method approved by the Engineer. Plastic ties or tying materials shall be of contrasting color to the DGC panels for inspection. Metallic connectors shall not be allowed. Secure and leak proof bags of sand shall be used to secure the DGC during installation. Securing pins shall not be used.
- Protect DGC at all times during construction from contamination by surface runoff.

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- Remove contaminated DGC and replace with uncontaminated DGC.
- C. Should the geotextile on the DGC be damaged during any step of the installation, torn or punctured sections shall be repaired by placing a piece of geotextile which extends at least 6 inches in all directions beyond the damaged area. Geotextile repair patches shall be secured by sewing or bonding as approved by the Engineer.
  - D. The orientation of DGC panels shall result in approximate alignment of the drainage paths between bottom ribs of the geonet with the drainage paths indicated by the elevations shown.
  - E. Overlap the excess geotextile at each edge of the geonet panels in a manner that results in a smooth geotextile surface free of wrinkles and openings across the overlapped panels of geonet. Seam the geotextile so that no slack material remains between seams. Acceptable seaming methods shall be in accordance with Section 02072 - Geomembrane.

3.02 PLACEMENT OF MATERIAL ON DGC

- A. Place Cover Soils on DGC as specified in Section 02300 - Earthwork. If damage occurs to the DGC during the spreading operation, the overlying material shall be carefully removed from the DGC and the damaged area repaired as specified.
- B. To protect the DGC from UV deterioration, protective plastic covering will be placed above the DGC on the slope. This coverage will be removed progressively as fill is placed against the slope. The Contractor shall furnish and install the protective plastic covering.
- C. Spread overlying Protective Soils in the direction of DGC overlap.

END OF SECTION

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## SECTION 02110

### WASTE EXCAVATION, REMOVAL, AND HANDLING

#### PART 1 GENERAL

##### 1.01 SUMMARY

- A. This section includes a description of responsibilities and project requirements for on-site management of wastes including removal, handling and storage. For the Former Gorham Manufacturing Facility, Parcel C-1 Phase I Cap, these materials and wastes are identified as the following:

1. Clearing Debris;
2. Grubbings;
3. Solid Waste;
4. Impacted Soil;
5. Soil Boring Cuttings;
6. Remediation Waste;
7. Sanitary Waste;
8. Site Trash;
9. Decontamination Water; and
10. Construction and Demolition Debris

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01351 – Safety, Health, and Emergency Response  
B. Section 02120 – Off-Site Transportation and Disposal  
C. Section 02231 – Clearing and Grubbing  
D. Section 02300 – Earthwork  
E. Section 02522 – Groundwater Monitoring Wells  
F. Section 01500 – Temporary Facilities and Controls

##### 1.03 SUBMITTALS

- A. The Contractor shall include as a component of the Construction Work Plan (described in Section 01110 – Summary of Work) a description of planned means and methods for management of all waste materials removed or generated as a component of the Work.

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##### 1.04 DEFINITIONS

- A. Clearing Debris: refer to Section 02231 – Clearing and Grubbing for definition.  
B. Grubbings: refer to Section 02231 - Clearing and Grubbing for definition

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- C. Solid Waste: typical municipal household and/or commercial/ industrial waste in solid form and not classified as bulky waste or hazardous waste, including rubbish/trash, garbage, other miscellaneous discarded material/debris, soil, sediment, sludge, and/or ash.
- D. Impacted Soils: Contaminated soils adjacent to and within the surficial fill and debris areas within the limit of the proposed capping system.
- E. Leachate: waste generated from the percolation of liquids (usually stormwater) through or contact of liquids with solid waste or contaminated soils, sediment, or sludge.
- F. Soil boring cuttings: Cuttings generated during drilling of groundwater monitoring wells
- G. Remediation Waste: Waste generated during remediation work as a result of environmental protections, worker protections and/or sampling procedures including disposable personal protective equipment (PPE), plastic sheeting, and sampling equipment.
- H. Sanitary Wastes: Wastes characterized as sanitary sewage. Refer to Section 01500 – Temporary Facilities and Controls.
- I. Site trash: Waste generated during the course of construction from site workers, equipment, and/or imported materials.

1.05. WASTE CONTAINERS

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- A. The Contractor shall provide:
  - 1. Trucks or other equipment as required for handling grubbings and solid waste during excavation and on-site consolidation/grading.
  - 2. Portable, temporary storage tanks (e.g., FRAC tanks and/or 55-gallon drums.) for the storage of collected dewatering liquids.
  - 4. Containers (e.g., roll-off containers) for non-hazardous site trash collected during the course of the project and during final site cleanup activities.
  - 5. Plastic bags for disposable personnel protection equipment. Plastic bags shall have a minimum thickness of six (6) mils

1.06. ON-SITE MANAGEMENT AND STORAGE OF MATERIALS

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- A. The Contractor shall be responsible for proper on-site management of wastes generated in compliance with all Federal, State and local regulations. Management shall include handling, segregating, testing, and storing, as required, for the wastes listed in Sub-Part 1.01A of this Section.
  - 1. Clearing Debris: manage and store as described in Section 02231 – Clearing and Grubbing
  - 2. Grubbings: manage and store as described in Section 02231 – Clearing and Grubbing
  - 3. Solid Waste: material excavated/removed from outside the capping system boundary shall be consolidated within the boundary.
  - 4. Impacted Soils: manage and consolidate within the capping system boundary.
  - 5. Soil Boring Cuttings: manage and store as described in Section 02522 – Groundwater Monitoring Wells.

- 6. Remediation Waste: segregate and bag all remediation waste separately from other Site Trash and store in the on-site Site Trash container.
  - 7. Sanitary Wastes: manage as described in Section 1500 – Temporary Facilities and Controls.
  - 8. Site Trash: manage and store on-site during construction in a designated roll-off container or similar.
- B. The Contractor shall be responsible for movement of the containers, trucks, etc. into positions required for proper loading and management of material.
  - C. The Contractor shall segregate hazardous from non-hazardous materials as required for proper off-site disposal.
  - D. The Contractor shall be responsible for loading all waste containers, trucks, etc. with all removed waste, debris, and soil.
  - E. The Contractor shall limit stockpiling of waste materials on-site.
  - F. Solid waste for on-site waste consolidation, if stockpiled, shall be maintained inside the capping system boundary.
  - F. The Contractor shall not load waste containers, trucks, etc. with non-contaminated materials prior to inspection and determination by the Engineer that decontamination of the waste containers has been achieved.
  - G. The Contractor shall be responsible for coordinating the schedule for delivery and pick-up of supplied waste containers. The Contractor shall also be responsible for movement and storage of containers within the Site to allow the progress of the Work.
  - H. The Contractor shall cover and line any material stockpiles with plastic sheeting and anchoring system to prevent stormwater runoff from contacting the waste material.

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**1.07. WASTE CHARACTERIZATION SAMPLING AND TESTING**

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- A. Engineer shall sample and test all Client Managed wastes prior to off-site disposal.
- B. The Contractor shall be responsible for the sample collection and laboratory testing of the following classifications of wastes if required:
  - 1. Clearing Debris (as limited in Section 02231 – Clearing and Grubbing);
  - 2. Construction and Demolition Debris;
  - 3. Sanitary Waste; and
  - 4. Site Trash;
- C. Laboratory testing of wastes shall be performed by a certified laboratory as required by the selected disposal facility:
  - 1. Laboratory reports shall be prepared by the subcontracted laboratory to include all requirements of the State.
  - 2. All laboratory test methods and frequencies shall be in accordance with the RIDEM requirements.

**Deleted:** Testing shall not be required for the following classifications of wastes:¶  
 ¶ Clearing Debris;¶  
 ¶ Grubbings;¶  
 3. Solid Waste consolidated on-site;¶  
 4. Soil Boring Cuttings;¶  
 5. Remediation Waste;¶  
 6. Sanitary Waste;¶  
 7. Site Trash;¶  
 8. Dewatering liquid;¶  
 9. Construction and Demolition Debris.

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**Deleted:** Impacted Soil disposed off-site; ¶  
 Decontamination Liquid; and¶  
 Solid Waste disposed off-site.¶

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**PART 2 PRODUCTS**

Not Applicable

PART 3 EXECUTION

Not Applicable

END OF SECTION

SECTION 02120

OFF-SITE TRANSPORTATION AND DISPOSAL

PART 1 GENERAL

1.01 SUMMARY

A. This section includes a description of requirements and responsibilities for proper staging and loading of waste materials removed and identified for off-site disposal by the Client including the following materials:

1. ~~Grubbings (as limited in Section 02331 – Clearing and Grubbing);~~
2. Impacted Soil;
3. Excess solid waste from on-site consolidation (exceeds the available on-site capacity);
4. Decontamination Liquid; and

**Deleted:** <#>Clearing Debris (as limited in Section 02331 – Clearing and Grubbing); ¶

B. This section includes a description of requirements and responsibilities for proper staging, transportation and disposal of waste materials removed and identified for off-site disposal by the Contractor including the following materials:

1. Clearing Debris (as limited in Section 02231 – Clearing and Grubbing);
2. Construction and Demolition Debris;
3. Sanitary Waste; and
4. Site Trash;

**Deleted:** <#>Construction and Demolition Debris.¶

C. Work not covered by this specification includes the on-site transportation of wastes/wastes materials and on-site disposal within the cap boundaries. These wastes/waste materials including the following:

1. Existing Solid Waste including excess soil from waste consolidation and subgrade excavations;
2. Soil Boring Cuttings; and
3. Sediment collected and removed from erosion and sedimentation control measures.

D. The Contractor shall be responsible for all characterization requirements and submitting all documents to Client for off-site disposal.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01110 – Summary of Work
- B. Section 01330 – Submittal Procedures
- C. Section 01352 – Environmental Protection Procedures
- D. Section 02110 – Waste Removal, Handling, and Storage

1.03 REFERENCES

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- A. The publications listed below are pertinent in whole or part to the Work. The publications are referred to within the text by basic designation only.
  - 1. Code of Federal Regulations (CFR)
    - a. 40 CFR 262: Standards Applicable to Generators of Hazardous Waste
    - b. 49 CFR 172: Tables, Hazardous Material Communication Requirements, and Emergency Response Information Requirements
  - 2. State of Rhode Island and Providence Plantations Department of Environmental Management (RIDEM) Rule and Regulations for Hazardous Waste Management Section 6.0 Transporters.
- B. The Contractor shall comply with all applicable Federal, State, and local requirements regarding transportation and disposal of hazardous and nonhazardous material.

1.04 SUBMITTALS

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- A. The Contractor shall include as a component of the Construction Work Plan (described in Section 01110 – Summary of Work) a description of planned means and methods for staging, characterizing and loading of all waste materials to be removed from the Site by the Client or generated as a component of the Work.

1.05 DEFINITIONS

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- A. Refer to the definitions for classifications of wastes in Section 02110 – Waste Excavation, Removal, and Handling.

1.06 WASTE CONTAINERS

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- A. The Contractor shall provide waste containers specific to the individual waste as described in Section 02110 – Waste Excavation, Removal, and Handling.

1.07 TRANSPORTATION OF WASTES

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- A. The Client shall be responsible for the off-site transportation of all wastes specified per Section 1.01 A.
- B. The Contractor shall be responsible for the off-site transportation of all wastes specified per Section 1.01 B..
- C. The Client shall be responsible for coordinating the number and schedule of vehicles required for off-site transportation of waste materials generated during the execution of the specified work.
- C. The Contractor shall provide the necessary labor and materials to insure all trucks, containers, etc. are lined with plastic prior to filling, as required; foamed or stabilized with an agent, if necessary; and covered prior to departure.
- D. Contractor shall comply with the Rhode Island Diesel Emissions Reduction Act (DERA) when using heavy duty vehicles, as described in Section 01352 – Environmental Protection Procedures.

1.08 DISPOSAL OF WASTES

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- A. The Contractor shall be responsible for the proper disposal of the wastes identified under Section 1.01 B of this Specification as a component of the Work or that are generated during the execution of the Work in conformance with all Federal, State, and local regulations and requirements. Proper disposal requires that the facility accepting the waste be a state licensed disposal/recycling facility that is approved for acceptance of the waste based on the results of the characterization testing and analysis.
- B. The disposal facilities shall be approved by the Engineer/RIDEM prior to the transporting of waste. The Contractor shall not change facilities without prior consent of the Engineer/RIDEM.

PART 2 PRODUCTS

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Not Applicable

PART 3 EXECUTION

Not Applicable

END OF SECTION

SECTION 02221  
SELECT SITE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. 00700 – General Conditions
- B. 02120 – Off-Site Disposal
- C. 02300 - Earthwork

1.2 SUMMARY

A. This Section includes the following:

- 1. Demolition and removal of selected portions of a building or structure.
- 2. Demolition and removal of selected site elements.
- 3. 

**Deleted:** Repair procedures for selective demolition operations.

B. Related Sections include the following:

- 1. 01100 - Summary of Work
- 2. 01500 - Temporary Facilities and Controls
- 3. 01560 – Dust and Odor Control submittal requirements

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Client.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

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1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Engineer and Client. Hazardous materials will be removed by Client under a separate contract.

D. Storage or sale of removed items or materials on-site will not be permitted.

## PART 2 - PRODUCTS

### 2.1 REPAIR MATERIALS

Not Used

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required. Contact Engineer if any discrepancies are identified.

B. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

### 3.2 UTILITY SERVICES

Not Used

### 3.3 PREPARATION

A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Client and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.

3. Protect existing site improvements, appurtenances, and landscaping to remain.

**Deleted:** <#>Hazardous materials will be removed by Client before start of the Work.¶

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**Deleted:** <#>Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.¶

<#>Maintain fire-protection facilities in service during selective demolition operations.¶

**Deleted:** <#>Use repair materials identical to existing materials.¶

<#>If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.¶

<#>Use materials whose installed performance equal or surpasses that of existing materials.¶

<#>Comply with material and installation requirements specified in individual Specification Sections.¶

**Deleted:** <#>Verify that utilities have been disconnected and capped.¶

**Deleted:** <#>When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Engineer.¶

<#>Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.¶

**Deleted:** <#>Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.¶

<#>Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Client and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Client and to authorities having jurisdiction.¶

<#>Provide at least **72 hours** notice to Client if shutdown of service is required during changeover.¶

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- C. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

### 3.4 POLLUTION CONTROLS

- A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
  - 1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

### 3.5 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces.
  - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
  - 4. Maintain adequate ventilation when using cutting torches.
  - 5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  - 6. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  - 7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

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8. Dispose of demolished items and materials promptly.
9. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

B. Removed and Salvaged Items: Comply with the following:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Client.
4. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items: Comply with the following:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Concrete: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.

E. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.

F. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

G. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

### 3.6 REPAIRS

A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.

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3.7 DISPOSAL OF DEMOLITION DEBRIS

A. Burning: Do not burn demolished materials.

B. Disposal: Dispose of demolished materials in accordance with Section 02120 – Off-Site Transportation and Disposal and Section 02300 - Earthwork.

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END OF SECTION

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Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.

Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Client and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Client and to authorities having jurisdiction.

Provide at least **72 hours** notice to Client if shutdown of service is required during changeover.

Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.

**Client** will arrange to shut off indicated utilities when requested by Contractor.

Arrange to shut off indicated utilities with utility companies.

If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.

Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

Utility Requirements: Do not start selective demolition work until utility shut off, disconnecting, removing, sealing or capping have been completed and verified in writing.

SECTION 02231  
CLEARING AND GRUBBING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Clearing includes cutting at the ground surface trees and general woody growth including shrubs, bushes, vines, and general brush.
2. Grubbing includes removal of vegetative cover (grass) with root systems, stumps with root systems, and other organic matter surficial or buried within the top 1 foot of soil (topsoil).

B. Limit of Work:

1. Perform clearing within the Proposed Limit of Tree as shown on the Construction Contract Drawings.
2. Prior to beginning remediation construction, perform grubbing within the limit of grading (as shown through contouring within the Contract Drawings) and additional areas as required to install the construction temporary facilities and controls.

C. Clearing performed outside the defined limit of clearing shall not be permitted without permission of the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02300 – Earthwork
- B. Section 02370 – Erosion and Sedimentation Control

1.03 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Burning of combustible debris is not permitted onsite.

B. Remove and dispose of non-salvageable structures and material in accordance with all applicable local and state laws, ordinances, and code requirements.

## PART 2 – PRODUCTS

### 2.01 MATERIALS

- A. Wrapping materials:
  - 1. Burlap, in accordance with AASHTO M182.
  - 2. Polyethylene film, in accordance with ASTM D 2103.
- B. Herbicides: Used only for treating poison ivy.

## PART 3 – EXECUTION

### 3.01 PROTECTION

- A. Streets, Roads, Adjacent Property, Existing Facilities, and Other Works to Remain:
  - 1. Protect throughout the work and exercise care to avoid unnecessary damage.
  - 2. Clearing and grubbing operations shall be conducted such that existing facilities or structures indicated to remain are not damaged. Existing features or structures that are indicated or made known prior to the start of clearing and grubbing operations shall be repaired in the event of any damage during such operations.
  - 3. Keep streets and roads accessible to emergency vehicles, patrols, and construction vehicles at all times.
- B. Utility Lines:
  - 1. Protect existing utility lines that are indicated to remain from damage.
  - 2. When utility lines to be removed or relocated are encountered within the area of clearing and grubbing operations, the Contractor shall notify the associated utility company in ample time to minimize interruption of the service.
  - 3. The Contractor shall notify the Engineer immediately of damage to or an encounter with an unknown existing utility line.
  - 4. The Contractor shall be responsible for the repairs of damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations.

### 3.02 PERFORMANCE

- A. Layout and Marking:
  - 1. Flag the clearing limit as delineated on the Contract Drawing.
- B. Clearing:

1. Remove trees, shrubs, and brush above the ground surface within the Limit of Clearing.
2. Cleared material may be stockpiled within the Construction Staging/Laydown/Decontamination areas in accordance with Section 02300 Earthwork and the General Notes on Sheet G-002 of the Contract Drawings as shown on the Contract Drawings but outside the capping system boundary.
3. Off-site hauling and disposal of cleared material is the responsibility of the Contractor.

**Deleted:** until off-site disposal is arranged

C. Grubbing:

1. Remove all stumps, roots over 2 inches in diameter, matted roots, and vegetative matter including grasses and weeds within the limit of grading.
2. Grubbings shall be stockpiled and covered if necessary to prevent wind-blown dust until off-site disposal is arranged.
3. Off-site hauling and disposal of grubbed material, including stumps, is the responsibility of the Client. The Contractor shall load all grubbed material for off-site disposal.

D. Disposal:

1. Cleared vegetation shall be considered non-impacted waste and shall be removed from the Site and legally disposed.
2. Grubbed materials are considered impacted wastes unsuitable for on-site disposal and shall be disposed off-site as solid waste to be coordinated and completed by the Client.
3. Burning of Materials: Burning is not permitted.
4. Removal: Should the Contractor be allowed to continue work beyond normal working hours, do not allow material to accumulate for more than 48 hours.

### 3.03 RESTORATION

- A. Restore any items damaged by this work to their original condition.

END OF SECTION

SECTION 02235

SHEET PILING

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Submittals
- B. References
- C. Closeout Submittals
- D. Quality Assurance

1.02 SUBMITTALS:

- A. Specification Section 01330 Submittal Procedures; Requirements for submittals.
- B. Provide design, fabrication, installation, maintenance, and removal of temporary shoring to install the Former Slag Area Cap at the location indicated on the Drawings.
- C. The term "Sheet Piling" is used for simplification. Sheet Piling design may include materials such as wood, metal, or PVC or other containment options such as Aqua Dam® Portadam® or approved equal.
- D. Submit the following information not less than 10 working days (2 weeks) prior to commencing Work.
  - 1. Fabrication drawings.
    - a. Indicate location, details and extent of sheet piling.
    - b. Include complete dimensions and details.
    - c. Include sequence of driving if required and detailed drawings of templates or other temporary guide structures.
    - d. Submit proposed procedures for removing the sheet piling.
    - e. Submit detailed procedures and features for protection of existing structures or other installations.
    - f. Include details of storage and handling procedures.
  - 2. Equipment List. Submit list and size of proposed equipment including cranes, driving equipment, extractors, protection caps, and other installation and removal accessories.
  - 3. Submit material certification, details of sheet piling, mill test reports, piling driving equipment certification and interlocking joint strength test procedure.
  - 4. Operator Certifications.

- E. Geotechnical subsurface information at the site of the proposed installation is not available. For the design, provide geotechnical subsurface data or assumptions on which the design calculations are based.
- F. The Contractor should expect to have to conduct drilling to determine subsurface geotechnical data.
- G. Submit temporary shoring design information, signed and sealed by a professional engineer licensed in the State of Rhode Island, not less than 14 days prior to commencing Work. Said licensed professional shall be experienced in shoring design.
  - 1. Design Calculations.
  - 2. Design Drawings.

1.03 REFERENCES:

- A. ASTM International
  - 1. ASTM A 328/A 328M (2007) Standard Specification for Steel Sheet Piling
  - 2. ASTM D25 – 99 (2005) Standard Specification for Round Timber Piles
- B. Occupational Safety and Health Administration (OSHA)
  - 1. 29 CFR 1926.652 – Requirements for Protective Systems
- C. American Welding Society:
  - 1. AWS D1.1 - Structural Welding Code - Steel.
  - 2. AWS D1.5 - Bridge Welding Code.

1.04 CLOSEOUT SUBMITTALS:

- A. Project Record Documents:
  - 1. Record actual locations of sheet piling and top and bottom elevations, if used.
  - 2. Provide driving records, if conducted.

1.05 QUALITY ASSURANCE:

- A. Perform welding in accordance with AWS D1.1 and AWS D1.5.
- B. Furnish each type of sheet piling from a single source.

## PART 2 - PRODUCTS

### 2.01 SECTION INCLUDES:

- A. Sheet Piling
- B. Fabrication

### 2.02 SHEET PILING:

- A. Sheet piling shall be designed in conformance with all federal, state and local regulations.
- B. General Requirements: Sheet piling shall be installed within the Former Slag Area Cap section as shown in the Drawings.

### 2.03 FABRICATION:

- A. Fabricate sheet piling to full length required for the installation of the Former Slag Area Cap as indicated on Drawings.

## PART 3 - EXECUTION

### 3.01 SECTION INCLUDES:

- A. Preparation
- B. Installation
- C. Removal

### 3.02 PREPARATION:

- A. Verify equipment on site conforms to approved Submittal.
- B. Verify that all underground utilities are located not less than five working days before beginning the Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
  - 2. Notify utility companies to remove or relocate utilities affected by the Work.
  - 3. Protect utilities indicated to remain from damage.
- C. Identify required lines, levels, contours, and datum.
- D. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

- F. Any excavation required within the area where sheet pilings are to be installed shall be completed prior to placing sheet pilings. Pilings properly placed and driven shall be interlocked throughout their length with adjacent pilings to form a continuous diaphragm throughout the length or run of piling wall. Perform in accordance with specification Section 02300 Earthwork

3.03 INSTALLATION:

- A. Installation of the sheet piling shall be done in accordance with manufacturers requirements, current best management practices and engineering direction per the submitted design.

3.04 REMOVAL:

- A. The removal of sheet pilings shall consist of pulling, decontamination, sorting, cleaning the interlocks, inventorying and storing previously installed sheet pilings as shown and directed.

The subsurface soil at the project site may be impacted. After extracting the piles, they shall be cleaned using steam / pressure washers prior to removal from the "Secure Zone as defined in Section 01354 - Decontamination. Follow approved HAZWOPR procedures in Specification Section 01351 - Safety, Health, and Emergency Response Requirements and/or Specification Section 01510 - Temporary Facilities and Controls and/or Specification Section 01354 - Decontamination for decontamination, cleaning, and recovery and disposal of rinsate.

END OF SECTION

## SECTION 02236

### DEWATERING

#### PART 1 – GENERAL

##### 1.1 SECTION INCLUDES:

- A. Submittals
- B. Summary
- C. References
- D. System Description
- E. Performance Requirements
- F. Closeout Submittals
- G. Quality Assurance
- H. Qualifications
- I. Sequencing
- J. Coordination

##### 1.2 SUBMITTALS:

- A. SPECIFICATION SECTION 01330 SUBMITTAL PROCEDURES: Requirements for submittals.
- B. Submit the following information not less than 10 working days (2 calendar weeks) prior to commencing Work.
  - 1. Design Data: Signed and sealed by Professional Engineer licensed in RI.
    - a. Indicate design values, analyses, and calculations to support design.
    - b. Include description and profile of geology, soil, and pond water conditions.
  - 2. Geotechnical subsurface information at the site of the proposed installation is not available.
  - 3. The Contractor should expect to have to conduct drilling to determine subsurface geotechnical data.
  - 4. Shop Drawings: Signed and sealed by Professional Engineer licensed in RI.
    - a. Indicate dewatering system layout, dewatering pump locations, pipe sizes and capacities, grades, filter sand gradations, surface water control devices, valves, and water disposal method and location.
    - b. Indicate primary and standby power system location and capacity.
    - c. Indicate layout and depth of flow measuring devices for system performance measurement.
    - d. Include detailed description of dewatering system installation procedures and maintenance of equipment.
    - e. Include description of emergency procedures to follow when problems arise.
  - 5. Product Data: Submit data for Dewatering Pumps: Indicate sizes, capacities,

priming method, engine motor characteristics.

6. Field Reports: Test and monitoring reports as specified in Field Quality Control article (3.12).

### 1.3 SUMMARY:

- A. Dewatering is necessary to allow construction and installation of the Former Slag Area Cap at the location indicated on the Drawings. The Engineer envisions using surface water pumps to dewater within the sheet piling for the installation of the Former Slag Area Cap down to the edge of water. Further, the Engineer envisions use of a shoring and sheeting system (Specification Section 02235 - Sheet Piling) to reduce the volume of pond water.

### 1.4 REFERENCES:

- A. Not used.

### 1.5 SYSTEM DESCRIPTION:

- A. Provide dewatering and surface water control systems to permit Work to be completed on dry and stable subgrade.
- B. Furnish standby equipment stored at Project Site and ready for immediate use upon failure of dewatering equipment. Provide the following standby equipment, but not less than one of each type:
  1. Dewatering Centrifugal Pumps.
  2. Portable Electric Generators.
  3. Critical hoses, pipes, connections, valves, fittings, or cables that are required for proper operation of equipment.

### 1.6 PERFORMANCE REQUIREMENTS:

- A. Design dewatering systems to:
  1. Collect and remove pond water and seepage entering sheet piling and former slag cap area.

### 1.7 CLOSEOUT SUBMITTALS:

- A. Specification Section 01770 – Project Closeout Requirements: Requirements for submittals.

### 1.8 QUALITY ASSURANCE:

- A. Comply with authorities having jurisdiction for the following:
  1. Water discharge and disposal from pumping operations.

### 1.9 QUALIFICATIONS:

- A. Design, install, and monitor operation of dewatering under direct supervision of Contractor's Professional Engineer experienced in design of this Work and licensed in the State of Rhode Island.

1.10 SEQUENCING:

- A. Specification Section 0110 – Summary of Work: Requirements for sequencing.
- B. Sequence work to obtain required permits before start of dewatering operations.
- C. Sequence work to install and test systems a minimum seven (7) days before operating dewatering systems.

1.11 COORDINATION:

- A. Coordinate work to permit the following construction operations to be completed on dry stable substrate.
  - 1. Shoring as specified in Section 02235 Sheet Piling.
  - 2. All capping system preparation and installation specified in specification Section 02300 Earthwork.

PART 2 – PRODUCTS

2.1 SECTION INCLUDES:

- A. Monitoring Equipment
- B. Accessories

2.2 MONITORING EQUIPMENT:

- A. Flow Measurement: Furnish devices as follows:
  - 1. Flow meter installed to measure flow from entire dewatering system.

2.3 ACCESSORIES:

- A. Valves and Fittings: Furnish valves and fittings to isolate each pump from header pipe and to prevent loss of pump prime.

PART 3 – EXECUTION

3.1 SECTION INCLUDES:

- A. Examination
- B. Preparation
- C. Dewatering System
- E. Surface Water Control System
- E. Dewatering System Operation and Maintenance
- F. Backup Dewatering Requirements
- G. System Removal
- H. Field Quality Control

### 3.2 EXAMINATION:

- A. Verify existing conditions before starting work.
- B. Identify required lines, levels, contours, and datum.
- C. Verify that all underground utilities are located not less than five working days before beginning the Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
  - 2. Notify utility companies to remove or relocate utilities affected by the Work.
  - 3. Protect utilities indicated to remain from damage.

### 3.3 PREPARATION:

- A. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- B. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- C. Protect existing adjacent buildings, structures, and improvements from damage caused by dewatering operations.

### 3.4 DEWATERING SYSTEM:

- A. Install dewatering system in accordance with approved submittals/shop drawings.
- B. Locate system components to allow continuous dewatering operations without interfering with installation of permanent Work and adjacent buildings, structures, and improvements.

### 3.5 SURFACE WATER CONTROL SYSTEM:

- A. Provide ditches, berms, and other devices to divert and drain surface water away from work area.
- B. Divert surface water within work areas into sumps and pump the storm and pond water back into the pond, within the limits of the existing and proposed turbidity curtains.
- C. Control and remove unanticipated water seepage into the work area.

### 3.6 DEWATERING SYSTEM OPERATION AND MAINTENANCE:

- A. Operate dewatering system as needed on a daily basis until cap installation is complete.
- B. Conduct daily observation of dewatering system. Make required repairs and perform scheduled maintenance.
- C. Fill fuel tanks before tanks reach 25 percent capacity.
- D. When dewatering system cannot control water within the area, notify the Engineer and stop work.

- E. Supplement or modify dewatering system and provide other remedial measures to control water within the area.
- F. Modify dewatering and surface water control systems when operation causes or threatens to cause damage to new construction, existing site improvements or adjacent property.
- G. Do not discontinue dewatering operations without the Engineer's approval.

3.9 WATER DISPOSAL:

- A. All pond and storm water removed from the former slag cap area shall be disposed of back into the pond within the existing / proposed turbidity curtain. If pond bottom scour occurs, the Contractor is to provide an anti-scour pad within the discharge area to protect the pond and limit erosion within the turbidity curtain.

3.10 BACKUP DEWATERING REQUIREMENTS:

- A. Backup systems shall be provided to ensure a dry work area at all times during the former slag area cap installation.

3.11 SYSTEM REMOVAL:

- A. Remove dewatering and surface water control systems after dewatering operations are discontinued.

3.12 FIELD QUALITY CONTROL:

- A. Specification Section 01770 – Project Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Submit initial installation reports including the following:
  - 1. Installation and development reports for pumps.
  - 2. Initial dewatering flow rates.
- C. Submit weekly monitoring reports including the following:
  - 1. Dewatering flow rates.
  - 2. Maintenance records for dewatering and surface water control systems.

END OF SECTION

SECTION 02300

EARTHWORK

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall furnish all labor, equipment, and materials necessary for excavation, filling/backfilling, compaction, testing, and grading. The Work shall be as shown on the Drawings, the Shop Drawings, and as specified herein. Work includes, but is not limited to the following:
  - 1. Grading and compacting existing fill to establish subgrade;
  - 2. Placing, grading, and compacting cap soil layers including the following materials:
    - a. Buffer Sand;
    - b. Protective Soil;
    - c. Cover Soil;
    - c. Riprap; and
    - c. Loam.
  - 3. Borrow Source testing, field testing, and contractor quality control testing;
- B. In preparation for earthwork, clearing shall occur in accordance with Section 02231 – Clearing and Grubbing.
- C. Control of surface water run-off during construction shall be in accordance with Section 02370 - Erosion and Sedimentation Control.
- D. Removal of larger waste debris including concrete and metal shall occur in accordance with Sections 02110 – Waste Excavation, Removal, and Handling and Section 02120 – Off-Site Transportation and Disposal.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 00330: Existing Conditions.
- B. Section 01110: Summary of Work.
- C. Section 01330: Submittals Procedures.
- D. Section 02110: Waste Excavation, Removal, and Handling
- E. Section 02120: Off-Site Transportation and Disposal.
- F. Section 02231: Clearing and Grubbing.
- G. Section 02370: Erosion and Sedimentation Control.
- H. Section 02072: Geomembrane.
- I. Section 02073: Nonwoven Geotextile.
- J. Section 02074: Drainage Geocomposite
- K. Section 02921: Seeding and Soil Supplements.

1.03 REFERENCES

- A. The publications listed below form a part of this Specification to the extent referenced. The current version/edition of the publication is referenced, unless otherwise noted. The publications are referred to in the text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM C 33 - Standard Specification for Concrete Aggregates;
  - 2. ASTM C 88 - Standard Test for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate;
  - 3. ASTM C 127 - Test Method for Specific Gravity and Absorption of Coarse Aggregate;

4. ASTM C 136 - Sieve Analysis of Fine and Coarse Aggregates;
  5. ASTM D 422 - Standard Test Method for Particle-Size Analysis of Soils;
  6. ASTM D 535 - Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine;
  7. ASTM D 854 - Test Method for Specific Gravity of Soils;
  8. ASTM D 1140 - Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve;
  9. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>);
  10. ASTM D 2216 - Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soils and Rock by Mass;
  11. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System);
  12. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth);
  13. ASTM D 2974 - Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils;
  14. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock by Nuclear Methods (Shallow Depth);
  15. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction;
  16. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils;
- C. Standards Specifications for Road and Bridge Construction, 2004, by the Rhode Island State Department of Transportation (RIDOT).
- D. "Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases", (Remediation Regulations) by the Rhode Island Department of Environmental Management (RIDEM), Office of Waste Management, as amended February 2004.
- E. Quarried Stone for Erosion and Sediment Control, by the National Stone Association, dated 1978.

#### 1.04 DEFINITIONS

- A. Satisfactory Soils:
1. Satisfactory Soils shall meet the requirements specified in Part 2 of this Section and shall be used in areas as shown on the Drawings, Shop Drawings, and as approved by the Engineer. In addition, Satisfactory Soils shall satisfy the following conditions:
    - a. Satisfactory Soils shall be free of all Unsatisfactory Soils/Materials listed below; and
    - b. Satisfactory Soils shall be free of material greater than 6 inches any direction, unless otherwise specified or approved by the Engineer. Furthermore, the maximum particle size shall not exceed one half of the specified maximum lift thickness, unless otherwise specified.
- B. Unsatisfactory Soils/Materials:
1. Unsatisfactory Soils/Materials include but are not limited to highly plastic/fat silt and clay, organic soils, and/or peat (classified as MH, CH, OL, OH, or PT per ASTM D 2487), stumps/brush, trash, refuse, debris, frozen soils, soils containing materials greater than the allowable size (see above), saturated soils, fine-grained soils above their liquid limit at the time of compaction, and soils that are either too wet or too dry to compact.

- C. Cohesionless and Cohesive Soils:
  1. Cohesionless soils include gravels, sand-gravel mixtures, sands, and gravelly-sands, classified as GW, GP, SW, or SP by the Unified Soil Classification System (ASTM D 2487).
  2. Cohesive soils include clayey gravels, sand-clay mixtures, clayey sands, clays, and silts, classified as GC, SC, CL, CH, ML, or MH by the Unified Soil Classification System (ASTM D 2487).
  3. Soils classified as GM and SM will be identified as cohesionless only when the “fines” are determined to be non-plastic.
  4. Testing required for the classification of soil shall be in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.
- D. Percent Compaction:
  1. Degree of compaction (percent compaction) required is expressed as a percentage of the maximum dry density, at the optimum moisture content.
  2. Maximum dry density and optimum moisture content shall be obtained by the test procedure presented in ASTM D 1557, unless otherwise specified.

1.05 QUALITY ASSURANCE

- A. Codes and Standards:
  1. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

1.06 SUBMITTALS

Submit to the Engineer for approval (unless otherwise specified) the following in accordance with Section 01340, “Submittals”:

- A. Borrow Source(s):
  1. The Contractor shall provide the proposed source(s) of borrow materials prior to initiation of work. Any available/previous geotechnical laboratory testing data shall be provided.
- C. Contractor’s Quality Control Testing Laboratory (QCTL):
  1. The name and qualifications of an independent third-party geotechnical testing laboratory to be used for borrow source testing and field quality control testing shall be submitted within 7 days following notice to proceed.
    - a. The Contractor’s QCTL shall meet the requirements of ASTM D 3740, at a minimum.
- D. Test Reports:
  1. The Contractor’s QCTL shall submit 2 copies of the following test reports directly to the Engineer, with at least 1 copy to the Contractor:
    - a. All test reports for borrow source materials; and
    - b. Field quality control test reports.

1.07 SITE CONDITIONS

- A. Known existing site conditions are described in Section 00330 – Existing Conditions and Subsurface Information.
- B. Protection of Persons and Property:
  1. Barricade and mark open excavations occurring as part of this Work in accordance with applicable standards.
  2. Protect structures, utilities, pavements, sidewalks, fences, and other facilities designated to remain from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations and heavy truck/equipment traffic.

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<u>ADDENDUM 1</u>		<u>6/11/2012</u>

PART 2 - PRODUCTS

2.01 REGRADED FILL

- A. Location/Use:
  - 1. Regraded Fill shall be used as necessary, to achieve the subgrade elevations indicated on the Drawings.
- B. Regraded Fill shall consist of Satisfactory Soils suitable for embankment construction. It shall be free from frozen materials, perishable rubbish, peat, and other Unsatisfactory Soils/Materials. It shall be of such a nature and character that it can be compacted to the specified density (see Part 3 of this Section).
- C. Regraded Fill shall have a maximum nominal particle size of 6 inches or less. Furthermore, the maximum particle size shall not exceed one half of the specified maximum lift thickness, unless otherwise specified.
- D. The moisture content shall be sufficient to provide the required compaction and a stable embankment and/or subgrade. In no case shall the moisture content exceed 3% above optimum as determined by ASTM D 1557.
- E. Satisfactory Soils obtained from on-site excavations of existing fill and/or subgrade preparations may be re-used on-site as Regraded Fill, as approved by the Engineer.

2.02 CRUSHED STONE

- A. Location/Use:
  - 1. Construction Entrance.
- B. Crushed Stone shall consist course aggregate consisting of 100 percent crushed bedrock. It shall not contain crushed or uncrushed gravel and shall be free soft, friable particles or any Unsatisfactory Soils/Material.
- C. Gradation shall meet the requirements of RIDOT Type II Crushed Stone as specified in RIDOT Specification Table 1, Subsection M.01.09 and shown in Table 02300-1.

**Table 02300-1: Crushed Stone Gradation Requirements**

Sieve Size	Percent Passing
2-1/4"	100%
2"	90 – 100%
1-1/2"	30 - 55%
1-1/4"	0 - 25%
1"	0 - 5 %

2.03 BUFFER SAND

- A. Location/Use:
  - 1. Slag Area Cap System.
- B. As defined in RIDOT Specification Subsection M.01.03 for Pervious Fill.
- C. Clean, naturally occurring granular bank run or plant-processed soil materials that shall not contain Unsatisfactory Soil/Materials.
- C. Gradation shall generally meet the requirements of RIDOT Type IV as specified in RIDOT Specification Table 1, Subsection M.01.09 with the following exception:
  - 1. Maximum particle size shall be 1/2 inches.
  - 2. The modified Type IV gradation in Table 02300-2.

**Table 02300-2: Sand Gradation Requirements**

Sieve Size	Percent Passing
1/2"	100%
#4	30 - 100%
#200	0-8%

2.04 RIPRAP

- A. Location/Use:
  - 1. Slag Area Cap Toe Detail;
  - 2. Riprap Apron Replacement.
- B. As defined in RIDOT Specification M.10.03 shall consist of broken stone produced from sound ledge or large boulders with at least three fractured faces on each particle and be free from shale, organic matter, overburden material, and/or other Unsatisfactory Soil/Materials. Rounded stones are not acceptable except at locations approved by the Engineer.
- C. Riprap shall meet the National Stone Association (NSA) gradations for the classifications of riprap (designated by the Modified NSA Numbers) as specified in RIDOT Specification M.10.03 and noted in the Table 02300-3.

**Table 02300-3: Riprap Gradation Requirements**

NSA Modified No.	Sieve Size		
	100% Passing	0-50% Passing	0-15% Passing
Type A	8"	4"	2"

2.05 PROTECTIVE SOIL

- A. Location/Use:
  - 1. Slag Area Cap;
- B. Protective soil shall consist of a minimum 12-inch layer of soil placed directly above the drainage geocomposite layer. The protective soil shall be free of trash, ice, snow, tree stumps, and other organic and deleterious materials. Satisfactory and certified clean material may be used provided it meets the performance criteria stated below. It shall be of such a nature and character that it can be compacted to 95% or greater of the material's maximum dry density (as determined by ASTM D 698) in accordance with Section 3.11 of this Specification. The maximum stone size shall be less than 1 inch. In order to meet filtration, stability, and clogging requirements for contact with the drainage geocomposite layer, the protective soil material shall meet the following gradation, retention, and clogging requirements for contact with the drainage geocomposite:

Gradation/Stability: For soil to be classified as both well graded and stable, it must meet the following criteria:

Well Graded:  $D_{60}/D_{10} > 4$  and

Stable:  $D_{30}^2 / (D_{10} \times D_{60}) < 3$

Where:

$D_{10}$  = the diameter at which 10 percent of the soil is finer

$D_{30}$  = the diameter at which 30 percent of the soil is finer

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Deleted: with a reasonable compaction effort.

$D_{60}$  = the diameter at which 60 percent of the soil is finer

Retention: The ability of the drainage geocomposite geotextile to retain the cover soil can be verified using the following criterion:

$O_{95} / D_{85} < B$

Where: B is a function of coefficient of uniformity ( $D_{60}/D_{10}$ )

$B = 1$   $D_{60}/D_{10} < 2$  or  $> 8$

$B = 0.5 \times D_{60}/D_{10}$   $2 < D_{60}/D_{10} < 4$

$B = 8 / (D_{60}/D_{10})$   $4 < D_{60}/D_{10} < 8$

$B = 1.8$  for silts and clays

$O_{95}$  = the 95 % opening size of the geotextile (in mm)

$D_{85}$  = the diameter at which 85 percent of the soil is finer

Clogging: To minimize particulate clogging:

$O_{95} > 3D_{15}$

Where:

$O_{95}$  = the 95 % opening size of the geotextile (in mm)

$D_{15}$  = the diameter at which 15 percent of the soil is finer

In place of the requirement for clogging, the materials may be analyzed directly for hydraulic performance with the geosynthetic used in the drainage composite by the gradient ratio test (ASTM D 5101).

In place of the three criteria (Gradation/Stability, Retention, and Clogging) specified above, a soil material with a minimum Plasticity Index (PI) of 15 and a maximum stone size of 1-inch will satisfy the Protective Cover requirements.

- D. The moisture content shall be sufficient to provide the required compaction and a stable embankment and/or subgrade. In no case shall the moisture content be 3% above or 1% below optimum, which shall be determined in accordance with ASTM D 1557.
- E. Protective Soil shall meet the Rhode Island Industrial/Commercial Direct Exposure Criteria for Volatile Organic Compounds (VOCs), Semi-Volatile Compounds (SVOCs), Total Metals (RCRA 18), Total Petroleum Hydrocarbons (TPH) as compared to Table 1 of the RIDEM "Remediation Regulations".

## 2.07 LOAM

- A. As defined in Section M.18.02 of the RIDOT Specifications.
- B. Loose, friable topsoil, free of refuse, brush, stumps, roots, rocks, cobbles, stones, noxious weeds, litter and any other materials that are longer than 1 inch in any dimension and which will prevent the formation of a suitable seed bed.
- C. Organic matter shall not constitute less than 4 percent or more than 20 percent as determined by loss-on-ignition testing of oven dried samples.
- D. A pH between 5.5 and 7.5.
- E. Loam shall meet the Rhode Island Industrial/Commercial Direct Exposure Criteria for Volatile Organic Compounds (VOCs), Semi-Volatile Compounds (SVOCs), Total Metals (RCRA 18), Total Petroleum Hydrocarbons (TPH) as compared to Table 1 of the RIDEM "Remediation Regulations".

2.08 COVER SOIL

- A. Location/Use:
  - 1. Upland Soil Cap
- B. Cover Soil shall consist of Satisfactory Soils suitable for embankment construction. It shall be free from frozen materials, perishable rubbish, peat, and other Unsatisfactory Soils/Materials. It shall be of such a nature and character that it can be compacted to the specified density (see Part 3 of this Section).
- C. Cover Soil shall have a maximum nominal particle size of 3 inches or less. Furthermore, the maximum particle size shall not exceed one half of the specified maximum lift thickness, unless otherwise specified. Acceptable materials will be classified as GM, GC, SW, or SP as determined by ASTM D2487.

2.08 BORROW SOURCE TESTING

- A. Borrow source testing, including geotechnical characterization requirements, shall be conducted on all soil materials proposed for construction. Minimum third-party geotechnical laboratory testing requirements and frequency for materials are listed as follows:

1.	Crushed Stone:		
	<u>Test</u>	<u>Methodology</u> <sup>1</sup>	<u>Frequency</u> <sup>2</sup>
	Sieve Analysis	ASTM C 136	1 test/source/material
2.	Buffer Sand:		
	<u>Test</u>	<u>Methodology</u> <sup>1</sup>	<u>Frequency</u> <sup>2</sup>
	Particle-Size Analysis (to #200 Sieve)	ASTM D 422	1 test/source/material
	Modified Proctor	ASTM D 1557	1 test/source/material
3.	Riprap:		
	<u>Test</u>	<u>Methodology</u> <sup>1</sup>	<u>Frequency</u> <sup>2</sup>
	Sieve Analysis	ASTM C 136	1 test/source/material
:			
5.	Protective Soil		
	<u>Test</u>	<u>Methodology</u> <sup>1</sup>	<u>Frequency</u> <sup>2</sup>
	Particle-Size Analysis (to #200 Sieve)	ASTM D 422	1 test/500 cy
	Modified Proctor	ASTM D 1557	1 test/source/material
	VOCs	EPA 8250B	1 test/500 cy
	SVOCs	EPA 8270C	1 test/500 cy
	TPH	EPA 8100M	1 test/500 cy
	RCRA Metals (total only)	EPA 6010B	1 test/500 cy
6.	Loam		
	<u>Test</u>	<u>Methodology</u> <sup>1</sup>	<u>Frequency</u> <sup>2</sup>
	Particle-Size Analysis (to #200 Sieve)	ASTM D 422	1 test/500 cy
	Organic Content	ASTM D 2974	1 test/500 cy
	pH	ASTM D 4972	1 test/500 cy
	VOCs	EPA 8250B	1 test/500 cy
	SVOCs	EPA 8270C	1 test/500 cy
	TPH	EPA 8100M	1 test/500 cy
	RCRA Metals		

	(total only)	EPA 6010B	1 test/500 cy
7.	Cover Soil		
	<u>Test</u>	<u>Methodology</u> <sup>1</sup>	<u>Frequency</u> <sup>2</sup>
	Particle-Size Analysis (to #200 Sieve)	ASTM D 422	1 test/500 cy
	Modified Proctor	ASTM D 1557	1 test/source/material
	VOCs	EPA 8250B	1 test/500 cy
	SVOCs	EPA 8270C	1 test/500 cy
	TPH	EPA 8100M	1 test/500 cy
	RCRA Metals (total only)	EPA 6010B	1 test/500 cy

Borrow Source Testing Notes:

1. Other testing methods may be considered acceptable, based on prior approval of the Engineer.
2. Testing frequency shall be as listed, at any change in borrow source, or at any discernable change in material delivered to the site (as determined by the Engineer).

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which excavating, filling, and grading are to be performed and notify the Engineer, in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

3.02 EXCAVATION DEWATERING

A. General:

1. ~~Dewatering shall be completed as required and in accordance with Section 02370.~~

**Deleted:** Dewatering to be provided per Specification 02236 - Dewatering

**Deleted:** . 3. See Construction Drawings for dewatering location.

3.03 STABILITY OF EXCAVATIONS

A. General:

1. Slope sides of excavations to comply with applicable codes and ordinances.
  - a. Shore and brace excavations where sloping is not possible because of space restrictions or stability of material excavated.
2. Maintain excavations in a safe condition until completion of backfilling, or longer if specified or directed by the Engineer.

B. Shoring, Sheeting, and Bracing:

1. ~~Shoring is not anticipated.~~

**Deleted:** Shoring to be provided per Specification 02235 - Sheet Piling

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3.04 COLD WEATHER PROTECTION

- A. Protect exposed subgrade surfaces against freezing when atmospheric temperature is less than 35°F.
- B. Fill materials shall not be placed atop frozen subgrade surfaces.

3.05 EXCAVATION

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- A. General:
  - 1. Excavation consists of removal of material encountered when establishing required subgrade.
  - 2. During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times.
- B. Subgrade Excavation:
  - 1. Any large, concrete or metal debris encountered during excavation shall be removed from the Site as described in Section 02221 – Select Site Demolition.
  - 2. Establish grades within a maximum 33.33 percent (3 horizontal (H) to 1 vertical (V)) and a minimum 5.00 percent (20H to 1V).
  - 3. Conform to grades within a tolerance of one inch deviation over 50 feet of slope. This relates to an allowable minimum slope of 4.83 percent (20.69H to 1V) and an allowable maximum slope of 33.51 percent (2.98H to 1V).

### 3.06 SUBGRADE PREPARATION

- A. General:
  - 1. Remove vegetation, debris, Unsatisfactory Soils/Materials, obstructions, and deleterious materials from subgrade surfaces prior to placement of fills.
  - 2. Bench, plow, strip, scarify, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
- B. Regraded Fill Placement
  - 1. Regraded Fill soil shall be obtained from cut areas within the limit of disturbance.
  - 2. Regraded Fill shall be placed in areas where fill is required to achieve subgrade elevations.
  - 3. Regraded Fill shall be placed in compacted lifts no greater than 12 inches in depth.
  - 4. Compaction of Regraded Fill shall be as specified in Sub-Part 3.11
  - 5. Prior to placing Regraded Fill the surface shall be relatively smooth/even, free of loose soil, ponded water, and debris. Any loose, soft, wet, frozen, or otherwise unsuitable/unsatisfactory soils or materials observed should either be re-compacted or undercut to a suitable subgrade, as approved by the Engineer.
  - 6. Any undercut/excavated material should be replaced/backfilled with Regraded Fill or Cover Soil, as approved by the Engineer.
    - a. Fill materials shall be placed and compacted as specified herein.
  - 7. Prior to placing Regraded Fill the exposed subgrade shall be benched, plowed, or scarified such that fill material will bond with existing subgrade surface.
    - a. Limit extent of disturbance, as indicated on the Construction Drawings and/or approved by the Engineer.
  - 8. All material within the Former Slag Area Cap boundary is to remain within the Former Slag Area Cap boundary. Materials may be brought and consolidated from other areas within the site to the Former Slag Area Cap.

### 3.07 HANDLING AND TEMPORARY ON-SITE STORAGE OF EXCAVATED MATERIALS

- A. General:
  - 1. During daily excavation activities, locate and retain excavated soils/materials away from the edge of excavations.
    - a. Temporary/daily stockpiles shall be maintained a sufficient distance from the top of the riverbank to prevent loading of the slope and to provide for stability of the slope.
- B. Satisfactory Soils:

1. Satisfactory Soils obtained from on-site excavations and/or subgrade preparations shall be re-used as Regraded Fill, and used insofar as practical for backfill within the cap limits to establish subgrade, as specified herein.
    - a. Satisfactory Soils and/or Regraded Fill shall have a maximum nominal particle size of 6 inches. Furthermore, the maximum particle size shall not exceed ½ of the specified maximum lift thickness, unless otherwise specified.
  2. Excess amounts of Satisfactory Soils shall be stockpiled and staged within the proposed limits of the capping system, and as approved by Client and the Engineer.
    - a. Stockpiles shall be constructed in accordance with Section 02110 - Waste Excavation, Removal, and Handling.
    - b. Soils suspected to be hazardous waste based on visual examination shall be segregated from those suspected to be non-hazardous.
      - 1) Final determination of hazardous versus non-hazardous shall be based on sampling, analysis, and characterization.
- C. Unsatisfactory Soils/Materials:
1. Unsatisfactory Soils/Materials obtained from on-site excavations and/or subgrade preparations that can be improved or modified (i.e., thawed, screened, and/or moisture-conditioned) to meet the definition of Satisfactory Soils may be re-used as Subgrade Fill, as approved by the Engineer.
  2. Unsatisfactory Soils/Materials that cannot be improved or modified to meet the definition of Satisfactory Soils shall be transported to the designated Waste Staging and Storage Area as shown on the Drawings, and as approved by Client and the Engineer.
    - a. Stockpiles shall be constructed in accordance with Section 02110 - Waste Excavation, Removal, and Handling.
    - b. Soils suspected to be hazardous waste based on visual examination shall be segregated from those suspected to be non-hazardous.
      - 1) Final determination of hazardous versus non-hazardous shall be based on sampling, analysis, and characterization.

### 3.08 SAMPLING, ANALYSIS, AND CHARACTERIZATION

- A. Shall be coordinated per Section 02120 – Off-Site Transportation and Disposal

### 3.09 TRANSPORTATION AND DISPOSAL

- A. Excess Satisfactory Soils:
  1. Transportation and/or disposal shall be in accordance with Section 02120 – Off-Site Transportation and Disposal.
- B. Unsatisfactory Soils/Materials:
  1. Transportation and/or disposal shall be in accordance with Section 02120 – Off-Site Transportation and Disposal.

### 3.10 PLACEMENT OF FILL/BACKFILL MATERIALS

- A. General:
  1. Place specified fill/backfill materials in lifts as specified herein as required to achieve specified subgrade elevations.
  2. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
  3. Backfill excavations as promptly as work permits, but not until completion of the following:

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- a. Acceptance by Engineer of construction below finish grade.
  - b. Inspection, testing, approval, and recording locations of underground utilities.
  - c. Removal of trash and debris.
- B. Fill/Backfill Placement:
- 1. Place fill/backfill materials in layers not more than 12 inches (prior to compaction) for material to be compacted by heavy compaction equipment (i.e., vibratory roller), unless otherwise specified.
  - 2. Place fill/backfill materials in layers not more than 8 inches (prior to compaction) for material to be compacted by hand-operated tampers or hydraulic equipment, unless otherwise specified.
  - 3. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density (Sub-Part 3.11).
  - 4. Place fill/backfill materials evenly around/adjacent to structures, to the required elevations.
    - a. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.
  - 5. Do not backfill anchor trenches until authorized by the Engineer.
    - a. Use care in backfilling to avoid damage or displacement of the geosynthetics.

3.11 COMPACTION

- A. General:
  - 1. Provide soil compaction during construction as necessary to achieve minimum percent/degree of compaction, as specified herein.
  - 2. Maximum dry density and optimum moisture content shall be determined in accordance with ASTM D 1557 (or Engineer-approved equivalent).
- B. Percent Compaction Requirements:
  - 1. Foundations and/or Pre-Cast Structures:
    - a. Fill/backfill materials placed beneath or adjacent to foundations or pre-cast structures shall be compacted to at least 95% of maximum Standard Proctor dry density, unless otherwise specified or approved by the Engineer.
  - 2. Pavement Areas:
    - a. Fill/backfill materials placed beneath areas to be surfaced with asphaltic concrete pavement shall be compacted to at least 95% of maximum Standard Proctor dry density, unless otherwise specified or approved by the Engineer.
  - 3. Cap Areas:
    - a. Fill/backfill materials shall be compacted to at least 95% of maximum Standard Proctor dry density, unless otherwise specified or approved by the Engineer.
  - 4. Pipe/Conduit Trenches:
    - a. Compact pipe/conduit bedding (Sand) and each layer of backfill (Sand) to six (6) inches over the pipe to at least 95% of maximum Standard Proctor dry density.
    - b. Backfill placed above 6 inches over the pipe shall be compacted in accordance with the applicable surface treatment, as shown on the Drawings and as specified above.

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C. Moisture Control:

1. Where the subgrade or a layer of fill/backfill must be moisture-conditioned before compaction, uniformly apply water to the surface, in proper quantities to prevent free water appearing on surface during or subsequent to compaction operations.
2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled as specified herein or spread and allowed to dry. Assist drying by dicing, harrowing, or pulverizing until moisture content is reduced to a satisfactory level.

3.12 GRADING

A. General:

1. The Contractor shall uniformly grade areas within the Limits of Disturbance. Smooth finished surface within specified tolerances, with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
2. Establish grades within a maximum 33.33 percent (3 horizontal (H) to 1 vertical (V)) and a minimum 5.00 percent (20H to 1V). Select areas at Cap Toe and upslope of the existing Stormwater Detention Basin outfall may be as steep as 50 percent (2H:1V), however, the extent of the areas shall be minimized.
3. Conform to grades within a tolerance of one inch deviation over 50 feet of slope. This relates to an allowable minimum slope of 4.83 percent (20.69H to 1V) and an allowable maximum slope of 33.51 percent (2.98H to 1V). For the 50 percent (2H:1V) slope areas, a maximum slope of 50.17 percent (1.99H to 1V) is allowable.
4. Subgrade elevations shall be met using available on-site Satisfactory Soil to the extent practical. Excess material shall be placed within the cap limits in areas with subgrade slopes flatter than the maximum allowable condition resulting in elevations above those depicted on the Subgrade Drawings. Areas with insufficient quantities of Satisfactory Soil to achieve the defined subgrade elevations shall be graded flatter than the maximum allowable condition but steeper than the minimum allowable condition. Off-site soil shall not be imported to achieve the defined subgrade elevations shown on the Drawings.

3.13 VEGETATION STABILIZATION

- A. Refer to Section 02921 – Seeding and Soil Supplements.
- B. Refer to Section 02370 – Erosion and Sedimentation Control.

3.14 FIELD QUALITY CONTROL TESTING

A. Quality Control Testing During Construction:

1. Allow testing service to examine and test subgrade surfaces and fill/backfill layers. Before further construction work is performed, test results meeting the requirements of Sub-Part 3.11 of this Section shall be obtained.
2. Perform field density tests in accordance with ASTM D2922 (nuclear method), or other Engineer approved methods, as applicable.

- a. Foundations and/or Pre-Cast Structures:
    - 1) For each layer of fill/backfill placed, conduct 1 compaction test for every 100 linear feet of foundation/structure, but in no case less than 3 tests.
    - 2) Exception: 1 test is acceptable for each layer of backfill around pre-cast below-grade vault structures.
  - b. Pavement Areas:
    - 1) For each layer of fill/backfill placed, conduct at least 1 compaction test for every 1000 square feet, but in no case less than 3 tests per lift.
  - c. Cap Areas:
    - 1) For each layer of fill placed, conduct at least 1 compaction test for every 4,000 square feet, but in no case less than 3 tests per lift.
    - 2) For every 4,000 square feet of cover soils placed, conduct at least 1 thickness test. Additional fill shall be placed in areas that do not meet minimum thickness requirements.
  - d. Pipe/Conduit Trenches:
    - 1) For each layer of fill placed, conduct at least 1 compaction test for every 100 linear feet of trench.
  - e. Anchor Trenches:
    - 1) For each layer of fill placed, conduct at least 1 compaction test for every 100 linear feet of trench.
3. If in opinion of Engineer, based on testing service reports and inspection, subgrade soils or fill/backfill materials which have been placed are below specified density, the Contractor shall provide additional compaction and testing at no additional expense to the Client.

### 3.15 MAINTENANCE

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

END OF SECTION

## SECTION 02370

### EROSION AND SEDIMENTATION CONTROL

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. Work Included: At a minimum provide and install all materials, equipment, and labor necessary for the removal of stormwater runoff/surface water and to install erosion and sedimentation control measures in accordance with the applicable erosion and sediment control regulatory requirements and standards, as shown on the Contract Drawings and specified herein. Depending on actual conditions encountered, additional erosion and sediment controls measures shall be implemented by the Contractor to ensure compliance with all applicable regulations. At the completion of the construction, provide all materials, equipment, and labor necessary for the removal, transport and disposal of temporary erosion and sediment control structures not specified to remain. Downgradient from disturbed areas, remove, transport, and dispose of sediment resulting from erosion control measures in a manner consistent with overall intent of this specification and which does not result in additional erosion.
- B. Provide and install all erosion and sediment control measures in accordance with the applicable erosion and sediment control regulatory requirements, standards and specifications and as required by field conditions during the execution of the Work. Conducting the Work in accordance with the control measures shown on the Construction Contract Drawings does not relieve the Contractor of responsibility for completing the Work in a manner that minimizes erosion when field conditions occur that require additional or different measures.
- C. Temporary erosion and sediment control measures shall be installed as the first step in construction, shall be continuously maintained, and shall not be removed until permanent surface stabilization of all disturbed areas is to the Engineer's satisfaction.
- D. Permanent controls or surface stabilization shall commence within 7 calendar days of completion of filling and grading activities. Areas which are not to final grade but will not be reworked for 21 days must be temporarily seeded and mulched within 14 calendar days.
- E. Not all erosion and sedimentation control measures described in this specification are shown or referenced on the Construction Contract Drawings. Other measures as described and specified herein may be used to augment the proposed measures referenced on the Construction Contract Drawings based on actual field conditions encountered.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01110 – Summary of Work.
- B. Section 01330 – Submittal Procedures.
- C. Section 01352 – Environmental Protection Procedures.

D. Section 02300 – Earthwork.

### 1.03 REFERENCES AND GUIDELINES

- A. Rhode Island Soil Erosion and Sediment Control Handbook (RISESCH), 1989 by the Rhode Island Department of Environmental Management, USDA-Natural Resources Conservation Service (formerly the Soil Conservation Service), and Rhode Island State Conservation Committee.
- B. Rhode Island Stormwater Design and Installation Standards Manual, December 2010 by the RIDEM and Coastal Resources Management Council.

### 1.04 REVIEW AND/OR INSPECTION OF SEDIMENTATION CONTROL MEASURES

All construction under this project shall be subject to review and/or inspection by the appropriate local, State, and Federal agencies responsible for ensuring the adequacy of sedimentation control measures.

### 1.05 SUBMITTALS

- A. The Engineer will prepare a Stormwater Pollution Prevention Plan (SWPPP) prior to construction activities.
- B. The Contractor shall include a description of their proposed means and methods to control erosion and sedimentation in the Construction Work Plan to be submitted per the requirements of Section 01110 – Summary of Work.
- C. The Contractor shall submit to the Engineer the following information:
  - 1. Manufacturer’s data for products
  - 2. Data for materials incorporated into the Work.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Silt Fence:
  - 1. Fabric – Silt fence geotextile shall meet the following properties:

<u>Fabric Properties</u>	<u>Minimum Value</u>	<u>Test Method</u>
Grab Tensile Strength (lbs)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682
Mullen Burst Strength (psi)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751
Slurry Flow Rate (gal/min/sf)	0.3	---
Equivalent Opening Size	40-80	US Standard Sieve
Ultraviolet Stability (%)	90	ASTM G26

2. Fence Posts – The length shall be a minimum of 54 inches long. Wood posts will be of sound quality hardwood with a cross sectional area of 3.0 square inches.
  3. Wire fence for reinforced silt fence (fabricated units) – Wire fencing shall be a minimum 14-1/2 gauge with a maximum 6 inch mesh opening.
  4. Prefabricated reinforced silt fence – Envirofence or approved equal may be used for reinforced silt fence in lieu of reinforced fence fabricated with wire fence.
- B. Mulch: For protection of newly seeded areas where erosion control blanket is not used.
1. Straw or hay free from primary noxious weed seeds and rough or woody materials and having not more than 15% moisture content. Provide hay or straw meeting the requirements of Chapter 5 of the RISESCH.
  2. Wood chips used for mulch or erosion control shall not exceed 3 inches in the greatest dimension and shall meet the requirements of Chapter 5 of the RISESCH.
  3. Wood fiber for use as mulch in conjunction with establishment of vegetation, shall meet the requirements of Chapter 5 of the RISESCH.
- C. Hay Bales: Hay bales shall consist of rectangular-shaped bales of hay or straw weighing approximately 40 pounds per bale and shall be free from primary noxious weed seeds and rough or woody materials.
- D. Temporary Protective Sheeting: Temporary sheeting material shall consist of minimum 6-mil polyethylene sheeting or a suitable approved alternative and of sufficient size to minimize seams.
- E. Seed for Erosion Control:
1. Temporary Control: Annual or perennial ryegrass or winter rye (cereal rye). Use winter rye if seeding in October or later.
- F. Erosion Control Matting: For protection of slopes greater than 10H:1V. Rolled erosion control product (RECP) shall be 100 percent biodegradable manufactured from long lasting natural fibers mechanically attached to or woven into two (2) continuous biodegradable netting structures. The RECP shall meet the following performance criteria:
1. Under the installed conditions of an unvegetated, maximum 80 foot long 3:1 slope consisting of sandy loam, soil loss shall be restricted to under 0.25 inches at the bottom 10 percent of the slope.
  2. Functional longevity shall be a minimum of 24 months.
  3. North American Green C125BN or approved equal may be used.
- G. Erosion Control Matting Staples: Provide manufacturer recommended number and size to accommodate the application. In general, provide “U” shaped 11 gauge wire staples with a minimum top width of 1 inch and minimum length of 6 inches.
- H. Construction Entrance: provide a construction entrance at all ingress and egress points within the work area per Detail 3 on Sheet C-501 of the Construction Drawings.

- I. Filter Fabric Basin for Pumped Dewatering Discharge: provide a temporary filter fabric basin into which discharge from excavation dewatering liquid is discharged in conformance with RISESCH Section Q if dewatering is required. ▼
- J. Scour Pad: provide a scour pad in conformance with RISESCH Section Q if conditions warrant and/or required by the Engineer.

**Deleted:** Turbidity Curtain: provide a turbidity curtain in conformance with the Construction Drawings. All submittals shall be submitted to the Engineer for review prior to installation of the control measure.

### PART 3 - EXECUTION

#### 3.01 PERFORMANCE

- A. It is the Contractor's responsibility to implement and maintain erosion and sedimentation control measures which effectively prevent accelerated erosion and sedimentation.
- B. Earth moving activities shall be conducted in such a manner as to prevent accelerated erosion and sedimentation.
- C. Land disturbance shall be kept to a minimum. Stabilization activities shall be scheduled immediately after any disturbance
- D. Diverting Surface Water:
  - 1. Build, maintain, and operate any temporary berms, swales, channels, flumes, sumps, and other temporary diversion and protection works needed to divert surface water through or around the work area and away from Work until surface stabilization has occurred.
  - 2. Storm runoff from disturbed areas must discharge through temporary erosion control measures shown on the Contract Drawings prior to discharge from the Site.
- E. Erosion Control Provisions (as necessary):
  - 1. Protect areas where existing banks are to be disturbed by constructing straw/hay bale or earth dikes at the top of slope to divert storm runoff from the disturbed area or at the toe of the slope to retain sediments, as conditions permit.
  - 2. All discharge from any necessary pumping operations during dewatering operations shall be conveyed back into the Pond within the protection of the turbidity curtain.
  - 3. Prior to removal of sediment barriers, remove retained silt or other materials at no additional cost to the Contract.
- F. Silt Fence: Install silt fence if required as a supplementary measure. The silt fence shall be installed on a level line (parallel to contours) to avoid concentrated flow areas along the fence. The area below the fence must be undisturbed or stabilized.
- G. Temporary Protective Sheeting: Soil stockpiles shall be protected with sheeting prior to forecasted significant rain events (0.5 inches or more) or as conditions require based on observed slope conditions. Overlap adjacent sheets by a minimum of 12 inches and securely anchor sheeting with sand bags and/or soil pegs, staples or stakes.
- I. Mulch: Conduct mulching immediately following seeding. For the mulching type used, apply mulch materials at the rate specified in RISESCH.
- J. Seed for Erosion Control:

1. Temporary Seeding: Minimum application rate of ryegrass (annual or perennial) shall be 60 pounds per acre and minimum application rate for winter rye shall be 100 pounds per acre.

### 3.02 MAINTENANCE

- A. The Contractor shall be held responsible for the implementation and maintenance of all erosion control measures on the Site.
- B. Throughout construction and until the Site has been stabilized upon completion of the Work, all erosion and sediment control measures will require periodic inspection and maintenance to ensure that such measures are providing effective service. At a minimum, the following inspection and maintenance shall be required during execution of this project:
  1. All erosion and sediment control will be inspected at least once a week and after all rain events. Conduct required repairs to installed measures immediately to ensure continued effective operation.
  2. Remove sediment that has accumulated in the filter bag of any installed catch basin inlet filters when it has reached the capacity limit recommended by the manufacturer.
  3. Remove sediment that has accumulated behind the sedimentation fencing when it has reached a depth of approximately ½ the height of the barrier or remove as needed when bulges develop in the fence. The sedimentation fence shall be repaired as necessary to maintain the barrier as intended.
  4. Sediment removed from control measures shall be collected and segregated as waste to be characterized, and properly disposed of off-site. No sediment shall be disposed of on-site.
  5. All seeded areas will be protected from traffic and shall receive appropriate watering during germination and growth establishment. Areas that do not establish a vigorous, dense vegetative cover (at least 70% surface coverage) shall be reseeded and mulched.
- C. Maintain the integrity of all erosion control measures throughout construction period.

### 3.03 SPECIAL CONDITIONS

- A. Prohibited Construction Practices - Prohibited construction practices include but shall not be limited to the following:
  1. Dumping of spoil material into any stream corridor, any wetlands, any surface waters, stormdrain system, or at any other unspecified locations.
  2. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridors, any wetlands or any surface waters.
  3. Pumping of silt-laden water from trenches or other excavations into any surface waters, any stream corridors, any wetlands, or any stormdrain system.

4. Disposal of trees, brush and other debris in any stream corridors, any wetlands, any surface water or at unspecified locations.
  5. Permanent or unspecified alteration of the flow line of any stream.
  6. Open burning of construction debris.
- B. Winter Stabilization – Beyond October 1, (when temporary seeding is not likely to germinate) mulch shall be used as a temporary soil stabilization measure.
1. Applicability and method to be approved by the Engineer.

#### 3.04 ADJUSTMENT OF PRACTICES

- A. If the planned measures do not result in effective control of erosion and sediment runoff to the satisfaction of the Engineer or regulatory agencies having jurisdiction over the project, the Contractor shall immediately adjust their program and/or institute additional measures so as to eliminate excessive erosion and sediment runoff.
- B. If the Contractor fails or refuses to comply promptly, the Client may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor.

#### 3.05 REMOVAL OF TEMPORARY WORKS

- A. Remove or level and grade to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

END OF SECTION

## SECTION 02522

### GROUNDWATER MONITORING WELLS

#### PART 1 – GENERAL

##### 1.01 DESCRIPTION

- A. The Contractor shall provide all necessary personnel, equipment, and materials required to perform drilling, well installation, and well development services associated with the remedial action at the Former Gorham Manufacturing Plant located in Providence, Rhode Island for the purpose of:
  - 1. Completing two (2) groundwater monitoring wells to an approximate depth of 20 feet below ground surface.
- B. The Contractor shall obtain approval for the well locations from the Engineer prior to drilling.
- C. The wells should be installed in accordance with American Society for Testing and Materials (ASTM), the United States Environmental Protection Agency (USEPA), The Rhode Island Department of Environmental Management (RIDEM), and generally accepted industry standards and requirements for well installation.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01330 – Submittal Procedures.
- B. Section 02110 – Waste Removal, Handling, and Storage.
- C. Section 02120 – Off-Site Transportation and Disposal.

##### 1.03 REFERENCES

- A. American Petroleum Institute (API)
  - 1. API Specification 13A (2008) Specification for Drilling-Fluid Materials, Seventeenth Edition.
- B. American National Standards Institute (ANSI)
  - 1. ANSI/ASME B 1.20.1-1983 (R2006) Pipe Threads, General Purpose (Inch)

- C. American Society for Testing and Materials (ASTM):
1. ASTM A 312 / A 312M (2009) Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
  2. ASTM A 403 / A 403M (2010a). Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings.
  3. ASTM A 778-01 (2009e1) Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products.
  4. ASTM D 422 (1998) Standard Test Method for Particle-Size Analysis of Soils.
  5. ASTM D 1785 (2006) Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedule 40, 80, and 120.
- D. American Water Works Association
1. AWWA C206-11, AWWA Standard for Field Welding of Steel Water Pipe.

#### 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01330 – Submittal Procedures:
1. Statements:
    - a. Groundwater monitoring well borehole drilling and well installation methodology;
    - b. Water treatment plan and justification;
    - c. The type and size of drilling and sampling equipment to be used at each location;
    - d. Recommended material for well housing and justification;
    - e. Number of personnel to be deployed during the work and the proposed schedule/logistics for completing the work.
- B. Field Test Reports:
1. Submit the following field test reports:
    - a. Written assurance each well meets the requirements specified herein for materials, depths, plumbness and alignment.
    - b. Drilling records including casings, cement-bentonite grout, well screens, penetration, and filter pack.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver screen, casing, and all materials in an undamaged condition. Materials must be approved by the Engineer prior to use. Store materials off the ground to provide protection against oxidation caused by ground contact. Replace defective or damaged materials with new materials.

## 1.06 SITE MAINTENANCE

- A. The site will be maintained in a neat and orderly condition, free from trash and waste construction materials at all times. Unattended construction materials, equipment, and trash shall be left in a manner such that they do not constitute fire hazards, or become or cause nuisance or danger due to forces of nature, such as rain or wind. All vehicles shall be loaded in a manner which shall prevent spillage, dripping, or loss of materials and debris.
- B. Provide, maintain, and remove upon completion of work all temporary rigging, scaffolding, hoisting, equipment, barricades, ladders, fences, staging, treatment, containment, decontamination, and all other temporary facilities. All temporary facilities shall conform to the requirements of the Engineer, and Federal, State, and local authorities.

## 1.07 NUISANCE WATER

- A. Nuisance water, such as rain or snow fall or surface water run-off may be encountered within the work site during the period of performance. Precautions shall be taken to assure that potentially contaminated soil and surface waters do not enter the boreholes or migrate away from the work area. Work shall be protected from damage by such waters, and measures to prevent delays in progress of work caused by such water shall be undertaken at all times.

## PART 2 – PRODUCTS

### 2.01 EQUIPMENT, MATERIAL, TOOLS, CONTAINERS

- A. Equipment, materials and tools shall conform to the respective specifications and other requirements as specified herein.
  - 1. Overburden Monitoring Well
    - a. Drill Rig and Tools: to be used for completion of two, six-inch borehole for installation of the overburden monitoring well referenced in Sub-Part 1.01.A.1 shall be capable of reaching depths of at least 20 feet. Drill rig and tools that are not adequate, in the opinion of the Engineer, will not be permitted. The drill rig and chosen methods shall be capable of creating sufficient annular space to install the monitoring well as shown on the Construction Contract Drawings and as directed by the Engineer.
- B. Well Materials:
  - 1. Overburden Monitoring Well:
    - a. Monitoring well riser and well screen shall be flush-threaded 2-inch diameter, Schedule 40 PVC.
    - b. Well screens shall be machine-slotted 0.010-inch screen openings and shall be assembled in five-foot sections.

C. Filter Pack and Grout:

1. Overburden Monitoring Well:

- a. Filter pack shall be placed around the well screens, extending a minimum of two feet above the top of the screen slots or to a depth specified by the Engineer. The Contractor shall supply the particle size and uniformity specifications of the filter pack prior to mobilization and the filter pack shall be reviewed and approved by the Engineer prior to placement.
- b. Bentonite chips or pellets shall fill the annular space above the filter pack for a 2-foot depth. The bentonite shall be hydrated if placed above the water table.
- c. Cement/bentonite grout shall fill the annular space above the bentonite chip/pellet layer to the bottom of the crushed stone base of the stick-up well cover. Provide neat cement grout, Type I or II Portland cement conforming to ASTM C 150, and water. The mixed grout shall contain no more than 7 gallons of water per bag (1.0 cubic foot or 94 pounds) of cement. Add commercially available bentonite designed for well sealing. Mixture to be 20 parts cement and 1 part bentonite. The method of grout placement shall be reviewed by the Engineer. If grout is placed below the water table it shall be tremied to the desired depth.

D. Protective Well Covers:

1. Overburden Monitoring Wells:

- a. Provide a removable, water-tight expansion well cap to seal the top of each monitoring well riser.
- b. Provide protective steel casing set a minimum of 2 feet below grade and 2 feet above grade.
- c. Set protective casing in-place with a concrete seal. The space between the protective casing and the well riser shall be partially filled with stone as shown on the Construction Contract Drawings.
- d. Provide a 12-inch diameter lockable steel well cover.

E. Identification Tags:

1. Monitoring Wells:

- a. Provide durable weather-resistant well identification tags with legible well identification numbers on each new well (2).
- b. Attach tags at least 24 inches above ground level using one of the following methods:
  - i. Strap the tag to the well casing using stainless steel bands or large hose clamps designed for exterior applications.
  - ii. Strap the tag to the well casing using ultra violet resistant nylon straps designed for exterior applications.

- iii. Rivet or bolt the tag to the well casing using stainless steel rivets or bolts.

F. Locks and Keys:

1. Monitoring Wells:

- a. Provide durable weather-resistant exterior grade padlocks for each (2 total) new well cover. Style of padlock shall be inset flush with the top of the cover.
- b. A minimum of two (2) sets of keys shall be provided to the Client.

2.02 QUALITY CONTROL

- A. Well materials shall be new and undamaged and where possible factory cleaned and wrapped. Materials which are damaged or determined to be not in accordance with desired specifications will be rejected. Equipment and materials will be decontaminated and stored in a fashion that will adequately protect them from contamination or degradation.

PART 3 – EXECUTION

3.01 BORING LOGS

- A. During the progress of each boring, the Contractor shall keep a continuous and accurate log of drilling technique, sample blow counts, downhole equipment, and materials used.
- B. Data to be provided:
  - 1. Names of driller and inspector.
  - 2. Dates and times of beginning and completion of work.
  - 3. Identifying number and location of boring.
  - 4. Diameter and description of drilling equipment.
  - 5. Total length and size of drilling equipment and/or casing.
  - 6. Length of drilling equipment or casing extending below ground surface at the completion of the boring.
  - 7. Depth to top of each different material penetrated, as noted by drilling performance or observation of drill cuttings.
  - 8. Depth to water surface in borehole at completion and at end of each major work stoppage.
  - 9. Loss or gain of drilling water or mud if used during the advancement of the borings to install the monitoring wells.
  - 10. Any sudden dropping of drill rods or other abnormal behavior.

3.02 CONSTRUCTION

- A. Overburden Monitoring Well Boreholes: The boreholes completed for installation of the overburden monitoring wells shall be completed using hollow-stem auger or other method to be approved by the Engineer that will advance the borings to the required depths in a timely manner, limit production of waste soil and water, and allow for appropriate construction of the well and surrounding material.

### 3.03 PERMITS, REGULATIONS, AND PUBLIC RELATIONS

- A. All wells shall be installed in accordance with RIDEM Rules and Regulations for Groundwater Quality.
- B. Permits and licenses of a temporary nature necessary for the execution of the Contractor's work shall be secured and paid for by the Contractor. The Contractor shall give all notices and comply with all laws, ordinances, rules, and public regulations bearing on the conduct of the work as described in the scope of work specified.
- B. If the Contractor performs any Work without giving notice to the Engineer and does not receive written notification from the Engineer to proceed with Work, which is later determined to be contrary to any laws, ordinances, or regulations, the Contractor proceeds at their own risk, and shall bear all penalties and costs arising from such actions.
- C. The Contractor shall be solely responsible for compliance with laws, ordinances, and regulations during the course of Work, including those relating to safety to personnel and property and the handling of wastes and/or hazardous material. No off-site shipment of wastes will be allowed without authorization from the Engineer. Copies of all permits, manifests, and other documentation shall be forwarded in a timely manner to the Engineer.

### 3.04 PROTECTION OF WORK, PUBLIC AND PROPERTY

- A. The means, methods, procedures, and techniques to be used by the Contractor are the responsibility of the Contractor, and shall be designed to meet the intent of the specifications.
- B. The Contractor shall continuously protect its work from damage and protect adjacent property as provided by law. The Contractor shall maintain lights and other safety devices as required. The Contractor shall promptly repair all damages caused by its operations. When using internal combustion equipment, the Contractor shall have available at the work site emergency fire extinguishers or other approved fire fighting apparatus at all times.
- C. During its operations, the Contractor may occupy only those portions of the public right-of-way for which the required permits have been obtained by the Contractor. If the Contractor desires to use additional areas outside of those required for the borings, it shall arrange for such areas at its own coordination and expense.
- D. Fill all drill holes, ruts, low spots, and areas of disturbed grade created as a result of the work. Grade disturbed areas smooth, seed, and mulch. Any property which is damaged as the result of the Contractor's operations shall be repaired at the Contractor's expense to the satisfaction of the Engineer. Remove and properly dispose of all unused or wasted construction materials and equipment.
- E. All drilling casings shall be withdrawn from the drill holes unless directed to be left in place by the Engineer.
- F. The Contractor shall secure the work site and any other potential hazards over night.

### 3.05 DISPOSAL OF CUTTINGS AND WELL DEVELOPMENT WATER

- A. Temporarily store soil boring cuttings in a container or temporary stockpile until transfer for on-site disposal within the capping system boundary.
- B. Collect, handle, and store all well development water and decontamination fluids in accordance to Section 01354 - Decontamination and Section 02120 – Off-Site Transportation and Disposal.

### 3.06 DECONTAMINATION

- A. Clean and decontaminate all equipment at the designated decontamination pad. All water will be containerized and sampled for contamination by the Contractor as specified in Section 01354 - Decontamination and Section 02120 – Off-Site Transportation and Disposal, and as described above.
- B. Decontaminate all rigs and equipment upon arrival at site, between each borehole, and upon completion of work. All down-hole sampling equipment shall be decontaminated between sample locations using a steam cleaner or high pressure wash, clean water, laboratory-grade detergent, oralconox or similar means. All drilling equipment shall be rinsed thoroughly with tap water. All sampling equipment shall be rinsed with de-ionized water.

END OF SECTION

## SECTION 02526

### WELL ABANDONMENT

#### PART 1 – GENERAL

##### 1.01 DESCRIPTION

- A. This specification establishes the requirements for monitoring well abandonment. Wells to be abandoned must be fully sealed in a manner appropriate for the geologic conditions to prevent contaminant migration through the borehole.
- B. Existing wells within the limits of work to be abandoned are as follows:
  - 1. Two (2) fire suppression intake wells, depth and construction unknown. Contractor to assume a depth of 25 feet and 4-inch well for Bid purposes.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01330 – Submittal Procedures
- B. Section 02110 – Waste Removal, Handling, and Storage
- C. Section 02120 – Off-Site Transportation and Disposal

##### 1.03 REFERENCES AND GUIDELINES

- A. RIDEM Rules and Regulations for Groundwater Quality

##### 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01330 – Submittal Procedures.
  - 1. Well Abandonment Completion Form:
    - a. Upon completion of abandonment of each well a Well Abandonment Completion Form must be completed and submitted. The Abandonment Form shall detail the material types, quantities, and methods used and any components of the well removed.

## PART 2 – PRODUCTS

### 2.01 WELL PLUGGING MATERIALS

- A. Type 1 cement/bentonite grout:
  - 1. Type 1 cement/bentonite grout with 4% (by weight) powdered bentonite may be used in the riser pipe interval of screen and riser pipe wells.
- B. Microfine cement grout:
  - 1. Microfine cement grout will be used for screened sections of wells and may be used for riser sections. The microfine cement should be similar or equal to MC-500 microfine cement distributed by Geochemical Corporation, Ridgewood, New Jersey.

## PART 3 – EXECUTION

### 3.01 WELL PLUGGING AND ABANDONMENT REQUIREMENTS

- A. Monitoring wells shall be abandoned according to the requirements of RIDEM and these Specifications.
- B. The Contractor shall maintain a well abandonment record. Groundwater levels shall be measured in all wells prior to abandonment. These water levels shall be included in the well abandonment records.
- C. Overbore or remove the casing to the greatest extent possible. All casing and well installations within five feet of the proposed final grade must be removed. Perforate casing left in place.
- D. Seal by pressure injection with Type 1 cement/bentonite grout (riser sections only) or microfine cement grout (screened or riser sections) using a tremie pipe or other method acceptable to RIDEM. Grout must extend the entire length of the boring, from the bottom of the well to five feet below the proposed final grade. The screened interval of the borehole must be sealed separately and tested to ensure its adequacy before sealing the remainder of the borehole. Where the surrounding geologic deposits are highly permeable, alternate methods of sealing may be required to prevent the migration of the grout into the surrounding geologic formation. Grout shall continue to be added to fill gaps created by settlement until the plugging material sets.
- E. Backfill and compact the upper five feet with subgrade fill as specified in Section 02300 – Earthwork.
- F. Restore the site to a safe condition. The site must be inspected periodically after sealing for settlement or other conditions which require remediation.
- G. Locations of abandoned wells shall be surveyed as a requirement of the Record Drawing submission.

### 3.01 WASTE DISPOSAL

- A. Waste materials derived from well abandonment may include removed casing, removed riser pipe and excess grout.
- B. Waste materials may be disposed of within the capping system boundary provided waste consolidation and grading activities are ongoing.
- C. Well casing and pipe shall be disposed of off-site in conformance with Section 02120 Off-Site Transportation and Disposal.
- C. If waste consolidation and grading activities on-site are complete, the Contractor shall dispose of well abandonment derived waste materials off-site in accordance with Section 02120 – Off-Site Transportation and Disposal.

END OF SECTION

SECTION 02921

SEEDING AND SOIL SUPPLEMENTS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. For restored areas to be vegetated as indicated on the Construction Contract Drawings, provide seed as specified herein.
- B. Furnish and place topsoil, lime, fertilizer, seed, and mulch or erosion control matting in the areas indicated, and maintain new seeding through the contract maintenance period.
- C. Disturbed areas outside the limit of grading but inside the limit of disturbance may be seeded and mulched without the addition of Loam.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01330 – Submittal Procedures
- B. Section 02300 – Earthwork
- C. Section 02370 – Erosion and Sedimentation Control

1.03 REFERENCES AND GUIDELINES

- A. Rhode Island Soil Erosion and Sediment Control Handbook (RISESCH), 1989 by the Rhode Island Department of Environmental Management (RIDEM), USDA Soil Conservation Service, and the Rhode Island State Conservation Committee.
- B. Rhode Island Stormwater Design and Installation Standards Manual, December 2010 by RIDEM and Coastal Resources Management Council.

1.04 SUBMITTALS

Submit the following in accordance with Section 01330 – Submittal Procedures.

- A. Grass Seed Vendor's Certificate:  
Subcontractor shall submit the seed vendor's certified statement for the grass seed mixture required, showing common name, percentage of seed mix by weight, percentages of purity and germination, year of production, date of packaging, and location of packaging.
- B. Fertilizer:  
Subcontractor shall submit the fertilizer manufacturer's product data showing chemical analysis and percent composition.
- C. Hydraulic Seeding Method:

If the Hydraulic Seeding Method is used, submit a certified statement as to the number of pounds of materials to be used per 100 gallons of water, and specify the number of square feet of seeding that can be covered with the quantity of solution in the hydroseeder.

#### 1.05 DEFINITIONS

- A. Limit of Disturbance:  
Seeding shall be performed on all disturbed areas within the limit of disturbance as delineated on the Contract Drawings.
- B. Limit of Grading:  
Loam, seeding, and mulching shall be performed within the outermost limit of grading as delineated on the Contract Drawings.
- C. The exception to these requirements is a for those areas that require alternate stabilization with erosion control matting, or riprap as shown on the Contract Drawings or described in Section 02370 - Erosion and Sedimentation Control.

#### PART 2 – PRODUCTS

#### 2.01 MATERIALS

- A. General:  
Obtain and retain as part of the project records, certifications, and/or labels of materials supplied.
- B. Loam:  
Refer to Section 02300 - Earthwork.
- C. Fertilizer:  
Supply fertilizer meeting the recommendation of the testing laboratory nutrient analysis for the Loam. At a minimum provide a standard commercial 10-20-20 grade containing at least 10 percent available nitrogen, 20 percent readily available phosphoric acid and 20 percent total available potash in conformity with soil tests such as those offered by the University of Rhode Island Soil Testing Laboratory. Supply in unopened bags with the weight, contents and guaranteed analysis shown thereon or on a securely attached tag.
- D. Lime:
  - 1. Apply ground limestone (equivalent to 50% calcium plus magnesium oxide) at a rate recommended by the testing laboratory based on the results of their nutrient analysis of the Loam. At a minimum apply 3 tons per acre (135 pounds. per 1,000 square feet).
- E. Seed for Permanent Vegetation:  
Shall meet the following minimum requirements:
  - 1. The grass seed mixture shall include no "primary noxious weed seeds."
  - 2. Furnish in fully-labeled, standard sealed containers.
  - 3. Percentage and germination of each seed type in the mixture, purity, and weed seed content of the mixture shall be clearly stated on the label.

4. The weight of pure live seed (PLS) is computed by the labeled purity percent times the labeled germination percent times the weight. To illustrate the method of computing to PLS from the tag basis, the following example is given: Required: 20 pounds PLS of a particular variety—stock available is 99.41% pure and 92% germination—20 divided by the product of 0.9941 and 0.92 equals 21.8 pounds on the tag basis to furnish 20 pounds of PLS.
5. Subject to the testing provisions of the Association of Official Seed Analysis, with the month and year of test clearly stated on the label.
6. Seed which has become wet, moldy, or otherwise damaged will not be acceptable.
7. All seed shall be certified as to mixture, germination, purity, and live seed as follows:  
 Percent germination > 80%  
 Pure Live Seed (PLS) > 85%  
 Percent Purity > 85%  
 Weed Seed < 1%  
 All seed shall be from the current year's crop unless recent tests by an approved testing agency demonstrate that older seed meets the above requirements.
8. Wetland Buffer Cap:  
Use the pipeline mix with switchgrass (ERNMX-102-1) as summarized in Table 02921-1 or approved equal.

Table 02921-1: Permanent Seed Mix for Wetland Buffer Cap Areas

<u>Species/ Variety</u>	<u>Rate in lbs per acre</u>
<u>Switchgrass</u>	<u>13.2</u>
<u>Creeping Red Fescue</u>	<u>10</u>
<u>Annual Ryegrass</u>	<u>7.2</u>
<u>Timothy 'Climax'</u>	<u>6.4</u>
<u>Alsike Clover</u>	<u>2</u>
<u>Redtop</u>	<u>1.2</u>

9. Upland Cap:  
 Use the seed mix specified as General Purpose of Table 4.2, "Permanent Seedings" of the RISESCH and summarized in Table 02921-2:

Table 02921-2: Permanent Seed Mix for Upland Soil Cap Areas

Species/ Variety	Rate in lbs per acre
Red Fescue	75
Colonial bentgrass, 'Exeter'	5
Perennial ryegrass	5
Birdsfoot Trefoil, 'Empire'	15

10. Other suitable seed mixtures may be used if approved by the Engineer.

**Deleted:** Use the seed mix specified as Buffer Zones Adjacent to Wetlands or Surface Waters and Wetland Areas of Table 4.2, "Permanent Seedings" of the RISESCH and reiterated in Table 02921-1: '¶  
 ¶ Table 02921-1: Permanent Seed Mix for Wetland Buffer Cap Areas¶  
 ¶ Species/ Variety ... [1]  
**Formatted:** Indent: First line: 0 pt  
**Deleted:** reiterated

11. For temporary seeding requirements see Section 02370 - Erosion and Sedimentation Control.

- F. Mulch:  
Refer to Section 02370 - Erosion and Sedimentation Control for mulching requirements.
- G. Erosion Control Matting:  
Refer to Section 02370 - Erosion and Sedimentation Control for erosion control matting requirements.

### PART 3 – EXECUTION

#### 3.01 PREPARATION

- A. All Areas to be Seeded:
  - 1. Shall be worked as necessary to provide a reasonably firm but friable seedbed.
  - 2. Shall meet the specified grades and are free of growth and debris.
  - 3. Take care to prevent the formation of low places and pockets where water will stand.
- B. Depth of Tillage:
  - 1. Two (2) inches or as directed by the Engineer.
  - 2. On slopes steeper than 3:1, reduce depth of tillage as directed.
  - 3. Where ryegrass has been planted for temporary erosion control and has not been eliminated prior to the completion of the Work, disk at least 4 inches deep and seed to permanent grasses.

#### 3.02 APPLICATION

- A. Loam:  
Loam shall be placed using earth moving equipment. The soil shall be spread and tracked to a uniform depth as indicated on the Contract Drawings. The soil surface shall be left free of ruts or channels. Remove all large stiff clods, lumps, brush, roots, stumps, litter, and other foreign material and stones over 3-inch in size. See Section 02300 - Earthwork for additional requirements.
- B. Fertilizer and Lime:
  - 1. Apply by means of a mechanical spreader or other acceptable method which is capable of maintaining a uniform rate of application.
  - 2. Conduct when the soil is in a moist condition and at least 24 hours before sowing the seed.

3. Fertilizer shall be applied at the rate based on the results of the nutrient analysis specified in Section 02300 – Earthwork. If the default 10-20-20 fertilizer is utilized, apply at a rate of 500 pounds per 1 acre.

C. Seeding:

1. Perform erosion control items of work such as seeding and mulching as soon as practical for areas of suspended work or areas of completed work.
2. When seeding is required on areas of the project where work is not complete but will be suspended for an extended period, use the appropriate temporary seed mix specified in Section 02370 – Erosion and Sedimentation Control.
3. When seeding is required on areas of the project where grading is complete, use the specified permanent seed mixture.
4. Apply permanent seed mix between April 1 to June 15 (Spring Seeding) or August 15 to September 30 (Fall Seeding) at a rate of 100 pounds per acre.
5. Planting between October 1 and April 1 shall be considered Winter Seeding and shall be approved by the Engineer prior to initiation.
6. Special care must be taken if seeding must occur during the generally hot, dry period from June to August.
7. Seeding Restrictions:  
Do not seed during windy weather or when the ground is excessively wet, or otherwise untillable.

D. Mulch:

1. Undertake immediately after each area has been properly prepared and seeded.
2. Apply the selected mulch type at the rates noted in Chapter 5 of the RISESCH on all seeded areas not otherwise protected with erosion control matting.
3. Blowing chopped mulch shall be permitted provided mulch anchoring is performed.
4. Hay or straw mulch should cover the ground enough to shade it, but the mulch should not be so thick that a person standing cannot see ground through the mulch.
5. Remove matted mulch or bunches.
6. Collect and dispose of all baling wire or rope off-site.

### 3.03 SEEDING METHODS

A. General:

Fertilizer, limestone, mulch material if required, and seed of the type specified may be placed at the locations shown or ordered by one of the following methods, provided an even distribution is obtained. The maximum seeding depth shall be 1/4-inch when using methods other than hydroseeding.

B. Dry Method:

1. Power Equipment: Use mechanical seeders, seed drills, landscape seeders, cultipacker seeders, fertilizer spreaders, or other approved mechanical seeding equipment or attachments when seed, limestone, and fertilizer are to be applied in dry form.

2. Manual Equipment: On areas which are inaccessible to power equipment, permission may be given to use hand-operated mechanical equipment when the materials are to be applied in dry form. The use of hand shovels to spread the materials will not be allowed.
3. Do not mix limestone and fertilizer together prior to their application, but work into the soil together to the specified depth.
4. After seeding, compact the entire area by a suitable roller weighing 60 to 90 lbs. per linear foot.
5. Allow at least 24 hours between fertilizing and seeding.
6. Unless otherwise ordered, mulch areas covered with seed.

C. Hydraulic Method:

1. The application of grass, seed, fertilizer, limestone, and suitable mulch, if approved, may be accomplished in one operation by the use of an approved spraying machine.
2. Mix materials with water in the machine and keep in an agitated state in order that the materials may be uniformly suspended in the water.
3. The spraying equipment shall be so designed that when the solution is sprayed over an area, the resulting deposits of limestone, fertilizer, and grass seed are equal in quantity to the required rates.
4. Flush and clean hydraulic seeding and fertilizing machine each day before seeding is to be started, and thoroughly flush of all residue after the completion of application or every 10 acres.
5. If the results of the spray operations are unsatisfactory, abandon this method and apply the materials by the dry method.
6. When inoculum is required, mix with the seed and spray.
7. Compaction or rolling not required.
8. If mulch material is not applied during the seeding operation apply mulch within 1/2 hour following the seeding operation.

3.04 WINTER (DORMANT) SEEDING

Applies to seeding that occurs between October 1 and April 1 when ground temperatures are generally unfavorable for seed germination.

- A. To be coordinated and approved by the Engineer prior to initiation.

3.05 CARE AFTER SEEDING

- A. Watering:  
Contractor shall ensure that adequate water is applied to the seeded area to establish a uniform stand of vegetation within the restored area of concern. If the restored area is seeded during a drought condition, the Contractor shall water with proper means through either a portable watering tank or other means approved by the Engineer.
- B. Acceptance:

To be acceptable, grass shall show a reasonably thick, uniform stand, free from sizable areas of thin or bare spots, with a minimum coverage of approximately 80 percent as agreed by the Contractor and Engineer and/or Client.

- B. Repair:  
Reseed any seeded areas which fail to show a uniform stand until all areas are covered with acceptable grass growth.
- C. Maintenance Period:  
Inspections for the SWPPP and other permitting obligations shall continue until the required 80% vegetation cover is established within the restored area.
- C. Warranty:  
The contractor shall provide the Owner and Client with a 1 year vegetation warranty. If after 1 year the vegetation has not been established to 80% cover, the Contractor shall reseed the areas out of compliance and provide continued maintenance until the 80% vegetation cover is met.

END OF SECTION

Use the seed mix specified as Buffer Zones Adjacent to Wetlands or Surface Waters and Wetland Areas of Table 4.2, "Permanent Seedings" of the RISESCH and reiterated in Table 02921-1:

Table 02921-1: Permanent Seed Mix for Wetland Buffer Cap Areas

Species/ Variety	Rate
Reed Canarygrass	20
Ladino Clover	1

TEXTRON, INC.  
FORMER GORHAM MANUFACTURING FACILITY, PROVIDENCE, RI  
REMEDIAL ACTION WORK PLAN – PHASE I SOIL CAPPING: PARCEL C-1

**APPENDIX C**  
**RHODE ISLAND RESIDENTIAL DIRECT EXPOSURE CRITERIA**

**Table C-1**  
**RIDEM Direct Exposure Criteria**  
**Remedial Action Work Plan**  
**Phase I Parcel DC-1**  
**Former Gorham Manufacturing Site**  
**Providence, RI**

Parameter	Residential Direct Exposure Criteria
<b>Volatile Organics (mg/Kg)</b>	
1,1,1,2-Tetrachloroethane	2.2
1,1,1-Trichloroethane	540
1,1,2,2-Tetrachloroethane	1.3
1,1,2-Trichloroethane	3.6
1,1-Dichloroethane	920
1,1-Dichloroethene	0.2
1,2-Dibromo-3-chloropropane	0.5
1,2-Dichloroethane	0.9
1,2-Dichloropropane	1.9
4-Methyl-2-pentanone	1200
Acetone	7800
Benzene	2.5
Bromodichloromethane	10
Bromoform	81
Bromomethane	0.8
Carbon tetrachloride	1.5
Chlorobenzene	210
Chloroform	1.2
cis-1,2-Dichloroethylene	630
Dibromochloromethane	7.6
Ethylbenzene	71
Ethylene dibromide (EDB)	0.01
Isopropyl benzene	27
Methyl ethyl ketone	10000
Methyl tert butyl ether (MTBE)	390
Methylene chloride	45
Styrene	13
Tetrachloroethylene	12
Toluene	190
trans-1,2-Dichloroethylene	1100
Trichloroethene	13
Vinyl Chloride	0.02
Xylene	110
<b>Semivolatile Organics (mg/Kg)</b>	
1,1'-Biphenyl	0.8
1,2,4-Trichlorobenzene	96
1,2-Dichlorobenzene	510
1,3-Dichlorobenzene	430
1,4-Dichlorobenzene	27
2-Methylnaphthalene	123
2,4,5-Trichlorophenol	330
2,4,6-Trichlorophenol	58
2,4-Dichlorophenol	30
2,4-Dimethylphenol	1400
2,4-Dinitrophenol	160
2,4-Dinitrotoluene	0.9
2-Chlorophenol	50
3,3-Dichlorobenzidine	1.4
4-Chloroaniline	310
Acenaphthene	43
Acenaphthylene	23
Anthracene	35
Benzo(a)anthracene	0.9
Benzo(a)pyrene (cPAH)	0.4

**Table C-1**  
**RIDEM Direct Exposure Criteria**  
**Remedial Action Work Plan**  
**Phase I Parcel DC-1**  
**Former Gorham Manufacturing Site**  
**Providence, RI**

Parameter	Residential Direct Exposure Criteria
Benzo(b)fluoranthene	0.9
Benzo(g,h,i)perylene	0.8
Benzo(k)fluoranthene	0.9
bis(2-Chloroethyl)ether	0.6
bis(2-Chloroisopropyl)ether	9.1
Bis(2-ethylhexyl) phthalate	46
Chrysene	0.4
Dibenzo(a,h)anthracene	0.4
Diethyl phthalate (PAE)	340
Dimethylphthalate	1900
Fluoranthene	20
Fluorene	28
Hexachlorobenzene	0.4
Hexachlorobutadiene	8.2
Hexachloroethane	46
Indeno(1,2,3-cd)pyrene	0.9
Napthalene (PAH)	54
Pentachlorophenol	5.3
Phenanthrene	40
Phenol	6000
Pyrene	13
<b>Pesticides/PCBs (mg/Kg)</b>	
Chlordane	0.5
Dieldrin	0.04
PCBs	10
<b>Inorganics (mg/Kg)</b>	
Antimony	10
Arsenic	7
Barium	5500
Beryllium	1.5
Cadmium	39
Chromium (+6)	390
Chromium (Trivalent)	1400
Copper	3100
Cyanide	200
Lead	150
Manganese	390
Mercury (inorganic; mercuric salts)	23
Nickel (soluble salts)	1000
Selenium	390
Silver	200
Thallium (chloride)	5.5
Vanadium	550
Zinc	6000

mg/Kg = milligram per kilogram

Rhode Island Department of Environmental Management (RIDEM), 2011. Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases. DEM-DSR-01-93. November.

Prepared by / Date: KJC 01/13/12  
Checked by / Date: DLC 01/13/12

TEXTRON, INC.  
FORMER GORHAM MANUFACTURING FACILITY, PROVIDENCE, RI  
REMEDIAL ACTION WORK PLAN – PHASE I SOIL CAPPING: PARCEL C-1

**APPENDIX D**  
**LABORATORY METHOD DETECTION LIMITS**

Table D-1  
Method Detection Limits and  
Method Reporting Limits for SVOCs  
in Soil (USEPA Method 8270C)

Remedial Action Work Plan  
Phase I Parcel **DC-1**  
Former Gorham Manufacturing Site  
Providence, RI

Analyte	MDL mg/kg	MRL mg/kg	MS/MSD %REC	MS RPD	BS/BSD %REC	RPD
2-Methylnaphthalene	0.072	0.333	40 - 140	30	40 - 140	30
Acenaphthene	0.081	0.333	40 - 140	30	40 - 140	30
Acenaphthylene	0.064	0.333	40 - 140	30	40 - 140	30
Anthracene	0.053	0.333	40 - 140	30	40 - 140	30
Benzo(a)anthracene	0.058	0.333	40 - 140	30	40 - 140	30
Benzo(a)pyrene	0.055	0.167	40 - 140	30	40 - 140	30
Benzo(b)fluoranthene	0.074	0.333	40 - 140	30	40 - 140	30
Benzo(g,h,i)perylene	0.072	0.333	40 - 140	30	40 - 140	30
Benzo(k)fluoranthene	0.097	0.333	40 - 140	30	40 - 140	30
Chrysene	0.055	0.167	40 - 140	30	40 - 140	30
Dibenzo(a,h)Anthracene	0.051	0.167	40 - 140	30	40 - 140	30
Fluoranthene	0.058	0.333	40 - 140	30	40 - 140	30
Fluorene	0.085	0.333	40 - 140	30	40 - 140	30
Indeno(1,2,3-cd)Pyrene	0.108	0.333	40 - 140	30	40 - 140	30
Naphthalene	0.076	0.333	40 - 140	30	40 - 140	30
Phenanthrene	0.083	0.333	40 - 140	30	40 - 140	30
Pyrene	0.077	0.333	40 - 140	30	40 - 140	30

Surrogate	%REC
surr: 1,2-Dichlorobenzene-d4	30 - 130
surr: 2-Fluorobiphenyl	30 - 130
surr: Nitrobenzene-d5	30 - 130
surr: p-Terphenyl-d14	30 - 130

MDL = method detection limit  
MRL = method reporting limit  
mg/kg = milligrams per kilogram

**Preservation: Non Preserved**  
**Container: 4 oz. jar**  
**Amount Required: 30g**  
**Hold Time: 14 days**

Table D-2  
Method Detection Limits and  
Method Reporting Limits for  
Metals in Soil

Remedial Action Work Plan  
Phase I Parcel **BC-1**  
Former Gorham Manufacturing Site  
Providence, RI

<b>Analyte - Method 6010 BICP</b>	MDL mg/Kg	MRL mg/Kg	DUP RPD	MS %REC	MS RPD	BS %REC	BS RPD
Antimony	0.8	6.7	35	75 - 125	35	80 - 120	30
Arsenic	0.6	3.3	35	75 - 125	35	80 - 120	30
Beryllium	0.02	0.14	35	75 - 125	35	80 - 120	30
Cadmium	0.09	0.67	35	75 - 125	35	80 - 120	30
Chromium	0.2	1.3	35	75 - 125	35	80 - 120	30
Copper	0.5	1.3	35	75 - 125	35	80 - 120	30
Lead	0.3	6.7	35	75 - 125	35	80 - 120	30
Nickel	0.3	3.3	35	75 - 125	35	80 - 120	30
Selenium	0.8	6.7	35	75 - 125	35	80 - 120	30
Silver	0.20	0.67	35	75 - 125	35	80 - 120	30
Zinc	0.7	3.3	35	75 - 125	35	80 - 120	30

<b>Analyte - Method 7000</b>	MDL mg/Kg	MRL mg/Kg	DUP RPD	MS %REC	RPD	BS %REC	RPD
Thallium	0.55	1.65	35	75 - 125	35	80 - 120	30

**Preservation: Non Preserved**  
**Container: 4 oz. jar**  
**Amount Required: 10g**  
**Hold Time: 180 days**

<b>Analyte - Method 7471A</b>	MDL mg/Kg	MRL mg/Kg	DUP RPD	MS/MSD %REC	RPD	BS/BSD %REC	RPD
Mercury	0.010	0.033	35	75 - 125	35	80 - 120	20

**Preservation: Non Preserved**  
**Container: 4 oz. jar**  
**Amount Required: 10g**  
**Hold Time: 28 days**

MDL = method detection limit  
MRL = method reporting limit  
mg/kg = milligrams per kilogram

Table D-3  
Method Detection Limits and Reporting Limits  
for Dioxin/Furans in Soil (USEPA Method 8290)

Remedial Action Work Plan  
Phase I Parcel DC-1  
Former Gorham Manufacturing Site  
Providence, RI

MAE Extraction

Analyte	CAS#	Solid(ng/kg) / Wipe(ng/m2)		Control limits		
		MDL	PRL	Lower	Upper	RPD
2,3,7,8-TCDF	51207-31-9	0.43	1.0	70	130	20
2,3,7,8-TCDD	1746-01-6	0.36	1.0	70	130	20
1,2,3,7,8-PeCDF	57117-41-6	0.44	5.0	70	130	20
2,3,4,7,8-PeCDF	57117-31-4	0.33	5.0	70	130	20
1,2,3,7,8-PeCDD	40321-76-4	0.54	5.0	70	130	20
1,2,3,4,7,8-HxCDF	70648-26-9	2.50	5.0	70	130	20
1,2,3,6,7,8-HxCDF	57117-44-9	0.72	5.0	70	130	20
2,3,4,6,7,8-HxCDF	60851-34-5	2.50	5.0	70	130	20
1,2,3,7,8,9-HxCDF	72918-21-9	0.42	5.0	70	130	20
1,2,3,4,7,8-HxCDD	39227-28-6	2.50	5.0	70	130	20
1,2,3,6,7,8-HxCDD	57653-85-7	0.63	5.0	70	130	20
1,2,3,7,8,9-HxCDD	19408-74-3	0.43	5.0	70	130	20
1,2,3,4,6,7,8-HpCDF	67562-39-4	2.50	5.0	70	130	20
1,2,3,4,7,8,9-HpCDF	55673-89-7	0.70	5.0	70	130	20
1,2,3,4,6,7,8-HpCDD	35822-39-4	0.48	5.0	70	130	20
OCDF	39001-02-0	1.19	10.0	70	130	20
OCDD	3268-87-9	1.85	10.0	70	130	20
Total TCDF	55722-27-5	0.43	1.0	70	130	20
Total TCDD	41903-57-5	0.36	1.0	70	130	20
Total PeCDF	30402-15-4	0.77	5.0	70	130	20
Total PeCDD	36088-22-9	0.54	5.0	70	130	20
Total HxCDF	55684-94-1	2.50	5.0	70	130	20
Total HxCDD	34465-46-8	2.50	5.0	70	130	20
Total HpCDF	38998-75-3	2.50	5.0	70	130	20
Total HpCDD	37871-00-4	0.48	5.0	70	130	20

Labelled Analyte	Control limits	
	Lower	Upper
<sup>13</sup> C <sub>12</sub> -2,3,7,8-TCDF	40	135
<sup>13</sup> C <sub>12</sub> -2,3,7,8-TCDD	40	135
<sup>13</sup> C <sub>12</sub> -1,2,3,7,8-PeCDF	40	135
<sup>13</sup> C <sub>12</sub> -2,3,4,7,8-PeCDF	40	135
<sup>13</sup> C <sub>12</sub> -1,2,3,7,8-PeCDD	40	135
<sup>13</sup> C <sub>12</sub> -1,2,3,4,7,8-HxCDF	40	135
<sup>13</sup> C <sub>12</sub> -1,2,3,6,7,8-HxCDF	40	135
<sup>13</sup> C <sub>12</sub> -2,3,4,6,7,8-HxCDF	40	135
<sup>13</sup> C <sub>12</sub> -1,2,3,7,8,9-HxCDF	40	135
<sup>13</sup> C <sub>12</sub> -1,2,3,4,7,8-HxCDD	40	135
<sup>13</sup> C <sub>12</sub> -1,2,3,6,7,8-HxCDD	40	135
<sup>13</sup> C <sub>12</sub> -1,2,3,7,8,9-HxCDD	40	135
<sup>13</sup> C <sub>12</sub> -1,2,3,4,6,7,8-HpCDF	40	135
<sup>13</sup> C <sub>12</sub> -1,2,3,4,7,8,9-HpCDF	40	135
<sup>13</sup> C <sub>12</sub> -1,2,3,4,6,7,8-HpCDD	40	135
<sup>13</sup> C <sub>12</sub> -OCDD	40	135
<sup>37</sup> Cl <sub>4</sub> -2,3,7,8-TCDD	40	135

MDL = method detection limit  
MRL = method reporting limit  
ng/kg = nanograms per kilogram

TEXTRON, INC.  
FORMER GORHAM MANUFACTURING FACILITY, PROVIDENCE, RI  
REMEDIAL ACTION WORK PLAN – PHASE I SOIL CAPPING: PARCEL C-1

## **APPENDIX E**

### **AMEC HEALTH AND SAFETY PLAN**

## HEALTH AND SAFETY PLAN

### TO SUPPORT THE FOLLOWING TASKS/INVESTIGATIONS:

- 2006 SUPPLEMENTAL SITE INVESTIGATION AND SLAG REMOVAL WORK PLAN
- 2006/2007 SUPPLEMENTAL SLAG REMOVAL ACTION ACTIVITIES
- JANUARY 2008 TANK CLOSURE ACTIVITIES
- SOIL VAPOR INVESTIGATION (Fall 2007 and Spring 2008)
- INSTALLATION OF AN ACTIVE SOIL DEPRESSURIZATION SYSTEM (Fall 2008)
- GROUNDWATER INVESTIGATION ACTIVITIES (2008-2009)
- Surface Water and Sediment Sampling from a Boat (2011)
- Phase I Soil Capping: Parcel D (June 2012)

FORMER GORHAM MANUFACTURING SITE  
333 ADELAIDE AVENUE  
PROVIDENCE, RHODE ISLAND

*Prepared for:*

Textron, Inc.  
40 Westminster Street  
Providence, Rhode Island 02903

*Prepared by:*

AMEC Environment & Infrastructure, Inc.  
(Formerly MACTEC Engineering and Consulting, Inc.)  
107 Audubon Road  
Wakefield, Massachusetts 01880

MAY 2006

Revised: January 29, 2007

Revised: January 11, 2008

Revised: December 12, 2008

Revised: October 29, 2009

Revision #5: December 9, 2011

Revision #6: June 13, 2012

Projects: 3650050041 and 3650110213.01

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**Attachments**

Attachment A	Air Monitoring Data Work Sheet
Attachment B	Job Hazard Analysis Forms
Attachment C	Site Safety Orientation
Attachment D	Record of Site Safety Meeting

## LIST OF ACRONYMS AND ABBREVIATIONS

AMEC	AMEC Environment & Infrastructure, Inc.
ASD	Active Soil Depressurization
CFR	Code of Federal Regulations
COCs	Contaminants of Concern
CPR	Cardiopulmonary Resuscitation
FOL	Field Operations Leader
GC	Gas Chromatographer
HASP	Health and Safety Plan
HSM	ES&H Manager
HSO	Health and Safety Officer
IDLH	Immediately Dangerous to Life or Health
JHA	Job Hazard Analysis
LEL	Lower Explosive Limit
LHSR	Local Health and Safety Representative
MACTEC	MACTEC Engineering and Consulting, Inc.
mg/m <sup>3</sup>	Milligrams per Cubic Meter
MCE	Mixed Cellulose Ester
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
PELs	Personal Exposure Limits
PFD	Personal Flotation Device
PID	Photoionization Detector
PM	Project Manager
PPE	Personal Protective Equipment
PPM	Parts per Million
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RHSM	Regional Health and Safety Manager
RIDEM	Rhode Island Department of Environmental Management
SSI	Supplemental Site Investigation

TCE	Trichloroethene
USEPA	U.S. Environmental Protection Agency
USTs	Underground Storage Tanks
VC	Vinyl Chloride
VOC	Volatile Organic Compounds
XRF	X-Ray Fluorescence

**RECORD OF HEALTH AND SAFETY PLAN REVISION**

Revision #	Date	Changes Made
1	January 2007	<ul style="list-style-type: none"> <li>• Addition of Record of Health and Safety Plan Revision.</li> <li>• Addition of dioxins and furans to Table 4-1.</li> <li>• Revision of Task E description to include excavation of soil.</li> <li>• Revision of Task G description to include loading of material into trucks.</li> <li>• Addition of Task K <i>Excavation of Soil along Perimeter of Former Slag Pile Removal Area.</i></li> <li>• Addition of a Site Safety Orientation training form.</li> <li>• Addition of Record of Site Safety Meeting form.</li> <li>• Addition of JHA for surface soil sampling using pick to get through the frozen soil.</li> </ul>
2	January 2008	<ul style="list-style-type: none"> <li>• Addition of Task N: Tank Closure Activities</li> </ul>
3	September 2008	<ul style="list-style-type: none"> <li>• Addition of Tasks O Soil Vapor Investigation, and Task P Installation of an Active Soil Depressurization System.</li> </ul>
4	December 2008 & October 2009	<ul style="list-style-type: none"> <li>• Addition of Task Q Groundwater Investigation Activities.</li> </ul>
5	December 2011	<ul style="list-style-type: none"> <li>• Addition of Task R Sampling Activities (Surface Water and Sediment) from a General Contractor’s Barge</li> </ul>
6	June 2012	<ul style="list-style-type: none"> <li>• Addition of Task S – Observing contractor clearing and grubbing; excavation and trenching; haul road improvements; and installing/repairing monitoring wells. Note: All of the activities associated with Task S have been conducted at the site previously.</li> </ul>

**HASP Approval Signatures\***

**Revision #6 June 2012**

_____	_____	_____	_____	_____	_____
Project Manager	Date	Local HSE Coordinator	Date	DES&H	Date
				<i>for Cindy Sundquist with permission</i>	
_____	_____	_____	_____	_____	_____
General Supervisor (field)	Date	Site Safety and Health Officer	Date	Other	Date

\* = signatures for the original HASP issuance and previous revisions are maintained on file.  
 \*\* = review not required; activities for current task have already been addressed in previous revisions.  
 The current revision merely brings the activities into one JHA and reflects the changes from MACTEC to AMEC.

## **1.0 INTRODUCTION**

This Health and Safety Plan (HASP) was prepared originally to govern AMEC Environment & Infrastructure, Inc. (AMEC, formerly MACTEC Engineering and Consulting, Inc.) field tasks planned for Spring 2006 at the Former Gorham Manufacturing Site (Site), 333 Adelaide Avenue, Providence, Rhode Island as described in the Supplemental Site Investigation (SSI) Work Plan (AMEC, May 2006), and the Slag Removal Work Plan (AMEC, May 2006). Based on results of the SSI and removal action completed in July 2006, the Rhode Island Department of Environmental Management (RIDEM) requested additional removal activities. This HASP has been updated to reflect these additional removal activities of the slag excavation area to be conducted, which are described in the *Former Slag Pile Area Supplemental Removal Action Work Plan*, submitted by AMEC to RIDEM on January 16, 2007. Any provision of this HASP that applies only to the original excavation activities that were conducted in July 2006 are identified with a (2006). Based on results of previous investigations, and discussions with RIDEM, additional characterization of the Site were/will be conducted as described in Section 1.1 of this HASP.

The Site is a 37-acre property that was used historically for the manufacture of silverware. All structures relating to the former facility have been demolished and the property has been partially redeveloped. Refer to SSI Work Plan (Section 2.0) for a description and layout of the Site. AMEC will conduct investigation activities on other areas of the Site and therefore will update/revise this HASP accordingly to cover those activities as described in Section 1.1 below.

This HASP has been prepared in conformance with the AMEC Health and Safety Program and is intended to meet the requirements of 29 Code of Federal Regulations (CFR) 1910.120. As such, the HASP addresses those activities associated with field operations for this project. Compliance with this HASP is required for all AMEC personnel engaged in field tasks.

### **1.1 SITE INVESTIGATION ACTIVITIES**

#### **1.1.1 January 2008 Tank Closure Activities**

In December 2007, AMEC conducted an assessment of the former Building N two underground storage tanks (UST's), which contain water, for closure purposes. Due to the structural concerns of nearby utility poles, the USTs must be closed in place. AMEC will observe Clean Harbors conduct tank closure activities for the two tanks. Clean Harbors will remove and dispose of the

water from the tanks, remove the fill, gauge, pump, and/or vent lines, and once empty, fill the USTs with a slurry concrete or flowable fill. Clean Harbors will also backfill over the tank and disturbed area. No entry into the tanks will be conducted. The excavation will be opened so that normal access to the tanks is permitted without the requirement of confined space entry procedures. A Job Hazard Analysis (JHA) for the observation of these activities is included in Attachment B.

### **1.1.2 Fall 2007 and Spring 2008 Soil Vapor and Indoor Air Investigation of the Existing Retail Complex and Groundwater Investigation**

In August, September, and November 2007, AMEC conducted soil vapor, indoor air, and groundwater investigations at the Site. In addition, a ‘communication’ test was conducted within the sub-slab soils of the former Stop & Shop retail space to evaluate the potential radius of influence of a single sub-slab soil vapor extraction point. Activities included collection of soil vapor samples within the retail complex, installation of temporary monitoring wells, and vacuum testing within the soil immediately beneath the concrete slab of the retail complex. Soil vapor sampling points and groundwater monitoring points were installed and samples collected using the direct push method.

The general contractor drilled through concrete (for indoor samples) and concrete and/or pavement to collect the samples outside of the retail complex buildings.

### **1.1.3 Fall 2008 Installation of a Active Soil Depressurization System at the Existing Retail Complex**

AMEC will observe Clean Harbors installing a separate Active Soil Depressurization (ASD) system for each retail space within the retail complex, which may include the installation of 2- or 3-inch diameter ASD extraction wells inside the buildings, above grade extraction well pipe inside the buildings hung from the existing building structure, and below slab extraction well piping. Clean Harbors will also provide and install complete ASD blower systems within an enclosure, and the associated above grade ASD discharge pipe from each of the ASD systems to exhaust treated discharge above the building. They will also install a power (electric) supply and telephone to the blower systems.

Following system ‘prove-out’ Clean Harbors will also be operating the ASD systems for at least six (6) months. This HASP will be updated if AMEC employees are required to operate any part of the ASD systems.

#### **1.1.4 Groundwater Investigation Activities**

AMEC will observe a general contractor conducting vertical profiling of groundwater contamination and installing groundwater monitoring wells using standard direct-push methods at the Site. Vertical profile groundwater samples will be collected by the general contractor and analyzed on a field gas chromatographer (GC). AMEC will develop and sample the monitoring wells using standard low flow techniques. AMEC will also manually install and retrieve diffusion samplers along the shore line of the Inner Cover in accordance with the Site Groundwater Investigation Work Plans.

#### **1.1.5 December 2011 Mashapaug Cove Supplemental Site Investigation**

AMEC and its general contractor (TG&B) will use a barge-mounted vibracore rig to collect surface water and sediment samples in the cove and pond as described in the Mashapaug Cove SSI work plan dated November 18, 2011. One AMEC field person will be stationed on the barge with TG&B staff. AMEC personnel will collect the surface water samples using a peristaltic pump and sample containers. TG&B personnel will operate the vibracore rig to obtain the sediment cores. AMEC personnel will photograph, log, and then collect samples of the sediment core. These activities are planned for December 12 through December 21, 2011. This HASP has been updated to include this task.

The HASP has also been revised to reflect the new company name (AMEC), and any changes to H&S procedures.

#### **1.1.6 June 2012 Remedial Action Work Plan Phase I Soil Capping: Parcel C-1**

As described in the Remedial Action Work Plan (RAWP) – Phase I Soil Capping: Parcel C-1 (AMEC, 2012), work on the Phase I soil cap includes the portion of Parcel C-1 along Mashapaug Pond and Cove west and north of the Alvarez High School (Parcel B) and the proposed open space/fields (Parcel C). Work will proceed from west to east going away from the school. This HASP update does not include tasks for Phases II & III, which will be addressed under separate RAWPs. These activities are planned for July 2012 through November 2012. This HASP has been updated to include this task.

## **2.0 ORGANIZATION AND RESPONSIBILITIES**

### **2.1 PROJECT PERSONNEL**

#### **2.1.1 Project Manager**

The project manager (PM) is the individual with overall project management responsibilities. Those responsibilities as they relate to health and safety include provision for the development of this site-specific HASP; the necessary resources to meet requirements of this HASP; the coordination of staff assignments to ensure that personnel assigned to the project meet medical and training requirements; and the means and materials necessary to resolve any health and safety issues that are identified or that developed on the project.

#### **2.1.2 Field Operations Leader**

The Site General Supervisor (also known as the Field Operations Leader [FOL]) is the PM's designee who is on-site directing the performance of the field scope of work. The FOL will direct daily operations and is vested with the authority to stop work and expel general contractor or other workers or visitors due to unsafe working conditions (e.g., weather hazards, safety hazards, health hazards, equipment hazards, etc.).

#### **2.1.3 Site Health and Safety Officer**

The Site Health and Safety Officer (HSO) will work in concert with the FOL to implement the HASP, maintain safe working conditions, conduct safety inspections and briefings, and investigate accidents and incidents. The HSO will have at least an indirect line of reporting to the Division ES&H Manager (HSM) for the duration of his/her assignment as project HSO. The HSO is responsible for developing and implementing this site-specific HASP in accordance with the AMEC Health and Safety Program. The HSO will investigate all accidents, illnesses, and incidents occurring on-site. The HSO will also conduct safety briefings and site-specific training for on-site personnel. As necessary, the HSO will accompany all U.S. Environmental Protection Agency (USEPA), Occupational Safety and Health Administration (OSHA), or other governmental agency personnel visiting an AMEC site in response to health and safety issues. The HSO, in consultation with the HSM, is responsible for updating and modifying this HASP as site or environmental conditions change.

### 2.1.4 Assignments

The following is a list of key personnel who will be involved in this project:

Name	Responsibilities
David Heislein	Project Manager
Phil Muller	Field Operations Leader/Health & Safety Officer*
Leo Laviolette	Field Operations Leader/Health & Safety Officer*
Mark Maggiore	Field Team Member
Dave Chapman	Field Team Member
Daron Kurkjian	Field Team Member
Cynthia Sundquist	Regional HSE Manager

\* = the Field Operations Leader/ Site Health and Safety Officer is typically the AMEC employee who has the most experience and who has been with the company the longest. The employee may fill both roles if needed.

## 2.2 TRAINING

Training is defined under the AMEC Health and Safety Program, and all personnel entering potentially contaminated areas of this site must meet the requirements of 29 CFR 1910.120. Personnel without the required training **will not be permitted** in any area with potential for exposure to toxic substances or harmful physical agents (i.e., downrange).

At least one field team member must be certified in first aid and Cardiopulmonary Resuscitation (CPR).

Prior to commencement of site activities and daily thereafter, site-specific training will be provided by the HSO or FOL and will include an overview of HASP requirements. Daily safety meetings will cover anticipated tasks for the day and the potential hazards and mitigation and/or controls of those hazards. A Daily Safety Meeting Checklist included as part of this HASP may be used to document this training.

In addition, all workers with a potential for exposure to lead at any level must receive the following training:

1. Lead exposures according to the requirements of the Hazard Communication Standard in Construction (29 CFR 1926.56), including warning signs and labels, Material Safety Data Sheets (MSDSs), and employee information and training.

All workers with a potential exposure to lead at or above the action limit of 0.03 milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ) (involved in the excavation of the slag material) must receive the following training:

1. The contents of the standard (29 CFR 1926.62/1910.1025) and its appendices.
2. The specific nature of the operations that could result in exposure to lead above the action limits.
3. The purpose of the medical surveillance program in regards to monitoring for lead. Information must include the adverse health effects associated with excessive exposure to lead (especially reproductive effects).
4. The engineering controls (if any) and work practices (e.g., wetting soil to control dust) to be used at the site.
5. Instructions that chelating agents should not be used to remove lead from their bodies except under the direction of a licensed physician. (NOTE: Chelating agents remove metals from the body by binding to the metal; making is soluble so that it can be excreted in the urine. The problem with them is that they are indiscriminate and remove essential metals from the body as well. Chelation is a last resort to be used only when extremely high lead levels are found in the blood.)
6. Inform workers that copies of the standard and its appendices are available to them if interested.
7. The contents of any compliance plan.
8. The employees right of access to records under 29 CFR 1910.1020.

### 2.3 MEDICAL SURVEILLANCE

All personnel entering potentially contaminated areas of this site will be medically qualified for site assignment through a medical surveillance program outlined in the AMEC Health and Safety Program. Personnel who have not received medical clearance **will not be permitted** in any area with potential for exposure to toxic substances or harmful physical agents (i.e., downrange).

In addition, those workers involved in the Excavation of the Slag Material will receive blood lead analysis (lead and zinc protoporphyrin levels) prior to the start up of this task (2006). All workers will be notified, in writing, of the results of the biological monitoring within 5 working days. (NOTE: Blood levels in excess of 30  $\text{mg}/100$  g of whole blood require removal from work involving lead exposures.)

Based on the results of the air monitoring and blood lead analysis, medical monitoring for lead levels of employees new to the site and conducting the tasks associated with the Phase I Soil Capping: Parcel C-1 is not required. Historic dust monitoring and metals air sampling data as described in the Slag Removal Action Summary Report (MACTEC, 2006) indicate that exposure to metals, including

lead, in airborne dust and to nuisance dust are not expected to cause an exposure issue. However, dust monitoring and dust mitigation measures as described in the RAWP for the Phase I Soil Capping: Parcel C-1 (AMEC, 2012) will be implemented during these activities.

### **3.0 SCOPE OF WORK**

This HASP was prepared and updated to govern AMEC field tasks as described in the following:

- SSI Work Plan (AMEC May, 2006);
- Slag Removal Work Plan (AMEC May, 2006);
- Former Slag Pile Area Supplemental Removal Action Work Plan (October, 2006);
- Tank Closure Activities (January, 2008);
- Soil Vapor and Indoor Air Investigation (Fall 2007 and Spring 2008);
- Scope of Work ASD System (August, 2008); and
- Groundwater Investigation Activities Work Plans (December 2008 & October 2009).
- Mashapaug Cove SSI (December 2011)
- Phase I Soil Capping: Parcel C-1 (AMEC, June 2012)

The major activities described in these plans consist of:

#### **Slag Pile Removal Work Plan Tasks:**

- Erosion Controls and Chain Link Fence
- Tree and Shrub Removal
- Temporary Access Road Grading and Loading Pad
- Reconstruction or Decommissioning of Monitoring Well GZA-5
- Excavation of Slag Material
- Metal Debris Removal
- Transport Off-site
- Site Restoration
- Field Screening via Soil Sampling

#### **Supplemental Site Investigation Work Plan:**

- Surface Soil Sampling
- Geophysical Survey of Mashapaug Cove
- Surface Water Sampling
- Sediment Sampling

**Former Slag Pile Area Supplemental Removal Action Work Plan Tasks:**

- Maintaining Erosion Controls and Chain Link Fence
- Maintaining the Temporary Access Road Grading and Creation of a Loading Pad
- Relocation of Existing Stone Backfill Pile
- Excavation of Soil and Residual Slag Material
- Loading Trucks with Soil Material for Transport Off-site
- Restoration of Chain Link Fence
- Field Screening via Soil Sampling (X-Ray Fluorescence [XRF])

**Tank Closure Activities (Near former Building N):**

For this field task, AMEC will observe the Contractor (Clean Harbors):

- Excavating to uncover the tanks' access port for sampling and pumping of liquid from the tanks for disposal.
- Removing the tanks' fittings including vent pipe, fill pipe, etc.
- Filling the two tanks with slurry concrete.
- Backfilling the excavated areas.

**Soil Vapor and Indoor Air Investigation (Existing Retail Complex and Residential Properties)**

For this field task, AMEC will conduct soil vapor, indoor air, and groundwater investigations at the Site. Activities included collection of soil vapor samples within the retail complex and residential areas, installation of temporary monitoring wells, and vacuum testing within the soil immediately beneath the concrete slab of the retail complex. Soil vapor sampling points and groundwater monitoring points will be installed and samples collected using the direct push method. The general contractor will drill through concrete (for indoor samples) and concrete and/or pavement to collect the samples outside of the retail complex buildings and residential properties.

**Groundwater Investigation Activities**

For these activities, AMEC will conduct install, develop, and sample groundwater monitoring wells, install diffusion samplers along the shore line of the Inner Cove, and oversee a general contractor perform vertical profiling of the groundwater contamination at the Site to develop and refine the conceptual Site model. Standard direct push methods and manual placement of the

diffusion samplers will be used to accomplish the activities.

**Active Soil Depressurization System:**

For this field task, AMEC will observe the Contractor (Clean Harbors):

- Installing a separate ASD system for each retail space within the retail complex, which may include the installation of 2- or 3-inch diameter ASD extraction wells inside the buildings, above grade extraction well pipe inside the buildings hung from the existing building structure, and below slab extraction well piping.
- Installing complete ASD blower systems within an enclosure, and the associated above grade ASD discharge pipe from each of the ASD systems to exhaust treated discharge above the building. This installation task will also require Clean Harbors to install a power (electric) supply and telephone to the blower systems.

Following the successful installation and testing, Clean Harbors will operate the ASD systems for at least six (6) months. In the event that AMEC employees are required to operate any part of the ASD system, this HASP will be updated.

AMEC will oversee general contractor(s) (2006) and contractors (2007) and provide health and safety oversight for the majority of the Slag Removal (2006) and Supplemental Removal Action (2007) work tasks. For the supplemental removal activities (2007), the contractor (Clean Harbors) is responsible for the excavation and must fulfill the Competent Person duties in accordance with OSHA requirements. For the Tank Closure Activities (2008), AMEC personnel will observe the contractor (Clean Harbors) conducting the tank closure activities. AMEC personnel will also observe Clean Harbors installing the ASD systems (2008).

For the SSI, AMEC personnel will perform the surface soil sampling and will use a general contractor for work tasks performed on Mashapaug Pond. AMEC personnel will remain on shore and will handle samples once they are brought to shore by the general contractor. The general contractor shall execute work under their own corporate health and safety program and shall be expected to comply with this Site HASP and AMEC's safety and Health program. AMEC will provide copies of AMEC applicable boating safety programs including:

- Safe Boating Checklist
- Trailing Checklist
- Inland Special Circumstances
- Float Plan

- Aquatic Nuisance Plants

**Sampling Activities from a General Contractor’s Barge:**

For the Mashapaug Cove SSI (December 2011), AMEC personnel will perform the surface water and sediment sampling activities from the general contractor’s barge. One AMEC person will be stationed on the barge to collect the samples as described in the work plan, and one AMEC person will be stationed on shore. The general contractor will execute the operation of the vibracore rig in compliance with their own corporate health and safety program and will be expected to comply with this Site HASP as applicable.

**Phase I Soil Capping: Parcel C-1**

For the Phase I Soil Capping: Parcel C-1 (AMEC, 2012), AMEC will be observing and documenting the general contractor performing the following activities unless otherwise noted:

- Limited clearing and grubbing.
- Excavating and removing soil and slag materials.
- Collecting confirmatory samples from the excavations (AMEC collecting samples from excavator bucket).
- Replacing the exit chain-link fence to run along the Parcel C-1 boundary extending from the southwest corner near Adelaide Avenue along Parcel C and connecting to the existing fence at the top of slope behind the high school.
- Improving the conditions of the existing haul road.
- Grading of the site fill material and covering it with a fabric or liner and a soil cover.
- Restoring vegetation.
- Restoring, installing, and sampling groundwater monitoring wells (AMEC collecting groundwater samples).

AMEC’s HASP is meant to describe the site hazards in general and provide site information to the general contractor. This HASP is not designed to cover the general contractor personnel or their general contractors performing their activities. The general contractor is responsible for conducting the activities above in accordance with their own corporate health and safety program and JHAs, but is expected to comply with this Site HASP as applicable under OSHA regulations. Prior to initiation of Site work, AMEC shall provide a copy of the HASP to the general contractor.

## **4.0 HAZARD EVALUATION AND TASK ANALYSIS**

Job hazards include health hazards such as exposure to chemical contaminants and safety hazards such as injuries from equipment or physical conditions.

### **4.1 HEALTH HAZARDS**

Contaminants of Concern (COCs) that could be potential health hazards are listed in Table 4-1. The COCs listed have been detected in soil, sediment, and groundwater during previous investigations. The table includes the maximum concentrations detected historically across the entire Site in soils and in those samples from the portion of the Site where activities are planned (the Park Parcel). The maximum concentrations from sediment samples collected by RIDEM from Mashapaug Cove in 2005 are also shown. Established exposure limits, where applicable are shown in the table. Remedial measures have been implemented across some areas of the Site that would limit contact with COCs in surface soils. A soil cap has been constructed to isolate soils in the developed southeastern parcel. Portions of the Park Parcel, where soil sampling is planned during the SSI, will also be capped as part of planned remedial action.

The primary COCs at the facility are metals such as arsenic, copper, and lead, chlorinated solvents such as trichloroethene (TCE) and tetrachloroethylene (PCE) and their degradation byproducts, polynuclear aromatic hydrocarbons (PAHs) and petroleum fuel hydrocarbons. PCE, TCE and the degradation product vinyl chloride (VC) are treated as potential human carcinogens by the National Institute for Occupational Safety and Health (NIOSH). Health hazards to workers from COCs are principally related to the inhalation of dust with inorganic COCs such as lead and other metals, exposure to chlorinated solvents and PAHs via inhalation or dermal contact, and exposure to dioxin via inhalation.

Most activities that utilize heavy equipment have the potential to produce excessive noise. Exposure to noise over the OSHA action level (85 decibels) can cause temporary hearing impairment. Noise can also impair voice communication, increasing the risk of accidents.

Mashapaug Pond water is known to contain dioxins, furans and polychlorinated biphenyls (PCBs) that create a health hazard from ingestion. Some of the pond sediment and soil samples collected indicate that dioxins, furans, and PCBs are present in Site media. Although these contaminants can create a health hazard from ingestion, the health and safety procedures (e.g., washing hands,

work zones, etc.) outlined in this HASP will be implemented to reduce or eliminate exposure via this route. Airborne particles onto which contaminants have been adsorbed could be released from contaminated soil during activities that disturb the material. However, engineering controls (dust suppression) as described in this HASP will be implemented and followed during field activities to reduce or eliminate exposure via this route.

Various biological hazards may be present at the Site, depending on the season. Poison ivy is known to be present in and around the work area. Although the Site is in an urban setting, ticks should be assumed to be present and could result in exposure to Lyme disease. Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered as well as spiders such as the brown recluse.

## **4.2 SAFETY HAZARDS**

Potential safety hazards include work around operating construction equipment such as excavators and dump trucks.

Surface hazards from working or walking on uneven ground, such as slips, trips, and falls are present.

Heat stress and cold stress are not thought to be likely given the planned work schedule in May and June 2006 and the performance of work activities in Level D personal protective equipment (PPE). However, supplemental tasks (January/February 2007), tank closure activities (January 2008), and ASD installation activities (Fall 2008) are expected to be conducted during the colder months of the year, and therefore cold stress is likely to be a safety hazard. Phase I Soil Capping: Parcel C-1 activities are planned during the summer months of 2012; therefore heat stress may be an issue during these activities. Also, if PPE levels are upgraded during the performance of Site tasks, there would be an increased potential for temperature-related stresses.

Some tasks include handling of sharp objects (e.g., the retrieval of waste metal, fence construction, and sediment sampling) and therefore there is the risk of contact with sharp surfaces. Activities conducted by the general contractor such as clearing and grubbing, removing the existing chain link fence and installing a new one, also have the direct potential to cause injury to general contractor personnel from sharp objects. AMEC personnel will be observing these activities and are not expected to come in contact with sharp surfaces.

The sediment and surface water tasks and excavation near at the pond which include working on and near water have the potential for drowning and accidents related to boating safety. The general contractor must follow appropriate procedures to prevent hazards related to working on or near the water. A copy of AMEC's water safety procedures are attached to this HASP for AMEC's reference only. The pond is not generally used for recreational activities by the public due to its industrial setting, known impacts and published health advisories so the potential for interaction with the public while performing tasks on the pond is low.

The JHAs attached (Attachment B) provide extra detail and identify safe working procedures for various tasks described above.

### **4.3 CONCLUSIONS/HAZARD EVALUATION**

A potential respiratory hazard associated with contaminants in soil exists for invasive activities, particularly those activities that will disturb soils using equipment that could generate dust (e.g., road grading, tree clearing/grubbing and excavation of the slag pile (2006 and 2012) and contaminated soil (2007, 2008 and 2012). This hazard should be mitigated by the use of engineering controls such as water to suppress visible dust and dust that exceeds 0.5 mg/m<sup>3</sup> in air. Dermal exposure should be suppressed by use of task-specific PPE. Inhalation of volatile organic compounds (VOCs), especially VC (present in sediment), is possible from impacted soil and sediment and should be monitored to prevent respiratory exposure.

During indoor drilling/coring activities (2007 and 2008), the buildup of carbon monoxide and other hazardous gases from using petroleum-powered equipment may result in a hazardous atmosphere; therefore, AMEC will continuously monitor for oxygen, lower explosive limit (LEL) conditions, and carbon monoxide levels during those activities. In addition, monitoring will be conducted during all activities that have the potential to create a hazardous indoor atmosphere.

Low to moderate health hazards are associated with those activities in which dermal contact with contaminated environmental media can be made. These include sampling or excavation of soils and sediment with organic or inorganic constituents of concern.

A low to moderate degree of safety hazard is associated with expected general and specific site activities. Of particular concern are working on water, working near excavation equipment,

working near onsite treatment facilities, collecting metal debris, walking on irregular surfaces and debris, and drilling indoors.

JHA has been performed for the tasks judged to have the highest degree of potential hazard.

#### **4.4 PROTECTIVE MEASURES**

##### **4.4.1 Engineering Controls**

Due to the nature of tasks to be conducted, engineering controls may be warranted for site activities to suppress dust from the breathing zone. In particular, water will be used to suppress dust during grading and excavation of the slag and contaminated soils. Slag material presents low hazard for dust generation in its present form as rock-size fragments but contains lead and other metals that could be released as dust if the slag is crushed. Levels of dust will be visually monitored and water will be used periodically as necessary to dampen the material and suppress potential dust. Road grading activities (2006 and 2012) that extend onto the Park Parcel may also require dust suppression. Supplemental removal activities (2007) are not expected to require road grading. Tank closure activities (January 2008) are not expected to require dust suppression.

##### **4.4.2 Levels of Protection**

All activities will be initiated at Level D, unless otherwise indicated in Table 4-3, with provisions to upgrade to Level C respiratory protection.

**Table 4-1  
 Contaminants of Concern**

Compound	Maximum in Soils (Site wide Historic Results) <sup>1</sup>	Maximum in Park Parcel Soil <sup>2,3</sup>	Maximum in Pond Sediment <sup>3</sup>	Maximum in Groundwater <sup>1</sup>	Threshold Limit Values
Arsenic	124	67.8	244	NA	0.01 mg/m <sup>3</sup>
Cadmium	14	14.5	7.11	NA	0.005 mg/m <sup>3</sup>
Chromium	1,540	1,330	640	NA	0.005 mg/m <sup>3</sup> (TLV) Cr <sup>+6</sup>
Copper	26,300	8,760	2,670	NA	1 mg/m <sup>3</sup>
Dioxins <sup>4</sup>	-	3x10 <sup>-5</sup>	3x10 <sup>-5</sup>	-	2 ng/m <sup>3</sup> (200 pg/m <sup>3</sup> ) <sup>6</sup>
Furans <sup>5</sup>					
Lead	22,600	5,580	1120	NA	0.05 mg/m <sup>3</sup>
Nickel	5,380	390	853	NA	1 mg/m <sup>3</sup>
Silver	472	385	227	NA	0.01 mg/m <sup>3</sup>
Zinc	6,850	4,760	1,940	NA	10 mg/m <sup>3</sup> (total dust)  5 mg/m <sup>3</sup> (respirable dust)
Cyanide	4	0.5	ND	NA	5 mg/m <sup>3</sup>
1,2-dichloroethylene	<.050	ND	175	0.94	200 ppm
1,1-dichloroethane	NA	ND	7.92	<0.125	100 ppm
ethylbenzene	NA	ND	ND	NA	100 ppm
tetrachloroethene (PCE)	7.6	1.1	27	50	25 ppm
1,1,1-trichloroethane (TCA)	0.041	ND	6.65	3	350 ppm
Trichloroethene	0.195	6.1	88	7.2	10 ppm
Toluene	<0.025	ND	1.92	NA	20 ppm
vinyl chloride (VC)	NA	ND	24.8	<0.025	1 ppm
xylenes	NA	ND	ND	NA	100 ppm
Benzo(a)pyrene	25.3	48.4	7.87	NA	0.2 mg/m <sup>3</sup> (coal tar pitch vol)
Benzo(a)anthracene	25.3	50	15.1	NA	0.2 mg/m <sup>3</sup> (coal tar pitch vol)
Dibenzo(a,h)anthracene	4.8	10.5	1.45	NA	0.2 mg/m <sup>3</sup> (coal tar pitch vol)

Compound	Maximum in Soils (Site wide Historic Results) <sup>1</sup>	Maximum in Park Parcel Soil <sup>2,3</sup>	Maximum in Pond Sediment <sup>3</sup>	Maximum in Groundwater <sup>1</sup>	Threshold Limit Values
Benzo(b)fluoranthene	21.3	45	14.8	NA	0.2 mg/m <sup>3</sup> (coal tar pitch vol)
Indeno(1,2,3-cd)pyrene	11.7	27.9	2.47	NA	0.2 mg/m <sup>3</sup> (coal tar pitch vol)
Total Petroleum Hydrocarbons	NA	73,800	2600	NA	NA

<sup>1</sup> From Table 4.2, AMEC Health and Safety Plan 2001

<sup>2</sup> Database Query, April 2004

<sup>3</sup> Supplemental Site Investigation Report, Fuss & O'Neill April 2006

<sup>4</sup> Dioxin is a collective term for more than 200 compounds from the group of polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs), which belong to the chlorinated hydrocarbons (CHCs). Synonyms for dioxin include TCDD, TCDBD, dioxine and 2, 3, 7, 8-TCDD (the most toxic version). The maximum concentration is for 2,3,7,8-TCDD.

<sup>5</sup> Furan is the parent compound for a broad class of structurally related compounds.

<sup>6</sup> 1988 proposed exposure limit for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)

NE = Not Established

**Table 4-2  
 Personal Protective Equipment Lists**

<b>LEVEL OF PROTECTION</b>	<b>EQUIPMENT</b>
C	Full-face, air-purifying respirator with MSA GMC-H (or equivalent) cartridge (changed daily)
C	Coveralls (TYVEK™, or polycoated disposable coveralls if wet conditions are encountered in subsurface materials)
C	Vinyl Gloves (inner)
C	Nitrile Gloves (outer)
C	Safety Boots (chemical-resistant, steel-toed) or regular safety boots with vinyl boot covers
C	Hardhat (for work near heavy equipment and where overhead hazards exist)
C	Earplugs (for work near heavy equipment and when noise levels exceed 85 dBA)
<b>LEVEL OF PROTECTION</b>	<b>EQUIPMENT</b>
D	Coveralls
D	Nitrile Gloves (for activities with direct contact with media; work gloves for activities with no handling of media (e.g., fence construction))
D	Safety Boots (steel-toed, steel shank)
D	Hardhat (for work near heavy equipment and where overhead hazards exist). Hard hat must be worn for Task R (Sampling Activities from a General Contractor’s Barge) due to the presence of overhead hazards.
D	Earplugs (for work near heavy equipment and when noise levels exceed 85 dBA)
D	Safety glasses (for potential splash or projectile hazards)
D	Personal flotation device (PFD) for any work on or near the water (within 6 feet of water’s edge).
* Modified D	All of the above (except coveralls) and Chemical-Resistant Clothing (coated TYVEK™)

**4.5 AIR MONITORING AND ACTION LEVELS**

Potential risks from respirable dust exist due to the presence of lead and other metals such as chromium, arsenic, and silver in site soils.

During the slag removal in July 2006, the presence of airborne contaminants was evaluated through the use of direct reading instrumentation. Dust monitoring and exposure sampling was performed on field personnel involved in the actual slag excavation and during times of disturbance to surface soils. The information gathered was used to ensure the adequacy of the levels of protection being used at the site, and was used as the basis for upgrading or downgrading the levels of protection in conformance with action levels provided in this HASP and at the direction of the site HSO. Monitoring of the ambient air in the breathing zone was conducted using a photoionization detector (PID) and a dust meter during work tasks that were invasive such as road grading, tree grubbing, and slag pile and soil excavation.

Perimeter monitoring was also conducted to show that nearby residential populations and retail operations were not impacted by the slag excavation. Dust suppression was performed throughout the removal activities and included the spraying of water over the exposed soils on the dirt roadway and in the slag stockpile. In addition to perimeter monitoring around the excavation area, AMEC collected personal air samples on Site personnel with the greatest potential to exposure of Site contaminants to measure particulate lead and other Resource Conservation and Recovery Act (RCRA-8) metal concentrations. The AMEC field engineer, excavator operator, and laborer were fitted with personal air sampling pumps equipped with Mixed Cellulose Ester (MCE) air sampling filters. The samples were submitted for laboratory analysis of lead and RCRA-8 metals. No detections were identified at levels exceeding health criteria. Analytical results were below detection limits for the majority of samples collected. The highest concentration detected at the site was 0.0021 mg/m<sup>3</sup>, well below the OSHA personal exposure limits (PELs) of 0.05 mg/m<sup>3</sup> and the OSHA AL of 0.03 mg/m<sup>3</sup>. The personal air monitoring and analytical results are summarized in the Slag Removal Summary Report (MACTEC, 2006).

The monitoring requirements for each work task are described in Section 4.6 below. Contaminant specific data regarding permissible exposure levels are shown on Table 4-1. Upgrades levels are summarized in Table 4-3.

For Task S (Phase I Soil Capping: Parcel C-1), AMEC will conduct dust monitoring in the work zone and at the work area perimeter during activities that have the potential to disturb soil (grading, excavation, trenching, drilling) using hand held real-time continuous air monitoring instruments. Work area perimeter dust monitoring will be performed using the MIE DR4000 monitors or equivalent placed in cases weatherproof cases. These instruments measure aerosol

dust and will be set to automatically store data (data logging) for subsequent retrieval. One perimeter dust monitor will be placed on each of the four points outside and within 30 feet of the soil capping activities (North, South, East, and West) to confirm that nearby residential populations and retail operations are not impacted by the capping activities. Real-time dust monitoring will continue throughout the capping activities, unless a significant precipitation event occurs, at which time dust monitoring may be suspended per manufacturer specifications and standard industrial hygiene practices. The sustained respirable dust meter action level is 0.29 mg/m<sup>3</sup>. AMEC believes that this action level is protective of worker health under the OSHA lead standard and given the known levels of contaminants in Site soils. If this level is exceeded, AMEC instructed the contractor to use water to suppress dust as an engineering control. If this action level is sustained, AMEC will halt work and require upgrade to Level C PPE. It is important to note that the upgrade action level for (upgrading from Level D to Level C) was not exceeded at any time during the Slag Removal Action in July 2006.

Continuous visual monitoring of dust (particulate) levels will also be conducted and recorded in the Site field logbook. If visible dust conditions are sustained for more than one minute within the work zone, dust suppression methods (i.e., water spray) will be implemented to reduce airborne dust levels. Dust suppression will be performed throughout the capping activities as needed and will include spraying of fine mist of water over exposed soils to suppress dust as needed. A portable water tank containing municipal water or a nearby fire hydrant if approved by the city of Providence will be used as the water supply for dust suppression activities. If heavy precipitation (rain or snow) is adequate to suppress dust, additional water spray will not be applied.

The general contractor is responsible for conducting personal exposure monitoring using direct reading instruments and with the collection of personal air samples. The general contractor will use appropriate sampling pumps and media to collect and document time-weighted average exposures to lead and other metals.

A PID and an XRF instrument will be used at the site for soil sampling, sediment sampling, and excavation tasks as described below on Section 4.6. The XRF will be used to measure the lead content of soil.

The action level for upgrade from Level D to Level C respiratory protection (full face cartridge

respirator) during tasks conducted on the Park Parcel is sustained PID readings of 9 parts per million (ppm) in the breathing zone. VC has been reported in one recent sediment sample at levels above 1 mg/kg but has not been detected in Site soils. During the sediment sampling task, a PID will be used to screen the soil tubes upon opening. If a positive response is observed (i.e., >0.5 ppm response above general background), VC will be measured using Dräger tubes. If VC is detected in the breathing zone (at a minimum distance of one foot above the exposed sediment core) work will be halted until the levels subside or personnel will be required to upgrade to Level B respiratory protection.

Monitoring of the work environment will be undertaken for all tasks to ensure that Immediately Dangerous to Life or Health (IDLH) or other dangerous conditions are identified. Due to the nature of tasks to be conducted and the physical conditions of the site, this monitoring will include evaluations for hazardous concentrations of airborne contaminants. The Site upgrade levels are provided in the Table below.

For the tank closure activities (January 2008), AMEC does not anticipate airborne dust exposure hazards since the soil is frozen or wet, and most areas have some snow cover. In the event that dust is generated, immediate dust suppression methods (water spray) must be implemented to minimize the exposure potential.

For the ASD installation activities (Fall 2008), AMEC does not anticipate airborne dust exposure hazards. However, in the event that dust is generated, immediate dust suppression methods (water spray) must be implemented to minimize the exposure potential.

**Table 4-3  
 Site Upgrade/Action Levels**

TASK (Describe)	Anticipated LOP		Upgrade LOP			
	LOP	Sustained Airborne Levels	LOP	Sustained Airborne Levels	LOP	Sustained Airborne Levels
Tasks A, B, F, and H	D/Modified D. (see Section 4.6)	Airborne exposure hazards not expected; monitoring not required.				
Tasks D, I, J, M, N, and Q	D/Modified D. (see Section 4.6)	Total VOCs: 0 to 9 ppm	C	Total VOCs: > 9 to 25 ppm	Stop work and evaluate conditions	Total VOCs: > 25 ppm
Tasks C, E, G, K, L, and S	D/Modified D. (see Section 4.6)	Total VOCs: 0 to 9 ppm Dust: O 0.29 mg/m <sup>3</sup>	C	Total VOCs: > 9 to 25 ppm Dust: P 0.5 mg/m <sup>3</sup>	Stop work and evaluate conditions	Total VOCs: > 25 ppm Dust: > 1 mg/m <sup>3</sup>
Tasks O and P	Modified D	Total VOCs: 0 to 9 ppm Dust: O 0.5 mg/m <sup>3</sup> Carbon Monoxide: 25 ppm O <sub>2</sub> : > 19.5% and < 22.5% LEL: O 10%		Total VOCs: > 9 to 25 ppm Dust: >0.5 to 1 mg/m <sup>3</sup> Carbon Monoxide: 0 to 50 ppm O <sub>2</sub> : > 19.5% and < 22.5% LEL: O 10%	Stop work and evaluate conditions	Total VOCs: > 25 ppm Dust: > 1 mg/m <sup>3</sup> Carbon Monoxide: > 50 ppm O <sub>2</sub> : < 19.5% or >22.5% LEL: >10%
Task R	D (see Section 4.6)	Exposure to VOCs, dusts, carbon monoxide, and O <sub>2</sub> /LEL is not anticipated during the December 2011 surface water and sediment sampling activities. Therefore, air monitoring equipment is not required for this task.				
<b>THE DEFINITION OF “SUSTAINED”: THE AIRBORNE BREATHING ZONE CONCENTRATION REMAINS CONSTANT FOR 1 MINUTE.</b>						

#### **4.5.1 Personal Monitoring**

AMEC could not rule out the possibility of lead levels in the breathing zone above the action limit of 0.03 mg/m<sup>3</sup> in the breathing zone when excavating the slag material (2006), therefore, personal monitoring was conducted during this operation. Personal monitoring was conducted to characterize the worker exposure to lead through the monitoring of representative employees. Employee selection was based on work task and duration of exposure. Sampling was representative of a full shift and included at least one sample for each job classification. Sampling and analysis was done in accordance with NIOSH methodology. Samples were submitted for laboratory analysis of lead and RCRA-8 metals. All analytical results were well below the OSHA PELs.

Based on the extent of excavation activities conducted during the July 2006 Slag Removal Action and the amount of slag excavated, AMEC assumes the air monitoring and air sampling results represent “worst-case” conditions with respect to workers’ exposure potential to airborne contaminants. Therefore, dust monitoring and the collection of personal air samples are not necessary during the supplemental soil removal activities in 2007, the tank closure activities in January 2008, the Soil Vapor and Indoor Air (2007 & 2008) Investigation, ASD activities (Fall 2008), and groundwater investigation activities (2008-2009). However, engineering controls in the form of dust suppression must be continued throughout the supplemental removal action to ensure that airborne dust is not created during any intrusive activity. Dust monitoring will be conducted during the June 2012 Phase I Soil Capping: Parcel C-1 as described in Section 4.5 above.

#### **4.5.2 Perimeter Monitoring During Slag Excavation/Removal**

Perimeter monitoring was conducted in 2006 to document the dust emissions generated while excavating the slag. Sampling was conducted as follows:

- Perimeter monitoring stations were setup on four sides of the exclusion zone (e.g., north, south, east, and west).
- A portable weather station was established to record wind direction, approximate speed, etc.
- Monitoring was conducted using a TSI Dust TRAK portable particulate meter.

The complete results of the air monitoring and air samples collected during the slag removal in July 2006 are presented in the *Slag Removal Action Summary Report, AMEC September 2006*. As described previously, based on the results of the dust monitoring and the air samples collected for lead and RCRA-8 metals analysis, perimeter monitoring and worker personal air samples will not be collected during the

supplemental removal action (2007), the tank closure activities (2008), and the Phase 1 Soil Capping: Parcel C-1. Real-time dust monitoring will be conducted by AMEC as described in Section 4.5 and worker personal air samples will be collected by the general contractor during the Phase I Soil Capping: Parcel C-1.

#### **4.6 WORK TASK SUMMARY**

The field activities summarized in Section 2.0 have varying health and safety risks associated with them. The hazard evaluation associated with each activity and personal protective requirements are summarized as follows:

##### **Task A: Erosion Controls and Chain Link Fence**

**Hazard Evaluation:** Low degree of hazard. Exposure to COCs exist primarily via dermal contact. Physical hazards on site include uneven ground and sharp fencing material.

**Respiratory Protection and Monitoring:** Level D.

**Protective Clothing:** Level D with leather work gloves.

##### **Task B: Tree and Shrub Removal**

**Hazard Evaluation:** Low to moderate degree of hazard. Exposure to COCs exists primarily through inhalation of dust and dermal contact. Poison ivy is present in and around the work area. Cutting tools and a wood chipper present physical hazards.

**Respiratory Protection and Monitoring:** Modified Level D with work gloves (nitrile gloves not required).

**Protective Clothing:** Modified Level D.

##### **Task C: Temporary Access Road Grading and Loading Pad**

**Hazard Evaluation:** Exposure potential via inhalation during grading activities. Physical hazards on site include working around heavy equipment and uneven ground.

**Respiratory Protection and Monitoring:** Level D (see Table 4-2). Use dust monitor station immediately downwind. If sustained levels of  $0.5 \text{ mg/m}^3$  are observed, implement engineering controls such as water suppression and continue dust monitoring. If levels are still sustained above  $0.5 \text{ mg/m}^3$  upgrade to Level C. If PID readings in the breathing zone are detected during the work activity above 9 ppm, upgrade to Level C respiratory protection.

**Protective Clothing:** Modified Level D.

##### **Task D: Reconstruction or Decommissioning of Monitoring Well GZA-5**

**Hazard Evaluation:** Low degree of hazard. Highest Exposure potential via dermal contact with impacted soils and inhalation of VOCs.

**Respiratory Protection and Monitoring:** Level D. Monitor periodically during sampling with a PID. If readings in the breathing zone are detected during the work activity above 9 ppm, upgrade to Level C respiratory protection.

**Protective Clothing:** Level D.

**Task E: Excavation of Slag Material and Soil**

**Hazard Evaluation:** Low to moderate degree of hazard. Exposure potential via inhalation and slop stability considerations. Heavy equipment operation within limited work area.

**Respiratory Protection and Monitoring:** Modified Level D (see Table 4-2). As described previously, dust monitoring stations were used to monitor dust conditions immediately downwind of the work area. The action level of 0.5 mg/m<sup>3</sup> (sustained in the breathing zone) was implemented; however, based on the success of the implemented engineering controls (water suppression) and the results of the continued dust monitoring, the action level was not exceeded and therefore Level C upgrade was not necessary. Ambient air was monitored periodically during sampling using with a PID. Readings in the breathing zone never exceeded 9 ppm, therefore, upgrade to Level C respiratory protection was not necessary. Continuous PID monitoring will be performed during all intrusive work.

**Protective Clothing:** Modified Level D.

**Task F: Metal Debris Removal**

**Hazard Evaluation:** Low to moderate degree of hazard. Sharp edges of debris present potential physical hazard.

**Protective Clothing:** Level D, work gloves.

**Task G: Loading of Material Into Trucks for Transport Off-site**

**Hazard Evaluation:** Low to moderate degree of hazard. Exposure potential via inhalation during loading of material into trucks. As described previously, dust monitoring stations were used to monitor dust conditions immediately downwind of the truck loading area. The action level of 0.5 mg/m<sup>3</sup> (sustained in the breathing zone) was implemented; however, based on the success of the implemented engineering controls (water suppression) and the results of the continued dust monitoring, the action level was not exceeded and therefore Level C upgrade was not necessary. Ambient air was monitored periodically during sampling using with a PID. Physical hazards associated with loading and transport of slag material using heavy equipment.

**Respiratory Protection and Monitoring:** Level D.

**Protective Clothing:** Level D.

**Task H: Site Restoration**

**Hazard Evaluation:** Low to medium degree of hazard. Heavy equipment presents physical hazard.

**Protective Clothing:** Level D.

**Task I: Surface Soil Sampling**

**Hazard Evaluation:** Exposure potential via inhalation or dermal contact with organic contaminants.

**Respiratory Protection and Monitoring:** Level D (see Table 4-2). Monitor periodically during sampling with a PID. If readings in the breathing zone are detected during the work activity above 9 ppm, upgrade to Level C respiratory protection.

**Protective Clothing:** Level D.

**Task J: Surface Water and Sediment Sampling**

**Hazard Evaluation:** Surface waters do not pose a dermal or inhalation hazard. Exposure is possible primarily via dermal contact with low or moderate levels of organic or inorganic contaminants that may be present in sediment. The greatest potential for exposure exists when opening the plastic sediment tubes. Safety hazards include all aspects of working near and on water including the potential for drowning and boating accidents.

**Respiratory Protection and Monitoring:** Level D (see Table 4-2). Monitor the opening of each sediment tube with a PID. If readings are detected during the work activity, screen for VC using a Dräger tube. If VC is detected or VOCs are present in the breathing zone above 9 ppm, upgrade to Level C respiratory protection.

**Protective Clothing:** Level D.

**Task K: Geophysics**

**Hazard Evaluation:** Geophysics is not an invasive activity and there is little exposure to COCs. Safety hazards are present when operating a boat on water.

**Respiratory Protection and Monitoring:** None required.

**Protective Clothing:** Level D.

**Task L: Excavation of Soil Along Perimeter of Former Slag Pile Removal Area**

**Hazard Evaluation:** Low to moderate degree of hazard. Exposure potential via inhalation considerations. Heavy equipment operation within limited work area.

**Respiratory Protection and Monitoring:** Modified Level D (see Table 4-2). Implement engineering controls such as water suppression during all intrusive activities.

**Protective Clothing:** Modified Level D.

**Task M: Soil Sampling of Excavation and in the Area of Former Slag Pile Excavation**

**Hazard Evaluation:** Low to moderate degree of hazard. Exposure potential via inhalation considerations. Heavy equipment operation in the area. **Entry into any excavation that is not shored or sloped in accordance with OSHA requirements (29 CFR 1926 Subpart P-Excavations) is prohibited.**

**Respiratory Protection and Monitoring:** Level D (see Table 4-2). Monitor periodically during sampling with a PID. If readings in the breathing zone are detected during the work activity above 9 ppm, upgrade to Level C respiratory protection.

**Protective Clothing:** Modified Level D.

**Task N: Tank Closure Activities (near former Building N)**

**Hazard Evaluation:** Low to moderate degree of hazard. Exposure potential via inhalation considerations. Heavy equipment operation in the area. **Entry into any excavation that is not shored or sloped in accordance with OSHA requirements (29 CFR 1926 Subpart P-Excavations) is prohibited.**

**Respiratory Protection and Monitoring:** Level D (see Table 4-2). Monitor periodically during sampling with a PID. If readings in the breathing zone are detected during the work activity above 9 ppm, upgrade to Level C respiratory protection.

**Protective Clothing:** Modified Level D.

**Task O: Soil Vapor and Indoor Air Investigation**

**Hazard Evaluation:** Low to moderate degree of hazard. Exposure potential via inhalation considerations. Heavy equipment operation in the area and drilling indoors.

**Respiratory Protection and Monitoring:** Level D (see Table 4-2). Monitor continuously during activity with a PID. If readings in the breathing zone are detected during the work activity above 9 ppm, upgrade to Level C respiratory protection. Monitor continuously during indoor drilling activities with a multi-gas meter for oxygen, LEL, and carbon monoxide levels. Action levels for these gases are shown in Table 4-3.

**Protective Clothing:** Modified Level D.

**Task P: Construction of Active Soil Depressurization System at Existing Retail Building**

**Hazard Evaluation:** Low to moderate degree of hazard. Exposure potential via inhalation considerations. Heavy equipment operation in the area, and drilling indoors.

**Respiratory Protection and Monitoring:** Level D (see Table 4-2). Monitor continuously during activities with a PID. If total VOC readings in the breathing zone are detected during the work activity above 9 ppm, upgrade to Level C respiratory protection. Monitor continuously during indoor drilling activities with a multi-gas meter for oxygen, LEL, and carbon monoxide levels. Action levels for these gases are shown in Table 4-3 above.

**Protective Clothing:** Level D.

**Task Q: Groundwater Investigation Activities**

**Hazard Evaluation:** Low to moderate degree of hazard. Exposure potential via inhalation considerations. Heavy equipment operation in the area. Work on or near water.

**Respiratory Protection and Monitoring:** Level D (see Table 4-2). Monitor continuously during activities with a PID. If total VOC readings in the breathing zone are detected during the work activity above 9 ppm, upgrade to Level C respiratory protection.

**Protective Clothing:** Level D.

**Task R: Sampling Activities (Surface Water and Sediment) from a General Contractor's Barge**

**Hazard Evaluation:** Moderate degree of hazard. Barge operation. Drowning hazards - work on and near water. Cold weather extremes.

**Respiratory Protection and Monitoring:** Level D (see Table 4-2). Monitoring not required based on tasks.

**Protective Clothing:** Level D.

**Task S: Phase I Soil Capping Parcel D**

**Hazard Evaluation:** Low to moderate degree of hazard. Exposure potential via inhalation and dermal contact considerations. Heavy equipment and hand tools (chain saw, machete by general contractor) operation. Modified Level D (see Table 4-2). As described previously, dust monitoring stations will be installed to monitor dust conditions upwind and immediately downwind of the work area. The action level of 0.29 mg/m<sup>3</sup> (sustained in the breathing zone) will be implemented; however, based on the success of the implemented engineering controls (water suppression) and the results of previous dust monitoring, AMEC does not anticipate the action level to be exceeded. Therefore Level C upgrade is not anticipated during this task. Ambient air will also be monitored using a PID. Readings in the breathing zone exceed 9 ppm, will require upgrade to Level C respiratory protection; however, based on previous ambient air PID monitoring, AMEC does not anticipate upgrade to Level C respiratory protection for this task. Continuous PID monitoring will be performed during all intrusive work. **AMEC entry into any excavation is prohibited.**

**Respiratory Protection and Monitoring:** Modified Level D (see Table 4-2). Implement engineering controls such as water suppression during all intrusive activities.

**Protective Clothing:** Modified Level D.

## **5.0 SITE CONTROL**

### **5.1 ZONATION**

The general zonation protocols that should be employed at hazardous waste sites are described in Appendix G of the original 1994 HASP. The site-specific zonation that will be used for this project is described as follows:

The exclusion zone will be established as a 15-foot radius surrounding the excavations, stockpiles or on-site treatment equipment. The support zone will be established based on site access and road layouts. As discussed in Section 5.0 of this HASP, a decontamination station will be established within the contaminant reduction zone, between the exclusion and support zones.

#### **Signs:**

The following sign must be posted at the entrance to any area with a potential for lead levels to exceed the PEL (Slag excavation area).

**WARNING  
LEAD WORK AREA  
POISON  
NO SMOKING OR EATING**

## 5.2 COMMUNICATIONS

Site communications will be as follows:

<input checked="" type="checkbox"/>	Verbal	
<input type="checkbox"/>	Two-way radio	
<input checked="" type="checkbox"/>	Cellular telephone	
<input checked="" type="checkbox"/>	Hand signals	
	▪ Hand gripping throat .....	Out of air, can't breathe
	▪ Grip partner's wrist or both hands around waist .....	Leave area immediately
	▪ Hands on top of head .....	Need assistance
	▪ Thumbs up .....	OK, I am all right, I understand
	▪ Thumbs down .....	No, negative
<input type="checkbox"/>	Horn	
	▪ Help .....	Three short blasts ( . . . )
	▪ Evacuation .....	Three long blasts ( _ _ _ )
	▪ All Clear .....	Alternating long and short blasts ( _ . _ . )
<input type="checkbox"/>	Siren	
<input type="checkbox"/>	Other:	

## 5.3 WORK PRACTICES

Work practices will conform to AMEC corporate safety and health requirements. Briefings of specific safety practices will be conducted prior to the initiation of activities at the site.

## 5.4 DECONTAMINATION/DISPOSAL

Used PPE will be removed at the end of each work task or the end of the work day and placed in contractor trash bags for offsite disposal. Mud and dirt will be removed from disposable PPE to extent practical prior to placement in the bags and work boots will be rinsed at a designated location to remove accumulated dirt.

A sign will be placed near the decontamination station is and/or where equipment is decontaminated that states:

**CAUTION: CLOTHING CONTAMINATED WITH LEAD. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, OR FEDERAL REGULATIONS.**

All workers **MUST** shower at the end of the workday if there is a potential for lead levels to be above the PEL (Level C PPE is worn).

## 5.5 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATION

The site HSO or the Health and Safety designee is the primary authority for directing operations at the site under emergency conditions. All communications both on- and off-site will be directed through the HSO or designee. Points of contact at the redevelopment site will interact with the HSO or designee for communicating redevelopment-specific requirements.

## 5.6 EMERGENCY MEDICAL TREATMENT/FIRST AID

In the event that an on-site emergency develops, the procedures delineated in Table 5-1 are to be immediately followed.

**TABLE 5-1  
EMERGENCY PROCEDURES**

- The HSO (or alternate) should be immediately notified via the on-site communication system. The HSO assumes control of the emergency response.
- The HSO notifies the PM and client contact of the emergency. The HSO shall then contact the Northern Division HSE Manager (Cindy Sundquist) who will then contact the Corporate Director of ES&H.
- If applicable, the HSO shall notify off-site emergency responders (e.g., fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.
- If applicable, the HSO evacuates the site. Site workers should move to the predetermined evacuation point.
- For small fires, flames should be extinguished using the fire extinguisher. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE, including SCBAs, should be donned.
- If chemicals are accidentally spilled or splashed into eyes or on skin, use eyewash and/or shower.
- If a worker is injured, first aid shall be administered by certified first aid provider.
- An injured worker shall be decontaminated appropriately.
- After the response, the HSO shall follow-up with the required company reporting procedures, including the Incident Analysis Forms (Appendix D).

Injuries requiring medical treatment beyond first aid (as well as work-related vehicle incidents) will require the employee to submit a post incident drug test. It is the responsibility of the Supervisor/PM to ensure that the employee who has had an on-the-job incident as defined in AMEC (formerly MACTEC's) Human Resource Policy HR4-02B, Drug and Alcohol-Free Workplace Policy for Employees (in Section 3.2), submits to this required testing. The policy is located on the AMEC (formerly MACTEC) Intranet

under Human Resources for further information. The *Procedures for Post Accident and Reasonable Suspicion Testing* may be found on the Intranet (via the Incident Reporting Procedures link under “Medical Treatment”). Contact Cindy Sundquist, at (207) 828-3309, or Collette Myers at 770-360-0607, if you have any questions on incident-related drug testing.

#### **5.6.1 AMEC Early Injury Case Management Program**

If the emergency involves an injury to an AMEC employee, the HSE Coordinator or Field Lead are to implement the AMEC Early Injury Case Management program. See procedures below:

NON-EMERGENCY INCIDENT	EMERGENCY INCIDENT
<p>Steps 1 &amp; 2 must be completed before seeking medical attention other than local first aid.</p> <ol style="list-style-type: none"> <li>1. Provide first-aid as necessary. Report the situation to your immediate supervisor AND HSE coordinator (all incidents with the apparent starting event should be reported within 1 hour of occurrence).</li> <li>2. Injured employee:</li> </ol>	<ol style="list-style-type: none"> <li>1. Provide emergency first aid. Supervisor on duty must immediately call 911 or local emergency number; no employee may respond to outside queries without prior authorization. Any outside media calls concerning this incident must be referred immediately to Greg Simpson and Dave Heislein.</li> <li>2. Once medical attention is sought and provided, the supervisor must:</li> </ol>
<p><b>Call WorkCare 24/7 Hotline*</b>  <b>(888) II-XPRTS or (888) 449-7787</b></p>	
<p>WorkCare will assess the situation and determine whether the incident requires further medical attention. During this process, WorkCare will perform the following:</p> <ul style="list-style-type: none"> <li>• Explain the process to the caller.</li> <li>• Determine the nature of the concern.</li> <li>• Provide appropriate medical advice to the caller.</li> <li>• Determine appropriate path forward with the caller.</li> <li>• Maintain appropriate medical confidentiality.</li> <li>• Help caller to execute path forward, including referral to the appropriate local medical facility.</li> <li>• Send an email notification to the Corporate HSE Department.</li> </ul>	<p>WorkCare will be responsible for performing the following:</p> <ul style="list-style-type: none"> <li>• Contact the treating physician.</li> <li>• Request copies of all medical records from clinic.</li> <li>• Send an email update to the Corporate HSE Department.</li> </ul>
<ol style="list-style-type: none"> <li>1. IMMEDIATELY after contacting WorkCare send a brief email notification AND inform verbally (direct contact is required) ONE of HSE corporate representatives. See Incident Flow Chart.</li> <li>2. Make all other local notifications and client notifications.</li> <li>3. Local Supervisor, HSE Coordinator, HSO and any applicable safety committees to complete preliminary investigation, along with the initial Incident Report within 24 hours.</li> <li>4. Corporate Loss Prevention Manager to complete Worker’s Compensation Insurance notifications as needed.</li> <li>5. Corporate HSE to conduct further incident notifications, investigation, include in statistics, classify, and develop lessons learned materials.</li> </ol> <p><b>* - NOTE: Step 2 is only applicable to the North-American operations and to incidents involving AMEC personnel. High potential near misses, general contractors’ incidents, regulatory inspections, spills and property damages above \$1,000 should be reported immediately, following directions from Step 3.</b></p>	



## 5.7 EMERGENCY TELEPHONE NUMBERS

Police Department (Providence)	911
Primary Hospital: Rhode Island Hospital	(401) 444-4000
Fire Department (Providence)	911
Poison Control Center (Boston)	(800) 682-9211
Poison Control Center (National)	(800) 222-1222
Site HSO*: <u>To be determined (task specific)</u> <u>*as identified on the daily Record of Safety Meeting form</u>	(781) 245-6606
Project Manager: <u>David Heislein</u>	(781) 245-6606 (339) 927-3792 (Cell)
AMEC RHSE Mgr: <u>Cindy Sundquist</u>	(207) 828-3309 (207) 650-7593 (Cell)
AMEC HS Coordinator: Annette McLean	(978) 392-5396 (978) 697-1983 (Cell)
Textron Inc.: <u>Mr. Greg Simpson</u>	(401) 457-3577

### 5.7.1 Routes to Emergency Medical Facilities

The primary source of medical assistance for the site is Rhode Island Hospital

Exit the Site on Downing Street. At first major intersection, take a right onto Reservoir Avenue (Route 2). Watch for sign for route 10 South (approximately 1 mile along Reservoir Avenue). Take Route 10 to Route 95 North. Take Exit 18 (Thurbers Avenue); bear left onto Thurbers Avenue. At red light take right onto Eddy Street. Proceed 1-1/4 miles on Eddy Street to the Hospital.

## 6.0 ADMINISTRATION

### 6.1 PERSONNEL AUTHORIZED DOWNRANGE

Personnel authorized to participate in downrange activities at this site have been reviewed and certified for site operations by the PM and the Regional Health and Safety Manager (RHSM). Certification involves the completion of appropriate training, a medical examination, and a review of this site-specific HASP. All persons entering the site must use the buddy system, and check in with the Site Manager and/or HSO before going downrange.

#### CERTIFIED AMEC TEAM PERSONNEL:

Mark Maggiore\*+

Phil Muller\*+

Dave Chapman \*+

Leo Laviolette

Chris Mazzolini\*+

\_\_\_\_\_

Dave Heislein\*+

\_\_\_\_\_

#### OTHER CERTIFIED PERSONNEL:

\_\_\_\_\_

\_\_\_\_\_

\*FIRST-AID-TRAINED

†CPR-TRAINED

## 6.2 HASP APPROVALS

By their signatures, the undersigned certify that this HASP will be used for the protection of the health and safety of all persons entering this site. Signatures also serve as certification of completion of the hazard assessments as required by 29 CFR 1910.132.

\_\_\_\_\_  
Health and Safety Officer

\_\_\_\_\_  
Date

\_\_\_\_\_  
Project Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
Local HS Coordinator

\_\_\_\_\_  
Date

## 6.3 FIELD TEAM REVIEW

I have read and reviewed the health and safety information in the HASP. I understand the information and will comply with the requirements of the HASP.

SITE/PROJECT: Former Gorham Manufacturing Facility – Providence, RI

## 6.4 MEDICAL DATA SHEET(S)

Telephone: Area Code ( ) \_\_\_-\_\_\_\_

This Medical Data Sheet will be completed by all on-site personnel and kept in the Support Zone during site operations. It is not a substitute for the Medical Surveillance Program requirements consistent with the AMEC Corporate Health and Safety Program for Hazardous Waste Sites. This data sheet will accompany any personnel when medical assistance or transport to hospital facilities is required. If more space is required, use the back of this sheet.

Project: \_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Home Telephone: Area Code ( ) \_\_\_\_\_

Age: \_\_\_\_\_ Height: \_\_\_\_\_ Weight: \_\_\_\_\_

In case of emergency, contact: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: Area Code ( ) \_\_\_\_\_

Do you wear contact lenses? Yes ( ) No ( )

Allergies: \_\_\_\_\_

List medication(s) taken regularly: \_\_\_\_\_

Particular sensitivities: \_\_\_\_\_

Previous/current medical conditions or exposures to hazardous chemicals:

\_\_\_\_\_

Name of Personal Physician: \_\_\_\_\_

### 6.4.1 Emergency Telephone Numbers

#### Update all phone numbers

Police Department (Providence)	(401) 272-3121
Primary Hospital: Rhode Island Hospital	(401) 444-4000
Fire Department (Providence)	(401) 421-1293
Poison Control Center (Boston)	(800) 682-9211
Poison Control Center (National)	(800) 222-1222
Site HSO: <u>Mr. Phil Muller or Mr. Leo Laviolette</u>	(603) 315-4402
<hr/>	
Field Operations Leader: <u>Mr. Phil Muller or Mr. Leo Laviolette</u>	(603) 315-4402
<hr/>	
Project Manager: <u>Mr. Dave Heislein</u>	(781) 245-6606 (339) 927-3792 (Cell)
AMEC RHSE Mgr: <u>Ms. Cindy Sundquist</u>	(207) 828-3309 (207) 650-7593 (Cell)
Textron, Inc.: <u>Mr. Greg Simpson</u>	(401) 457-6007
DIGSAFE PERMIT NO. _____	

#### **6.4.2 Routes to Emergency Medical Facilities**

The primary source of medical assistance for the site is Rhode Island Hospital

Exit the Site on Downing Street. At first major intersection, take a right onto Reservoir Avenue (Route 2). Watch for sign for route 10 South (approximately 1 mile along Reservoir Avenue). Take Route 10 to Route 95 North. Take Exit 18 (Thurbers Avenue); bear left onto Thurbers Avenue. At red light take right onto Eddy Street. Proceed 1-1/4 miles on Eddy Street to the Hospital.

**HEALTH AND SAFETY PLAN  
PART II**

**FORMER GORHAM MANUFACTURING SITE  
333 ADELAIDE AVENUE  
PROVIDENCE, RHODE ISLAND**

**ATTACHMENTS**

**AMEC Environment & Infrastructure, Inc.**

**JANUARY 2007**

**Revised: January 11, 2008  
Revised: December 12, 2008  
Revised: October 29, 2009  
Revised: December 9, 2011  
Revised: June 13, 2012**

**ATTACHMENT A**  
**AIR MONITORING DATA WORK SHEET**

**Air Monitoring Work Sheet**

Sample Date: \_\_\_\_\_ Project Number: \_\_\_\_\_ Page \_\_\_ of \_\_\_  
 Sampled by: \_\_\_\_\_ Project Name: \_\_\_\_\_  
 Collection media: \_\_\_\_\_ Compound(s) sampled for: \_\_\_\_\_ Barometric pressure: \_\_\_\_\_ Temperature: \_\_\_\_\_

Sample Number	Pump Number and Type	Pump Flow Rate	Sample Start Time	Sample Stop Time	Total Sample Time	Total Sample Volume	Sample Location (if personal, note name and job)	Sample Results (mg/m <sup>3</sup> )

Notes (describe activities, unusual circumstances, weather conditions, etc.): \_\_\_\_\_

\_\_\_\_\_  
 Sampler's Signature: \_\_\_\_\_

## **ATTACHMENT B**

### **JOB HAZARD ANALYSIS FORMS**

- **FIELD WORK – GENERAL**
- **EXCAVATION AND BACKFILLING**
- **SOIL SAMPLING**
- **INSECT BITES AND STINGS**
- **GROUNDWATER SAMPLING**
- **SUB-SLAB INDOOR AIR SAMPLING**
- **SUBSLAB SOIL VAPOR SURVEY ACTIVITIES**
- **GROUNDWATER SAMPLING FROM A  
GENERAL CONTRACTOR’S BOAT/BARGE**
- **SURFACE WATER/SEDIMENT SAMPLING AND  
INSTALLING DIFFUSION SAMPLERS FROM SHORE**
- **GEOPROBE OVERSIGHT (Provided for Awareness Only)**
- **SAMPLING ACTIVITIES (SURFACE WATER AND  
SEDIMENT) FROM A GENERAL CONTRACTOR’S  
BARGE**
- **POISONOUS PLANTS**
- **CLEARING AND GRUBBING (Provided for Awareness  
Only)**



## Job Hazard Analysis

**Job Title:** Field Work - General

**Date of Analysis:** 06/11/2012

**Minimum Recommended PPE\*:** hard hat, steel-toed boots, safety glasses, hearing protection. Leather gloves when using power and hand tools.

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization/ See Mobilization/Demobilization and Site Preparation JHA Demobilization and Site Preparation	1A) See Mobilization/Demobilization and Site Preparation JHA	1A) See Mobilization/Demobilization and Site Preparation JHA
2. Communication	2A) Safety, crew unity	2A) Talk to each other. <ul style="list-style-type: none"> <li>▪ Log all workers and visitor on and off the site.</li> <li>▪ Let other crewmembers know when you see a hazard.</li> <li>▪ Avoid working near known hazard trees (trees that are rotten, dead, damaged, etc.).</li> <li>▪ Always know the whereabouts of fellow crewmembers.</li> <li>▪ Carry a radio and spare batteries or cell phone.</li> <li>▪ Review Emergency Evacuation Procedures (see below).</li> </ul>
3. Walking and working in the field	3A) Falling down, twisted ankles and knees, poor footing	3A) Always watch your footing. <ul style="list-style-type: none"> <li>▪ Horseplay is strictly prohibited</li> <li>▪ Slow down and use extra caution around logs, rocks, and animal holes.</li> <li>▪ Extremely steep slopes (&gt;50%) can be hazardous under wet or dry conditions; consider an alternate route.</li> <li>▪ Wear laced boots with a minimum 8" high upper and non-skid Vibram-type soles for ankle support and traction.</li> </ul>
	3B) Falling objects	3B) Protect head against falling objects. <ul style="list-style-type: none"> <li>▪ Wear your hardhat for protection from falling limbs and pinecones, and from tools and equipment carried by other crewmembers.</li> <li>▪ Stay out of the woods during extremely high winds.</li> </ul>
	3C) Damage to eyes	3C) Protect eyes: <ul style="list-style-type: none"> <li>▪ Watch where you walk, especially around trees and brush with limbs sticking out.</li> <li>▪ Exercise caution when clearing limbs from tree trunks. Advise wearing eye protection.</li> <li>▪ Ultraviolet light from the sun can be damaging to the eyes; look for sunglasses that specify significant protection from UV-A and UV-B radiation. If safety glasses require, use one's with tinted lenses</li> </ul>
	3D) Chemical/Toxicological Hazards	3D) Chemical/Toxicological Hazards <ul style="list-style-type: none"> <li>▪ See HASP for appropriate level of PPE</li> <li>▪ Use monitoring equipment, as outlined in HASP, to monitor breathing zone</li> <li>▪ Read MSDSs for all chemicals brought to the site</li> <li>▪ Be familiar with hazards associated with site contaminants.</li> <li>▪ Ensure that all containers are properly labelled</li> <li>▪ Decon thoroughly prior to consumption of food, beverage or tobacco.</li> </ul>
	3E) Bee and wasp stings	3E) See JHA for Insect Stings and Bites
	3F) Ticks and infected mosquitos	3F) See JHA for Insect Stings and Bites
	3G) Contact with Poisonous Plants	3G) See JHA for Poisonous Plants



## Job Hazard Analysis

**Job Title:** Field Work - General

**Date of Analysis:** 06/11/2012

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3H) Lifting Injuries (e.g., Back Injuries)	3H) Lifting Injuries (e.g., Back Injuries) <ul style="list-style-type: none"> <li>• Site personnel will be instructed on proper lifting techniques.</li> <li>• Perform warm-up exercises before starting work.</li> <li>• <b>DO NOT EXCEED THE AMEC LIFTING LIMIT OF 50 POUNDS.</b></li> <li>• Use two people to lift, lower, or carry equipment or materials heavier than 50 pounds.</li> <li>• Mechanical devices should be used to reduce manual handling of materials.</li> <li>• Drive the field vehicle as close to the point that the heavy equipment/material will be used as long as the area is safe to drive into and you do not create hazards to you, your co-worker, or the vehicle.</li> </ul>
	3I) Shoveling	3I) Shoveling <ul style="list-style-type: none"> <li>▪ Select the proper shovel for the task. A long handled, flat bladed shovel is recommend for loose material</li> <li>▪ Inspect the handle for splinters and/or cracks</li> <li>▪ Ensure that the blade is securely attached to the handle</li> <li>▪ Never be more than 15 inches from the material you are shoveling</li> <li>▪ Stand with your feet about hip width for balance and keep the shovel close to your body.</li> <li>▪ Bend from the knees (not the back) and tighten your stomach muscles as you lift.</li> <li>▪ Avoid twisting movements. If you need to move the snow to one side reposition your feet to face the direction the snow will be going.</li> <li>▪ Avoid lifting large shoveling too much at once. When lifting heavy material, pick up less to reduce the weight lifted.</li> <li>▪ Pace yourself to avoid getting out of breath and becoming fatigued too soon.</li> <li>▪ Be alert for signs of stress such as pain, numbness, burning and tingling. Stop immediately if you feel any of these symptoms.</li> </ul>
	3J) Slips/Trips/Falls	3J) Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Maintain work areas safe and orderly; unloading areas should be on even terrain; mark or repair possible tripping hazards.</li> <li>• Site SHSO inspect the entire work area to identify and mark hazards.</li> <li>• Be aware of work area conditions that can cause slip hazards such as ponding of water on concrete surfaces. Ponding of water on smooth surfaces, such as concrete, coupled with the warm or freezing weather conditions has the potential to cause slippery conditons such as growth of scum or ice, as applicable. Adding a layer of clean fill to the surface may prevent the growth of scum, and/or create a non-slippery walking surface.</li> </ul>
	3K) Vehicular Traffic	3K) Vehicular Traffic <ul style="list-style-type: none"> <li>▪ Spotters will be used when backing up trucks and heavy equipment and when moving equipment.</li> <li>▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads.</li> </ul>
	3L) Overhead Hazards	3L) Overhead Hazards <ul style="list-style-type: none"> <li>▪ Personnel will be required to wear hard hats that meet ANSI Standard Z89.1.</li> <li>▪ All ground personnel will stay clear of suspended loads.</li> <li>▪ All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects.</li> <li>▪ All overhead hazards will be identified prior to commencing work operations.</li> </ul>



## Job Hazard Analysis

**Job Title:** Field Work - General

**Date of Analysis:** 06/11/2012

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3M) Dropped Objects	3M) Dropped Objects <ul style="list-style-type: none"> <li>▪ Steel toe boots meeting ANSI Standard Z41 will be worn.</li> </ul>
	3N) Noise	3N) Noise <ul style="list-style-type: none"> <li>▪ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); all equipment will be equipped with manufacturer's required mufflers. Hearing protection shall be worn by all personnel working in or near heavy equipment.</li> </ul>
	3O) Eye Injuries	3O) Eye Injuries <ul style="list-style-type: none"> <li>▪ Safety glasses meeting ANSI Standard Z87 will be worn.</li> </ul>
	3P) Heavy Equipment (overhead hazards, spills, struck by or against)	3P) Heavy Equipment <ul style="list-style-type: none"> <li>▪ Equipment will have seat belts.</li> <li>▪ Operators will wear seat belts when operating equipment.</li> <li>▪ Do not operate equipment on grades that exceed manufacturer's recommendations.</li> <li>▪ Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>▪ Ground personnel will stay clear of all suspended loads.</li> <li>▪ Personnel are prohibited from riding on the buckets, or elsewhere on the equipment except for designated seats with proper seat belts or lifts specifically designed to carry workers.</li> <li>▪ Ground personnel will wear high visibility vests</li> <li>▪ Spill and absorbent materials will be readily available.</li> <li>▪ Drip pans, polyethylene sheeting or other means will be used for secondary containment.</li> <li>▪ Ground personnel will stay out of the swing radius of excavators.</li> <li>▪ Eye contact with operators will be made before approaching equipment.</li> <li>▪ Operator will acknowledge eye contact by removing his hands from the controls.</li> <li>▪ Equipment will not be approached on blind sides.</li> <li>▪ All equipment will be equipped with backup alarms and use spotters when significant physical movement of equipment occurs on-site, (i.e., other than in place excavation or truck loading).</li> <li>▪ Inspect rigging prior to each use.</li> </ul>
	3Q) Struck by vehicle/equipment	3Q) Struck by vehicle/equipment <ul style="list-style-type: none"> <li>▪ Be aware of heavy equipment operations.</li> <li>▪ Keep out of the swing radius of heavy equipment.</li> <li>▪ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times and will wear high visibility vests.</li> <li>▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone.</li> <li>▪ Ground personnel will not stand directly behind heavy equipment when it is in operation.</li> <li>▪ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop!</li> <li>▪ Spotters will be used when backing up trucks and heavy equipment and when moving equipment.</li> <li>▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads.</li> </ul>



## Job Hazard Analysis

**Job Title:** Field Work - General

**Date of Analysis:** 06/11/2012

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3R) Struck/cut by tools	3R) Struck/cut by tools <ul style="list-style-type: none"> <li>▪ Cut resistant work gloves will be worn when dealing with sharp objects.</li> <li>▪ All hand and power tools will be maintained in safe condition.</li> <li>▪ Do not drop or throw tools. Tools shall be placed on the ground or worksurface or handed to another employee in a safe manner.</li> <li>▪ Guards will be kept in place while using hand and power tools.</li> </ul>
	3S) Caught in/on/between	3S) Caught in/on/between <ul style="list-style-type: none"> <li>▪ Workers will not position themselves between equipment and a stationary object.</li> <li>▪ Workers will not wear long hair down (place in pony-tail and tuck into shirt) or jewelry if working with tools/machinery.</li> </ul>
	3T) Contact with Electricity/Lightning	3T) Contact with Electricity/Lighting <ul style="list-style-type: none"> <li>▪ All electrical tools and equipment will be equipped with GFCI.</li> <li>▪ Electrical extension cords will be of the "Hard" or "Extra Hard" service type.</li> <li>▪ All extension cords shall have a three-blade grounding plug.</li> <li>▪ Personnel shall not use extension cords with damaged outer covers, exposed inner wires, or splices.</li> <li>▪ Electrical cords shall not be laid across roads where vehicular traffic may damage the cord without appropriate guarding.</li> <li>▪ All electrical work will be conducted by a licensed electrician.</li> <li>▪ All utilities will be marked prior to excavation activities.</li> <li>▪ All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead powerlines known to be 50 kV or less and 35 feet from all others.)</li> <li>▪ The SHSO shall halt outdoor site operations whenever lightning is visible, outdoor work will not resume until 30 minutes after the last sighting of lightning.</li> </ul>
	3U) Equipment failure	3U) Equipment failure <ul style="list-style-type: none"> <li>▪ All equipment will be inspected before use. If any safety problems are noted, the equipment should be tagged and removed from service until repaired or replaced.</li> </ul>
	3V) Hand & power tool usage.	3V) Hand & power tool usage <ul style="list-style-type: none"> <li>▪ Inspect the tool daily.</li> <li>▪ Remove broken or damaged tools from service.</li> <li>▪ Use the tool for its intended purpose.</li> <li>▪ Use in accordance with manufacturers instructions.</li> <li>▪ See JHA for Power Tool Use - Electrical and Power Tool Use - Gasoline</li> </ul>



## Job Hazard Analysis

**Job Title:** Field Work - General

**Date of Analysis:** 06/11/2012

Key Work Steps	Hazards/Potential Hazards	Safe Practices				
	3W) Fire Protection	3W) Fire Protection <ul style="list-style-type: none"> <li>▪ Ensure that adequate number and type of fire extinguishers are present at the site</li> <li>▪ Inspect fire extinguishers on a monthly basis – document</li> <li>▪ All employees who are expected to use fire extinguishers will have received training on an annual basis.</li> <li>▪ Obey no-smoking policy</li> <li>▪ Open fires are prohibited</li> <li>▪ Maintain good housekeeping. Keep rubbish and combustibles to a minimum.</li> <li>▪ Keep flammable liquids in small containers with lids closed or a safety can.</li> <li>▪ When dispensing flammable liquids, do in well vented area and bond and ground containers.</li> </ul>				
4. Environmental health considerations	4A) HEAT Stress	4A) Take precautions to prevent heat stress <ul style="list-style-type: none"> <li>▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load.</li> <li>▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action.</li> </ul> <p>NOTE: The severity of the effects of a given environmental heat stress is decreased by reducing the work load, increasing the frequency and/or duration of rest periods, and by introducing measures which will protect employees from hot environments.</p> <ul style="list-style-type: none"> <li>▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability).</li> <li>▪ Allow approximately 2 weeks with progressive degrees of heat exposure and physical exertion for substantial acclimatization.</li> <li>▪ Acclimatization is necessary regardless of an employee's physical condition (the better one's physical condition, the quicker the acclimatization). Tailor the work schedule to fit the climate, the physical condition of employees, and mission requirements.               <ul style="list-style-type: none"> <li>▪ A reduction of work load markedly decreases total heat stress.</li> <li>▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization.</li> </ul> </li> <li>▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.</li> </ul>				
	4B) Wet Bulb Globe Temperature (WBGT) Index	4B) WBGT <ul style="list-style-type: none"> <li>▪ Curtail or suspend physical work when conditions are extremely severe (see attached Heat Stress Index).</li> <li>▪ Compute a Wet Bulb Globe Temperature Index to determine the level of physical activity (take WBGT index measurements in a location that is similar or closely approximates the environment to which employees will be exposed).</li> </ul> <p style="text-align: center;">WBGT THRESHOLD VALUES FOR INSTITUTING PREVENTIVE MEASURES</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;">80-90 degrees F</td> <td style="width: 50%; vertical-align: top;">Fatigue possible with prolonged exposure and physical activity.</td> </tr> <tr> <td style="vertical-align: top;">90-105 degrees F</td> <td style="vertical-align: top;">Heat exhaustion and heat stroke possible with prolonged exposure and physical activity.</td> </tr> </table>	80-90 degrees F	Fatigue possible with prolonged exposure and physical activity.	90-105 degrees F	Heat exhaustion and heat stroke possible with prolonged exposure and physical activity.
80-90 degrees F	Fatigue possible with prolonged exposure and physical activity.					
90-105 degrees F	Heat exhaustion and heat stroke possible with prolonged exposure and physical activity.					



## Job Hazard Analysis

**Job Title:** Field Work - General

**Date of Analysis:** 06/11/2012

Key Work Steps	Hazards/Potential Hazards	Safe Practices
		105-130 degrees F      Heat exhaustion and heat stroke are likely with prolonged heat exposure and physical activity.
	4C) Cold Extremes	4C) Take precautions to prevent cold stress injuries <ul style="list-style-type: none"> <li>▪ Cover all exposed skin and be aware of frostbite. While cold air will not freeze the tissues of the lungs, slow down and use a mask or scarf to minimize the effect of cold air on air passages.</li> <li>▪ Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended.</li> <li>▪ Take layers off as you heat up; put them on as you cool down.</li> <li>▪ Wear head protection that provides adequate insulation and protects the ears.</li> <li>▪ Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia.</li> <li>▪ Acclimate to the cold climate to minimize discomfort.</li> <li>▪ Maintain adequate water/fluid intake to avoid dehydration.</li> </ul>
	4D) Wind	4D) Effects of the wind <ul style="list-style-type: none"> <li>▪ Wind chill greatly affects heat loss (see attached Wind Chill Index).</li> <li>▪ Avoid marking in old, defective timber, especially hardwoods, during periods of high winds due to snag hazards.</li> </ul>
	4E) Thunderstorms	4E) Thunderstorms <ul style="list-style-type: none"> <li>▪ Monitor weather channels to determine if electrical storms are forecasted.</li> <li>▪ Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.)</li> <li>▪ Suspend all field work at the first sound of thunder. You should be in a safe place when the time between the lightning and thunder is less than 30 seconds.</li> <li>▪ Only return to work 30 minutes after the after the last strike or sound of thunder</li> </ul>
5. Check and calibrate industrial hygiene and other field instruments and	5A) Exposure to Calibration Gases/Chemicals due to: <ul style="list-style-type: none"> <li>• Use of damaged instruments.</li> </ul>	5A) Verify proper operation of the instrument prior to calibration. Calibrate instruments in an area with adequate ventilation and follow the manufacturer's recommendations. <ul style="list-style-type: none"> <li>▪ Wear appropriate PPE to conduct calibrations as specified in the instrument manual.</li> </ul>



## Job Hazard Analysis

**Job Title:** Field Work - General

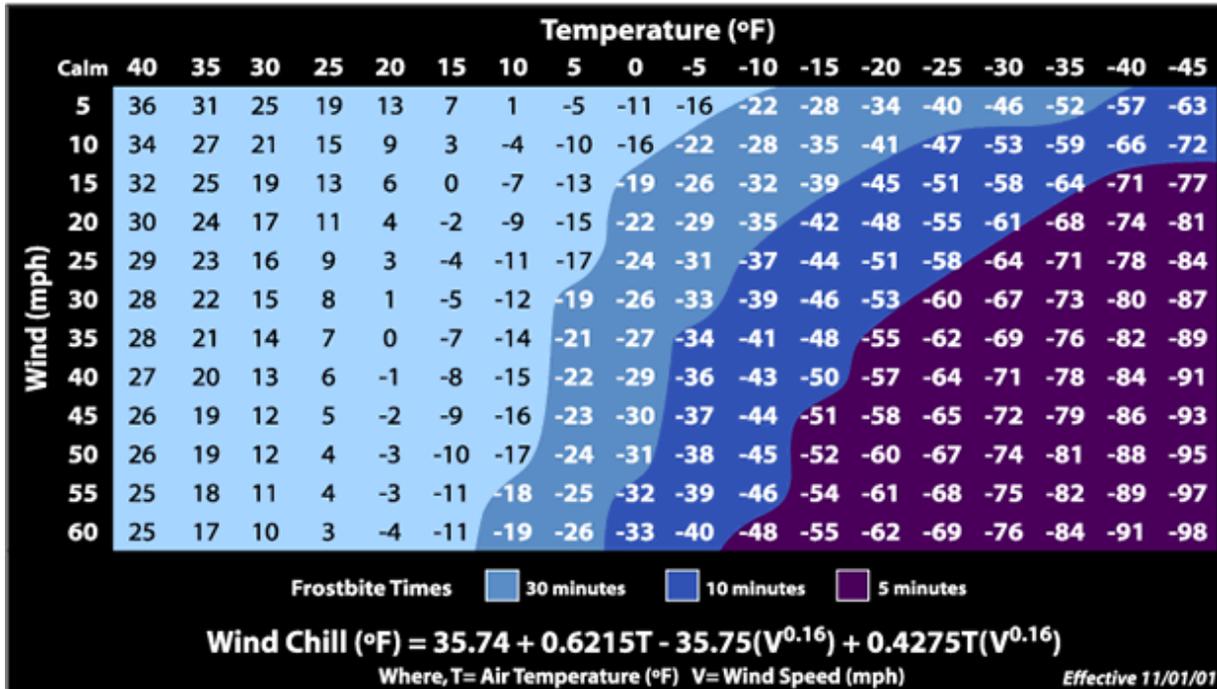
**Date of Analysis:** 06/11/2012

Key Work Steps	Hazards/Potential Hazards	Safe Practices
<p>equipment as required and as recommended by the manufacturer</p>	<p>5B) Exposure to Site contaminants due to:</p> <ul style="list-style-type: none"> <li>• Improper instrument calibration;</li> <li>• Misinterpretation of calibration results;</li> <li>• Improper instrument repair;</li> <li>• Improper use of instrument due to lack of training.</li> </ul>	<p>5B) Calibrate the instrument in accordance with the manufacturer's recommendations (see instrument manual) using the applicable calibration standard and calibration procedure.</p> <ul style="list-style-type: none"> <li>• Perform calibrations at a frequency recommended by the manufacturer. Be aware of the instrument's limitations (e.g., detection limit, maximum sensitivity) and the conditions (e.g., humidity) that may affect correct operation or accuracy of that equipment. Possible sources of error that may affect the correct calibration of the instrument.</li> <li>• Use only calibration materials recommended by the manufacturer for calibration. Do not use substitutions.</li> <li>• Confirm that the connections between the instrument and the calibration gas/material is leak-free.</li> <li>• Record all instrument calibrations in the field logbook. Include the instrument ID (type/manufacture/serial number/lamp eV, etc.), calibration gas used (chemical and concentration), and instrument result.</li> <li>• Do not attempt to repair instrument. Return to the vendor for replacement. Report any damaged or malfunctioning instrument to the vendor.</li> <li>• All personnel must be familiar with operation of the instrument and understand:               <ul style="list-style-type: none"> <li>- Theory of its operation including any alarms and their setpoints</li> <li>- Materials the instrument can and cannot detect,</li> <li>- Instrument's limitations</li> <li>- The expected responses to calibration gases/materials</li> <li>- Interfering gases/chemicals and their affects on the instrument readings</li> <li>- When re-zeroing is appropriate</li> </ul> </li> </ul>

<b>Heat Index Chart</b>																		
% Relative Humidity																		
		15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
T e m p e r a t u r e	110	108	112	117	123	130												
	105	102	105	108	113	117	122	130										
	100	97	98	102	104	107	110	115	120	126	132							
	95	91	93	95	96	98	100	104	106	109	113	119	124	130				
	90	86	87	88	90	91	92	95	97	98	100	103	106	110	114	117	121	
	85	81	82	83	84	85	86	87	88	89	90	92	94	96	97	100	102	
	80	76	77	78	78	79	79	80	81	82	83	84	85	86	87	88	89	
<b>Legend</b>																		
80-89 degrees		Fatigue is possible with prolonged exposure and/or physical activity.																
90-104 degrees		Sunstroke, heat cramps and heat exhaustion are possible with prolonged exposure and/or physical activity.																
105-129 degrees		Sunstroke, heat cramps and heat exhaustion are likely. Heat stroke is possible with prolonged exposure and/or physical activity.																
130+ degrees		Heatstroke/sunstroke is highly likely with continued exposure.																



# Wind Chill Chart





### Job Hazard Analysis

**Job Title:** Excavation and Backfilling

**Date of Analysis:** June 11, 2012

**Minimum Recommended PPE\*:** High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Identify location of underground utilities	1A) Encountering electrical, gas, communications, water, or other underground utility lines	1A) Identify utility locations prior to mobilizing: <ul style="list-style-type: none"> <li>▪ Contact "Dig Safe" and obtain a permit (or one call center) to have underground utilities located and marked prior to any subsurface work on site.</li> <li>▪ Confirm other utility providers (e.g., local water, sewer, etc.) have been notified and the utilities marked.</li> <li>▪ Use facility engineers and/or employ a private utility locator for utilities on private property.</li> <li>▪ Maintain utility markings throughout the duration of the field work. If the site activity will remove/destroy the original markers of underground installation(s), place offset markers prior any intrusive work to mark the location of the utilities. Pin flags in colors corresponding to the color code used by Dig Safe will be used to mark the offset and the path of all site utilities.</li> <li>▪ Work at adequate offsets from utility locations. For areas where utility locations cannot be verified, hand dig for the first 3 feet. Immediately cease work if unknown utility markings are discovered.</li> </ul>
2. Excavation of impacted soils	2A) Underground utilities	2A) Underground utilities <ul style="list-style-type: none"> <li>▪ Work at adequate offsets from utility locations</li> <li>▪ For areas where utility locations cannot be verified, workers must hand dig for the first 3 feet</li> <li>▪ Immediately cease work if unknown utility markings are discovered.</li> <li>▪ Conform to utility clearances based on voltage of lines. For powerlines of 50 KV or less stay at least 10 feet away. For powerlines of &gt; 50 KV, add an additional 0.4 inches per KV over 50 KV. Rule of thumb: Stay 10 feet away if powerline <u>known</u> to be 50 KV or less. Stay 35 feet away for lines &gt; 50 KV or if voltage is unknown.</li> </ul>
	2B) Vapor/Dust Exposure	2B) Vapor/Dust Exposure <ul style="list-style-type: none"> <li>▪ Conduct breathing zone air monitoring as described in the HASP.</li> <li>▪ Implement dust control measures as applicable as described in the HASP.</li> <li>▪ Wear proper PPE as described in the HASP.</li> </ul>
	2C) Odors	2C) Odors <ul style="list-style-type: none"> <li>▪ If applicable, implement odor control mitigation in accordance with the Site Management Plan.</li> </ul>
	2D) Heavy Equipment	2D) Heavy Equipment <ul style="list-style-type: none"> <li>▪ See General Site Hazards described in the HASP.</li> </ul>
	2E) Cave-ins	2E) Cave-ins Excavation work must be conduct in accordance with OSHA 1926 Subpart P (650-652) Excavations including but not limited to: <ul style="list-style-type: none"> <li>▪ AMEC personnel shall not enter the excavation for any reason.</li> </ul> The general contractor shall: <ul style="list-style-type: none"> <li>▪ Designate a competent person to inspect, decide soil classification, proper sloping, the correct shoring, or sheeting for the excavation.</li> </ul>

Key Work Steps	Hazards/Potential Hazards	Safe Practices
		<ul style="list-style-type: none"> <li>▪ Guard by a shoring system, slope of the ground, or some other equivalent means. Walls and faces of trenches 5 feet or more deep, and all excavations in which employees may be exposed to danger from moving ground or cave-in shall be guarded.</li> <li>▪ Cordon-off the perimeter of the excavation to delineate cave-in hazard area.</li> <li>▪ Construct diversion ditches or dikes to prevent surface water from entering excavation and provide good drainage of the areas surrounding the excavation.</li> <li>▪ Collect ground water/rain water from excavation and dispose of properly</li> <li>▪ Store spoils, materials and equipment at least 2 feet from the edge of the excavation; prevent excessive loading of the excavation face.</li> <li>▪ Inspect excavations (when personnel entry is required) daily, any time conditions change and document the inspection.</li> </ul>
	2F) Slips/Trips/Falls	2F) Slips/Trips/Falls The general contractor shall: <ul style="list-style-type: none"> <li>▪ Provide sufficient egress (stairs, ladders, or ramps) when workers enter excavations over 4 feet in depth, and place these structures so that workers travel no more than 25 feet to reach ladders. Provide at least two means of exit for personnel working in excavations.</li> <li>▪ Maintain minimum safe distance from the excavation and only approach the excavation on the short side.</li> </ul>
	2G) Confined Space	2G) Confined Space <b>AMEC personnel are not authorized to enter excavations. Soil samples will be collected from the excavator bucket. No exceptions.</b> <ul style="list-style-type: none"> <li>▪ Treat excavations over 4 feet deep as confined spaces and implement confined space permit entry procedure prior to entry.</li> <li>▪ Monitor atmosphere in excavation for oxygen, flammable then toxic vapors, in that order.</li> <li>▪ Implement confined space entry JHA.</li> </ul>
	2H) Site Security	2H) Site Security <ul style="list-style-type: none"> <li>▪ Fill in excavation prior to leaving the site or provide barricades or fencing (able to withstand 200 lbs. of vertical pressure) to protect the excavation from the public and place warning signs on fence/barricade.</li> <li>▪ Consider hiring a security guard</li> <li>▪ If cover excavation with plywood or other material, ensure cover is labeled with the words "cover" or "hole."</li> </ul>
3) Backfilling of Soils	3A) Heavy Equipment	3A) Heavy Equipment <ul style="list-style-type: none"> <li>▪ See General Site Hazards (Heavy Equipment)</li> </ul>
	3B) Cave-ins	3B) Cave-ins <ul style="list-style-type: none"> <li>▪ See 2E above.</li> </ul>

Completed by: Annette McLean

Date: 06/11/2012

<b>Job Hazard Analysis</b>		
<b>Job Title:</b> <u>Groundwater Sampling</u>		
<b>Date of Analysis:</b> <u>1/11/2008</u>		
<b>Minimum Recommended PPE*:</b> <u>steel-toed boots, safety glasses, chemical resistant gloves</u>		
<b>*See HASP for all required PPE</b>		
<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
1. Prepare for sampling event	1A) Chemical exposure	1A) Chemical Exposure <ul style="list-style-type: none"> <li>▪ Read HASP and determine air monitoring and PPE needs.</li> </ul>
2. Carrying equipment to well	2A) Back or muscle strain	2A) Back or muscle strain <ul style="list-style-type: none"> <li>▪ Use proper lifting techniques when lifting pumps or generators.</li> <li>▪ Use mechanical aids if available.</li> <li>▪ Use 2 person lift for heavy items.</li> </ul>
3. Calibrate monitoring equipment	3A) Exposure to calibration gases	3A) Exposure to calibration gases <ul style="list-style-type: none"> <li>▪ Review equipment manuals.</li> <li>▪ Calibrate in a clean, well ventilated area.</li> </ul>
4. Opening the well cap, taking water level readings	4A) Contact with poisonous plants or the oil from poisonous plants	4A) Contact with poisonous plants or the oil from those plants: <ul style="list-style-type: none"> <li>▪ Look for signs of poisonous plants and avoid.</li> <li>▪ Wear PPE as described in the HASP.</li> <li>▪ Do not touch anything part of your body/clothing.</li> <li>▪ Always wash gloves before removing them.</li> <li>▪ Discard PPE in accordance with the HASP.</li> </ul>
	4B) Contact with biting insects (i.e., spiders, bees, etc.) which may have constructed a nest in the well cap/well.	4B) Contact with stinging/biting insects <ul style="list-style-type: none"> <li>▪ Discuss the types of insects expected at the Site and be able to identify them.</li> <li>▪ Look for signs of insects in and around the well.</li> <li>▪ Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the JHA "Insects Stings and Bites."</li> <li>▪ If necessary, wear protective netting over your head/face.</li> <li>▪ Avoid contact with the insects if possible.</li> <li>▪ Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable.</li> </ul> Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.
	4C) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated groundwater/soil); liquid splash; flammable atmospheres.	4C) Exposure to hazardous substances <ul style="list-style-type: none"> <li>▪ After the initial headspace reading (if required by the Work Plan), allow the well to vent for several minutes before obtaining water level and before sampling.</li> <li>▪ Wear PPE as identified in HASP.</li> <li>▪ Review hazardous properties of site contaminants with workers before sampling operations begin.</li> <li>▪ Monitor breathing zone air in accordance with HASP to determine levels of contaminants present.</li> <li>▪ When decontaminating equipment wear additional eye/face protection over the safety glasses such as a face shield.</li> </ul>

<b>Job Hazard Analysis</b>		
<b>Job Title:</b> <u>Groundwater Sampling</u>		<b>Date of Analysis:</b> <u>1/11/2008</u>
<b>Minimum Recommended PPE*:</b> <u>steel-toed boots, safety glasses, chemical resistant gloves</u>		
<b>*See HASP for all required PPE</b>		
<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
	4D) Back strain due to lifting bailers or pumps and from moving equipment to well locations	4D) Back strain <ul style="list-style-type: none"> <li>▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items.</li> <li>▪ Use proper lifting techniques</li> </ul>
	4E) Foot injuries from dropped equipment	4E) Foot Injuries <ul style="list-style-type: none"> <li>▪ Be aware when moving objects, ensure you have a good grip when lifting and carrying objects.</li> <li>▪ Do not carry more than you can handle safely.</li> <li>▪ Wear Steel toed boots.</li> </ul>
5. Collecting water samples	5A) Fire/Explosion/Contamination hazard from refueling generators	5A) Fire/Explosion/Contamination hazard from refueling generators <ul style="list-style-type: none"> <li>▪ Turn the generator off and let it cool down before refueling.</li> <li>▪ Segregate fuel and other hydrocarbons from samples to minimize contamination potential.</li> <li>▪ Transport fuels in approved safety containers. The use of containers other than those specifically designed to carry fuel is prohibited.</li> <li>▪ See JHA for Gasoline use.</li> </ul>
	5B) Electrocutation	5B) Electrocutation <ul style="list-style-type: none"> <li>▪ A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits.</li> <li>▪ Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off.</li> <li>▪ Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water.</li> <li>▪ Do not stand in wet areas while operating power equipment.</li> <li>▪ Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced.</li> <li>▪ When unplugging a cord, pull on the plug rather than the cord.</li> <li>▪ Never do repairs on electrical equipment unless you are both authorized and qualified to do so.</li> </ul>
	5C) Exposure to contaminants	5C) Exposure to Contaminants <ul style="list-style-type: none"> <li>▪ Stand up wind when sampling.</li> <li>▪ Monitor breathing zone with appropriate monitoring equipment (see HASP).</li> <li>▪ Wear chemical resistant PPE as identified in HASP.</li> <li>▪ See section 4C) under Safe Practices above.</li> </ul>
	5D) Infectious water born diseases	5D) Infectious water born diseases <ul style="list-style-type: none"> <li>▪ Wear chemical resistant gloves and other PPE – as identified in HASP.</li> <li>▪ Prevent water from contacting skin.</li> <li>▪ Wash exposed skin with soap and water ASAP after sampling event.</li> <li>▪ Ensure that all equipment is adequately decontaminated using a 10% bleach solution.</li> </ul>

<b>Job Hazard Analysis</b>		
<b>Job Title:</b> <u>Groundwater Sampling</u>		
<b>Date of Analysis:</b> <u>1/11/2008</u>		
<b>Minimum Recommended PPE*:</b> <u>steel-toed boots, safety glasses, chemical resistant gloves</u>		
<b>*See HASP for all required PPE</b>		
<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
	5E) Exposure to water preservatives	5E) Exposure to water preservatives <ul style="list-style-type: none"> <li>▪ Work in a well ventilated area, upwind of samples.</li> <li>▪ Wear chemical resistant PPE as identified in HASP.</li> <li>▪ When preserving samples always add acid to water, avoid the opposite.</li> <li>▪ See JHA Acids – Sampling.</li> </ul>
	5F) Slips/trips/falls	5F) Slips/trips/falls <ul style="list-style-type: none"> <li>▪ Ground can become wet/muddy, created by spilled water.</li> <li>▪ Place all purged water in drums for removal.</li> <li>▪ Wear good slip resistant footwear.</li> </ul>
	5G) Repetitive Motion and other Ergonomic Issues	5A) Ergonomic Issues <ul style="list-style-type: none"> <li>▪ Use mechanical means where possible to raise and lower equipment into well.</li> <li>▪ Alternate raising and lowering equipment between field sampling team members, and alternate bailing the well.</li> <li>▪ Use safe lifting techniques.</li> </ul>
6. Sample Processing	6A) Contaminated water	6A) Contaminated water <ul style="list-style-type: none"> <li>▪ Wear appropriate PPE as identified in HASP.</li> <li>▪ Prevent water from contacting skin.</li> <li>▪ Work in well ventilated area – upwind of samples.</li> <li>▪ Waste will be returned to the operation office for storage and disposal.</li> </ul>
7. Shipping Samples	7A) Freeze burns, back strain, hazardous chemical exposure, sample leakage	7A) Freeze burns, back strain, hazardous chemical exposure, sample leakage <ul style="list-style-type: none"> <li>▪ Wear appropriate chemical resistant gloves as identified in HASP.</li> <li>▪ Wear leather or insulated gloves when handling dry ice.</li> <li>▪ Follow safe lifting techniques – get help lifting heavy coolers.</li> <li>▪ Samples that contain hazardous materials under the DOT definition, must be packaged, manifested and shipped by personnel that have the appropriate DOT HAZMAT training.</li> </ul>

<b>Job Hazard Analysis - HASP Format</b>		
<b>Job Title: Groundwater Sampling from a General Contractor’s Boat/Barge Date of Analysis: 12/11/08</b>		
<b>Minimum Recommended PPE*: Safety boots/Shoes; Personal Flotation Device; Safety Glasses</b>		
<b>*See HASP for all required PPE</b>		
<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
1) Prepare for site visit	1A) Slips, trips, falls	1A) Slips, trips, falls <ul style="list-style-type: none"> <li>▪ Familiarize self with site prior to visit.</li> <li>▪ Complete appropriate training before going on site.</li> <li>▪ Ensure the General Contractor has appropriate trained staff to operate the boat/barge.</li> <li>▪ Provide the Project Manager your field work itinerary so that he/she knows your daily schedule.</li> <li>▪ Prepare listing of emergency phone numbers, both on and offsite.</li> <li>▪ Identify site/activity PPE needs – see HASP.</li> <li>▪ Ensure that First Aid training is current.</li> </ul>
2. Working at the site	2A) General Field Work – Walking and working in the field, Environmental conditions, communication	2A) See JHA for Field Work – General.
3. Weather Extremes	3A) Weather extremes (thunder, wind, etc.)	3A) See JHA for Field Work – General.
4. Working Near or in the Water	4A) Drowning Hazards	4A) Drowning Hazards The General Contractor must: <ul style="list-style-type: none"> <li>▪ Inspect the vessel to ensure it is safe to use (no holes, defects, etc.).</li> <li>▪ Ensure that the anchors are adequate weight and the anchor ropes are adequate lengths to securely anchor the vessel in the water at each sampling location.</li> <li>▪ Attach a safety line anchored to a stable point on shore to the vessel if the body of water is fast moving.</li> <li>▪ Do not overload the vessel.</li> <li>▪ Distribute the weight of people and equipment evenly to keep the vessel stable.</li> <li>▪ Keep the load as low as possible and secure equipment to prevent it from shifting and affecting the stability of the vessel.</li> <li>▪ When entering or exiting the vessel, maintain three points of contact (with the vessel) and stay low to maintain balance.</li> </ul>

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<b>Job Title: Groundwater Sampling from a General Contractor’s Boat/Barge Date of Analysis: 12/11/08</b>		
<b>Minimum Recommended PPE*: Safety boots/Shoes; Personal Flotation Device; Safety Glasses</b>		
<b>*See HASP for all required PPE</b>		
Key Work Steps	Hazards/Potential Hazards	Safe Practices
		<ul style="list-style-type: none"> <li>▪ All personnel working on or near the water must:</li> <li>▪ Don a Coast Guard approved personal flotation device (PFD) rated for your weight when working within 6 feet of the water’s edge. Keep the PFD fastened at all times. Due to the amount of gear, equipment, etc. that personnel will need to transport, a Coast Guard-approved inflatable PFD may be used in lieu of the standard type PFD.</li> <li>▪ Do not lean your shoulders too far outside of the vessel as this can capsize the vessel.</li> <li>▪ Stay away from dams. It is illegal and dangerous to boat near them.</li> <li>▪ Stay clear of “strainers” (fallen trees, branches, etc.).</li> </ul> <p><b>Rescue Procedures</b></p> <ul style="list-style-type: none"> <li>▪ If you fall out of the vessel, hold onto the vessel - unless it presents a life-threatening situation. If floating in current, position yourself on the upstream side of the capsized vessel. Keep your feet up (on the surface) and pointed downstream and swim to shore.</li> <li>▪ Swim to calm water before attempting to stand up in the water.</li> </ul>
5. Load/carry equipment to the site.	5A) Slips, trips, falls	5A) Slips, trips, falls <ul style="list-style-type: none"> <li>▪ See JHA Field Work – General.</li> </ul>
	5B) Irrate property owners, pets	5B) Irrate property owners, pets <ul style="list-style-type: none"> <li>▪ Call property owners in advance.</li> <li>▪ Check in to introduce yourself upon arrival.</li> <li>▪ Be courteous and diplomatic</li> </ul>

<b>Job Hazard Analysis - HASP Format</b>		
<b>Job Title: Groundwater Sampling from a General Contractor’s Boat/Barge Date of Analysis: 12/11/08</b>		
<b>Minimum Recommended PPE*: Safety boots/Shoes; Personal Flotation Device; Safety Glasses</b>		
<b>*See HASP for all required PPE</b>		
<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
	5C) Crime	5C) Crime <ul style="list-style-type: none"> <li>▪ Do not enter areas where threats are present.</li> <li>▪ Contract security where applicable. Use the buddy system.</li> <li>▪ Maintain contact with support such as radio or cell phone.</li> </ul>
	5D) Struck by traffic – General Contractor launches vessel.	5D) Struck by traffic – General Contractor launches vessel. <ul style="list-style-type: none"> <li>▪ Wear high-visibility safety vest, use buddy system.</li> <li>▪ Use traffic cones and a lookout. Have the General Contractor launch the vessel from public boat launch facilities if available.</li> </ul>
	5E) Battery handling – acid exposure	5E) Battery handling – acid exposure <ul style="list-style-type: none"> <li>▪ AMEC personnel shall not touch nor operate any of the General Contractor’s vessel equipment.</li> </ul>

<b>Job Hazard Analysis - HASP Format</b>		
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<b>*See HASP for all required PPE</b>		
<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
	5F) Working on the boat/barge: Capsize	5F) Working on the boat/barge: Capsize <ul style="list-style-type: none"> <li>▪ Ascertain from the General Contractor’s supervisor the vessel’s maximum weight, person capacity, and engine size limit.</li> <li>▪ Balance the gear and people on the vessel.</li> <li>▪ All personnel near the water or on water must wear approved, properly sized and buckled Coast Guard-approved PFD suited to their weight.</li> <li>▪ Ensure vessel lines and body parts are out of the water before the vessel engine is turned on.</li> <li>▪ General Contractor should provide signal flags and communication to protect the public of vessel activities where applicable.</li> <li>▪ General Contractor should test the motor prior to shoving away from the launch dock/pier/platform.</li> <li>▪ The General Contractor must ensure that all appropriate equipment (e.g., fire extinguisher, life ring with at least 90 feet of rope, etc.) is provided and accessible according to Coast Guard safe boating recommendations. The General Contractor must include a bailer, anchor, second means of propulsion, line and throwable floatation, etc. See the AMEC EH&amp;S Manual – Boating Safety for examples of these equipment.</li> </ul>
	5G) Noise – engine (if applicable – noise at 85 decibels or greater)	5G) Noise – engine (if applicable – noise at 85 decibels or greater) <ul style="list-style-type: none"> <li>▪ Wear hearing protection.</li> </ul>

<b>Job Hazard Analysis - HASP Format</b>		
<b>Job Title: Groundwater Sampling from a General Contractor’s Boat/Barge Date of Analysis: 12/11/08</b>		
<b>Minimum Recommended PPE*: Safety boots/Shoes; Personal Flotation Device; Safety Glasses</b>		
<b>*See HASP for all required PPE</b>		
<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
6. Collecting Field parameters	6A) Falling into water and capsize	6A) Falling into water and capsize <ul style="list-style-type: none"> <li>▪ General Contractor shall use equipment that facilitates reaching the sampling location from a safe distance (extensions, etc.).</li> <li>▪ Work using the buddy system.</li> <li>▪ Wear PFD when working on the water.</li> <li>▪ The General Contractor must balance equipment and people and anchor or secure the vessel at the sample location.</li> <li>▪ AMEC person should remain in an area on the vessel that is out of the way of operating equipment, etc.</li> <li>▪ Avoid leaning over the side of the boat/barge.</li> <li>▪ General Contractor should steer vessel to meet waves on the bow.</li> <li>▪ If moving about, keep weight low.</li> </ul>
	6B) Slips trips and falls	6B) Slips trips and falls <ul style="list-style-type: none"> <li>▪ Wear appropriate safety-toe, non-slip footwear.</li> <li>▪ Survey and clear walking area.</li> <li>▪ Do not walk on slippery surfaces.</li> <li>▪ Maintain good housekeeping.</li> <li>▪ Provide walkways, platforms or secure walking surface.</li> <li>▪ Use the buddy system and maintain communications with support staff.</li> </ul>

<b>Job Hazard Analysis - HASP Format</b>		
<b>Job Title: Groundwater Sampling from a General Contractor’s Boat/Barge Date of Analysis: 12/11/08</b>		
<b>Minimum Recommended PPE*: Safety boots/Shoes; Personal Flotation Device; Safety Glasses</b>		
<b>*See HASP for all required PPE</b>		
<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
	6C) Vermin, leaches, Insect/animal born disease	6C) Vermin, leaches, Insect/animal born disease <ul style="list-style-type: none"> <li>▪ Survey the area for dens, nests, etc.</li> <li>▪ Identify areas where biological hazards may be present.</li> <li>▪ Be aware of your surroundings.</li> <li>▪ Wear insect netting clothing or apply insect repellent on all exposed skin surfaces as appropriate – consider sample contamination.</li> <li>▪ Wear long sleeve shirt and full-length pants.</li> <li>▪ Do not put hand/arm into/under an area that you cannot see into/under clearly.</li> <li>▪ Do not touch any suspected contaminant without appropriate hand PPE.</li> <li>▪ Wash hands as soon as possible upon completion of task.</li> <li>▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers. Ticks may be present during colder months.</li> <li>▪ Remain vigilant and respectful of wildlife. (See JHA for Insects, Stings and Bites.)</li> <li>▪ Wear wind impervious outerwear.</li> </ul>

<b>Job Hazard Analysis - HASP Format</b>		
<b>Job Title: Groundwater Sampling from a General Contractor’s Boat/Barge Date of Analysis: 12/11/08</b>		
<b>Minimum Recommended PPE*: Safety boots/Shoes; Personal Flotation Device; Safety Glasses</b>		
<b>*See HASP for all required PPE</b>		
<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
	6D) Run aground – shifting or unbalanced vessel - equipment/personnel/slip/fall/overboard	6D) Run aground – shifting or unbalanced vessel – equipment/personnel/slip/fall/overboard <ul style="list-style-type: none"> <li>▪ The General Contractor must operate the vessel at a safe speed.</li> <li>▪ The General Contractor should post a look out for shallow or submerge obstacles.</li> <li>▪ Remain seated (if applicable) when under way.</li> <li>▪ The General Contractor should be aware and alert for signs of tides, flooding, flash floods, and dam releases.</li> <li>▪ The General Contractor should use the anchor line or a pole/paddle to pull the vessel back toward the way direction of deeper water.</li> </ul>
7. Sample collection	7A) Same as Item #6 above.	7A) Same as Item #6 above.
	7B) Bending, pulling, twisting	7B) Bending, pulling, twisting <ul style="list-style-type: none"> <li>▪ Use a proper lifting technique.</li> </ul>
	7C) Splash	7C) Splash <ul style="list-style-type: none"> <li>▪ Wear safety glasses (tinted for sun if applicable).</li> <li>▪ Be aware if sampling water through a filter (if applicable), if it becomes plugged with sediment it may unexpectedly “blow off” the hose and splash.</li> <li>▪ Change filter prior to sedimentation back-pressure.</li> <li>▪ Minimize pouring distance to limit the splash between containers.</li> </ul>

<b>Job Hazard Analysis - HASP Format</b>		
<b>Job Title: Groundwater Sampling from a General Contractor’s Boat/Barge Date of Analysis: 12/11/08</b>		
<b>Minimum Recommended PPE*: Safety boots/Shoes; Personal Flotation Device; Safety Glasses</b>		
<b>*See HASP for all required PPE</b>		
<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
	7D)Chemical exposure	7D)Chemical exposure <ul style="list-style-type: none"> <li>▪ Wear PPE including protective gloves and safety glasses as appropriate. See HASP.</li> <li>▪ Review and understand material safety data sheet (MSDS) for all chemicals being handled.</li> <li>▪ Work slowly and carefully when handling acids and caustic substances.</li> <li>▪ Wear adequate PPE and wash hands after completion of task.</li> </ul>
8. Vessel Operations	8A)Lack of boating skills, boating incident	8A)Lack of boating skills, boating incident <ul style="list-style-type: none"> <li>▪ The General Contractor must have completed Coast Guard –approved safety boating course or other equivalent and recognized boating course and have a HASP that describes the hazards and hazard controls for vessel operation.</li> <li>▪ All employees must wear PFDs while the vessel is underway.</li> <li>▪ The General Contractor must maintain vessel and proper safety equipment.</li> <li>▪ Carry a cell phone or two-way radio.</li> <li>▪ If on navigable waterway, file a float plan with the Project Manager</li> <li>▪ Always follow the buddy system.</li> </ul>

**Job Hazard Analysis - HASP Format**

**Job Title:** Surface Water/Sediment Sampling and Installing Diffusion Samplers from Shore **Date of Analysis:** 5/31/06

**Minimum Recommended PPE\*:** Safety Boots/Shoes; Safety Glasses; Rubber boots; Waders; Personal Flotation Device;

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for site visit	1A) Slips, trips, falls	1A) Familiarize self with site prior to visit. <ul style="list-style-type: none"> <li>▪ Complete appropriate training before going on site.</li> <li>▪ Provide appropriate person in district office your itinerary.</li> <li>▪ Prepare listing of emergency phone numbers, both on and offsite.</li> <li>▪ Identify site/activity PPE needs.</li> <li>▪ Ensure that First Aid training is current, and that tetanus booster are current.</li> </ul>
2. Check and calibrate sampling equipment.	2A) Muscle Strain - lifting, twisting, tugging	2A) Muscle Strain - lifting, twisting, tugging <ul style="list-style-type: none"> <li>▪ Inspect all PPE and equipment and ensure that it is working properly.</li> <li>▪ Get assistance from a coworker or use mechanical means to move equipment (dolly, cart, etc.)</li> </ul>
	2B) Slips, trips, falls, strain	2B) Slips, trips, and falls <ul style="list-style-type: none"> <li>▪ Wear proper footwear.</li> <li>▪ Pay attention to where walking.</li> </ul>
3. Load/carry equipment to the site.	3A) Slips, trips, falls,	3A) Slips, trips, falls <ul style="list-style-type: none"> <li>▪ See JHA for Mobilization / Demobilization and Site Preparation</li> <li>▪ Survey and clear the pathway. See JHA for Clearing Brush and Trees</li> </ul>
	3B) Muscle Strain - lifting, twisting, tugging	3B) Muscle Strain - lifting, twisting, tugging <ul style="list-style-type: none"> <li>▪ Proper lifting, ergonomic practices and body mechanics.</li> <li>▪ Share the load, move items in smaller shifts, or use cart.</li> </ul>
	3C) Irrate property owners, pets	3C) Irrate property owners, pets <ul style="list-style-type: none"> <li>▪ Call property owners in advance.</li> <li>▪ Check in to introduce yourself upon arrival.</li> <li>▪ Be courteous and diplomatic</li> </ul>
	3D) Crime	3D) Crime <ul style="list-style-type: none"> <li>▪ Do not enter areas where threats are present.</li> <li>▪ Contract security where applicable.</li> <li>▪ Use the buddy system.</li> <li>▪ Maintain contact with support such as radio or cell phone.</li> </ul>
	3E) Struck by traffic - sampling from a bridge or roadway.	3E) Struck by traffic - sampling from a bridge or roadway. <ul style="list-style-type: none"> <li>▪ Wear orange/yellow safety vest</li> <li>▪ Use buddy system.</li> <li>▪ Use traffic cones and a lookout.</li> <li>▪ Attempt to sample away from the bridge if possible</li> </ul>
4. Field parameters	4A) Falling into water	4A) Falling into water <ul style="list-style-type: none"> <li>▪ Limit access to water.</li> <li>▪ Use equipment that facilitates reaching the location from a safe distance.</li> <li>▪ Work using the buddy system. Wear PFD if working NEAR or ON the water.</li> </ul>

**Job Hazard Analysis - HASP Format**

**Job Title:** Surface Water/Sediment Sampling and Installing Diffusion Samplers from Shore **Date of Analysis:** 5/31/06

**Minimum Recommended PPE\*:** Safety Boots/Shoes; Safety Glasses; Rubber boots; Waders; Personal Flotation Device;

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	4B) Slips trips and falls	4B) Slips trips and falls <ul style="list-style-type: none"> <li>▪ Wear appropriate footwear.</li> <li>▪ Survey and clear walking area.</li> <li>▪ Do not walk on slippery surfaces.</li> <li>▪ Housekeeping.</li> </ul>
	4C) Stuck in the mud or sand	4C) Stuck in the mud or sand <ul style="list-style-type: none"> <li>▪ Ensure secure footing.</li> <li>▪ Provide walkways, platforms or secure walking surface.</li> <li>▪ Use the buddy system and maintain communications with support staff.</li> <li>▪ (See JHA for Rescue from Mud footing)</li> </ul>
	4D) Vermin, leaches, Insect/animal born disease	4D) Vermin, leaches, Insect/animal born disease <ul style="list-style-type: none"> <li>▪ Survey the area for dens, nests, etc.</li> <li>▪ Identify areas where biological hazards may be present.</li> <li>▪ Be aware of your surroundings.</li> <li>▪ Wear insect netting clothing or apply insect repellent on all exposed skin surfaces as appropriate – consider sample contamination</li> <li>▪ Wear long sleeve shirt and full length pants</li> <li>▪ Wear appropriate footwear (snake boots, etc.)</li> <li>▪ Avoid high grass areas if possible</li> <li>▪ Tuck pants leg into boot</li> <li>▪ Do not put hand/arm into/under an area that you can not see into/under clearly</li> <li>▪ Do not touch any suspected contaminant without appropriate hand PPE</li> <li>▪ Wash hands as soon as possible upon completion of task.</li> <li>▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers.</li> <li>▪ Contract vermin relocation, if applicable.</li> <li>▪ Remain vigilant and respectful of wildlife.</li> <li>▪ See JHA for Insects, Stings and Bites</li> <li>▪ See JHA for Dog – Wildlife Safety.</li> </ul>

**Job Hazard Analysis - HASP Format**

**Job Title:** Surface Water/Sediment Sampling and Installing Diffusion Samplers from Shore **Date of Analysis:** 5/31/06

**Minimum Recommended PPE\*:** Safety Boots/Shoes; Safety Glasses; Rubber boots; Waders; Personal Flotation Device;

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	4E) Weather – temperature extremes	4E) Weather – temperature extremes <ul style="list-style-type: none"> <li>▪ Train workers about weather and appropriate precautions.</li> <li>▪ Heat:                             <ul style="list-style-type: none"> <li>○ Familiarize self with signs of heat related illnesses: cramps, heat rash, dehydration, heat exhaustion, and heat stroke.</li> </ul> </li> <li>▪ Sun:                             <ul style="list-style-type: none"> <li>○ Keep body protected</li> <li>○ Wear sunscreen, wide brimmed hat or hardhat.</li> <li>○ Drink plenty of fluids to remain hydrated.</li> <li>○ Schedule work for cool part of day.</li> <li>○ Take breaks in the shade.</li> </ul> </li> <li>▪ Wind:                             <ul style="list-style-type: none"> <li>○ Wear layered clothing, gloves, hard hat with winter liner, etc.</li> </ul> </li> <li>▪ Cold:                             <ul style="list-style-type: none"> <li>○ During cold weather - layer clothing and wear wind impervious outerwear</li> <li>○ During warm months – wear a long sleeve cotton/breathable fabric shirt and pant.</li> </ul> </li> </ul>
5. Sample collection	5A) Same as Item #4 above.	5A) Same as Item #4 above.
	5B) Bending, pulling, twisting	5B) Bending, pulling, twisting <ul style="list-style-type: none"> <li>▪ Use a vibrating or wiggling motion on the sample device to break the soil suction.</li> <li>▪ Proper lifting technique.</li> </ul>
	5C) Splash	5C) Splash <ul style="list-style-type: none"> <li>▪ Wear appropriate safety glasses (tinted for sun).</li> <li>▪ Be aware if sampling water through a filter, if it becomes plugged with sediment it may unexpectedly “blow off” the hose and splash.</li> <li>▪ Change filter prior to sedimentation back pressure.</li> </ul>
	5D) Chemical exposure	5D) Chemical exposure <ul style="list-style-type: none"> <li>▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate.</li> <li>▪ Work upwind of the sample location.</li> <li>▪ Minimize exposure using a shovel/spoon or tool to collect the sample.</li> <li>▪ Review and understand MSDS for all chemicals being handled.</li> <li>▪ Be careful when handling acids and caustic substances.</li> <li>▪ Wear adequate PPE and wash hands after completion of task.</li> </ul>

**Job Hazard Analysis - HASP Format**

**Job Title:** Surface Water/Sediment Sampling and Installing Diffusion Samplers from Shore **Date of Analysis:** 5/31/06

**Minimum Recommended PPE\*:** Safety Boots/Shoes; Safety Glasses; Rubber boots; Waders; Personal Flotation Device;

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5E) Vegetation, sticks, reeds, - cuts and punctures	5E) Vegetation, sticks, reeds, - cuts and punctures <ul style="list-style-type: none"> <li>▪ Clear access to site.</li> <li>▪ Be familiar with toxic plants such as poison ivy. Avoid such plants.</li> <li>▪ Wash thoroughly after accidental contact with toxic materials and plants.</li> </ul>
6. Sample preparation.	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain <ul style="list-style-type: none"> <li>▪ Use proper ergonomics when lifting heavy objects</li> <li>▪ Use appropriate mechanical assistance and tools when possible.</li> </ul>
	6B) Chemical Exposure	6B) Chemical Exposure <ul style="list-style-type: none"> <li>▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate.</li> <li>▪ Wash/wipe or decontaminate exterior of sample containers and equipment.</li> <li>▪ Use care handling preservatives (acids/bases.)</li> </ul>
	6C) Sharps and knives	6C) Sharps and knives <ul style="list-style-type: none"> <li>▪ Use care handling tape dispensers, knives and sharp objects.</li> </ul>
	6D) Extreme cold (ice preservation)	6D) Extreme cold (ice preservation) <ul style="list-style-type: none"> <li>▪ Minimize exposure to ice.</li> <li>▪ Use a shovel/spoon or tool to fill bags for preserving samples in coolers.</li> </ul>
7. Site exit and drive home or next site.	7A) Vehicle contamination	7A) Vehicle contamination <ul style="list-style-type: none"> <li>▪ Wash hands promptly.</li> <li>▪ Contaminated PPE (booties, Tyvek, nitrile gloves) should be disposed on-site.</li> <li>▪ Remove boots and soiled clothing for secure storage in trunk; decontaminate as soon as possible.</li> <li>▪ Update exposure log.</li> </ul>
	7B) Traffic hazards.	7B) Traffic hazards. <ul style="list-style-type: none"> <li>▪ See JHA for Mobilization / Demobilization and Site Preparation.</li> </ul>

**Job Hazard Analysis - Short Form HASP**

**Job Title:** Geoprobe Investigation – Oversight and Sample Collection ONLY. It should be noted that AMEC will not be operating the Geoprobe drill rig. AMEC will only be describing and collecting soil / water samples.

**Date of Analysis:** 4/21/06

**Minimum Recommended PPE\*:** High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection, proper hand protection for soil sampling

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. General Contractor Drive Geoprobe onto site	1A) Malfunction of vehicle/equipment	1A) Drivers shall perform a pre-operational check of equipment, read and be familiar with any operator's manual. <ul style="list-style-type: none"> <li>▪ Report all needed repairs promptly.</li> <li>▪ Operators shall not use defective/unsafe equipment.</li> </ul>
	1B) Wreck of Geoprobe while being driven	1B) Wreck of Geoprobe while being driven <ul style="list-style-type: none"> <li>▪ All drivers shall be properly licensed.</li> <li>▪ Supervisors shall verify that drivers are capable and qualified on each type of equipment before allowing the equipment to be used unsupervised.</li> <li>▪ Keep wind shields, windshield wipers, side mirrors and side windows clean</li> <li>▪ Drivers shall conduct a pre-operation vehicle safety check</li> <li>▪ Drivers shall plan ahead to minimize or eliminate the need for backing. Always check to the rear before backing and use an observer when available. If an observer is not available, the driver shall walk around the vehicle to make sure rear is clear prior to backing.</li> <li>▪ Seat belts shall be worn when driving by driver and passengers.</li> <li>▪ Choose the safest location possible to park equipment. Avoid parking in blind spots of other equipment.</li> <li>▪ Adjust vehicle speed for load and weather. Tire chains should be utilized as dictated by weather conditions.</li> <li>▪ When operating a vehicle off the roadway, be aware of possible hidden objects in the grass and unstable terrain.</li> <li>▪ Never allow anyone between truck and trailer when backing to hook trailer</li> <li>▪ Perform periodic checks of equipment on long trips to assure the load is secure.</li> <li>▪ Do not leave equipment unattended with the engine running. Shut off engine and set the parking brake when equipment is not in use.</li> </ul>
2. Loading/unloading of equipment	2A) Crush and pinch points created when loading/unloading equipment 2B) Heavy lifting, twisting, bending 2C) Slip, trips and falls	2A) Crush and pinch points created when loading/unloading equipment <ul style="list-style-type: none"> <li>▪ Be aware of crushing and pinching hazards when loading, unloading and fastening down equipment.</li> <li>▪ Make sure cargo is properly loaded and secured.</li> <li>▪ Wear protective equipment consistent with the hazard (hard hats, safety glasses, leather gloves, safety shoes, etc.)</li> </ul> 2B) Size up the load, utilize help for heavy items, split loads as necessary. Use proper body mechanics and ergonomic techniques. 2C) Keep walking area clear. Proper housekeeping.
3. Geoprobe operation by General Contractor	3A) Vehicle movement/ unstable 3B) Crushing injuries, pinch points, entanglement and flying particles, 3C) Noise 3D) slip trips and falls, 3E) material under stress, equipment	Geoprobe operation by the General Contractor. Read Owner's Manual. 3A) Always apply the parking brake and shut off engine before exiting the vehicle. <ul style="list-style-type: none"> <li>• Ensure back up alarm is operational.</li> <li>• Complete a visual inspection of the equipment prior to operation. Replace or repair equipment if necessary. Complete a checklist to document inspections and corrective</li> </ul>

**Job Hazard Analysis - Short Form HASP**

**Job Title:** Geoprobe Investigation – Oversight and Sample Collection ONLY. It should be noted that AMEC will not be operating the Geoprobe drill rig. AMEC will only be describing and collecting soil / water samples.

**Date of Analysis:** 4/21/06

**Minimum Recommended PPE\*:** High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection, proper hand protection for soil sampling

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	limitations, rope or cable blocks, hydraulic leaks 3F) utility lines, 3G) overhead loads, 3H) lifting 3I) Chemical exposure	actions required. <ul style="list-style-type: none"> <li>• Keep body parts clear of probe foot.</li> <li>• Be familiar with Emergency kill switch and controls. Test prior to probing.</li> <li>• When on sloped surface position the unit parallel to the slope with the control on the up hill side.</li> <li>• Use caution on soft or loose surface. Be aware of the weight of loaded vehicle.</li> <li>• Be aware of weather and windy conditions. Do not operate during lightning storm or high winds.</li> </ul> 3B) Heed all Caution, Warning or Danger decals on machine. <ul style="list-style-type: none"> <li>• Ensure everyone is clear of moving parts.</li> <li>• Designate only one experienced operator to avoid unexpected engagement.</li> <li>• Operate only from the control side. Do not reach across operating probe.</li> <li>• Avoid placing your hands on top of the tool string when raising/lowering the hammer or swinging/ folding probe assembly.</li> <li>• DO not wear loose clothing. Tie back hair when operating equipment.</li> <li>• PPE – safety shoes, hard hat, safety glasses, hearing protection, gloves. Optional Tyvek or coveralls.</li> </ul> 3C) PPE – hearing protection. 3D) Maintain an orderly and clean site. <ul style="list-style-type: none"> <li>• Housekeeping.</li> <li>• Barricade or establish work zones to minimize unauthorized entry.</li> <li>• Adequate lighting</li> </ul> 3E) Know the capacities, equipment limitations and acceptable operating loads. Follow the equipment operator’s manual and proper maintenance requirements. <ul style="list-style-type: none"> <li>• Stand clear of potential release of energy. Keep body part clear of moving parts.</li> <li>• Use the correct tool for the job.</li> <li>• Limit the rate of the hammer lowering while advancing the tool string to avoid raising the probe foot more than 6 inches off the ground surface.</li> <li>• In the event problem or binding, the operator should release all control levers to neutral.</li> <li>• Inspect hydraulic lines. Repair or replace damaged hoses.</li> </ul> 3F) Be aware of surroundings. Establish safe “dig” zones. Contact Dig Safe or “one call” system to mark underground utilities or tanks. <ul style="list-style-type: none"> <li>• Before moving onto a site, evaluate height restrictions due to overhead utilities and vegetation.</li> <li>• Borings to be located a minimum of 10 feet from overhead lines.</li> </ul>

**Job Hazard Analysis - Short Form HASP**

**Job Title:** Geoprobe Investigation – Oversight and Sample Collection ONLY. It should be noted that AMEC will not be operating the Geoprobe drill rig. AMEC will only be describing and collecting soil / water samples.

**Date of Analysis:** 4/21/06

**Minimum Recommended PPE\*:** High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection, proper hand protection for soil sampling

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
		<ul style="list-style-type: none"> <li>• Do not drive the machine with the mast extended.</li> <li>3G) Remain alert. Establish work zone to minimize workers under overhead loads. Avoid sudden jerks or overloading. Check load for balance and appropriate support prior to hoisting.</li> <li>3H) Use mechanical means to lift heavy loads and removing rod.</li> <li>3I) Don appropriate PPE for chemicals of concern. Work from upwind. Be aware of combustion fumes if equipment has auxiliary power. Practice good hygiene by washing hands, and no eating/smoking within the exclusion zone.</li> </ul>
<p>4. Operational area</p>	<p>4A) adverse weather conditions (temperature extremes),                      4B) uneven terrain,                      4C) poisonous plants/snakes/insects hazards</p>	<p>4A) Keep a weather eye. Monitor the weather forecast and actual conditions.</p> <ul style="list-style-type: none"> <li>• Wear appropriate clothing that does not restrict, cause over heat or is too loose.</li> <li>• Be aware of muddy conditions or puddles.</li> </ul> <p>4B) Be aware of drop-offs, uneven ground and potential hidden objects which may cause loss of control when maneuvering rigs or create unstable drill set-ups. In heavily wooded area, scout to locate hidden objects. Use care when walking.</p> <p>4C) Be aware of poisonous plants, insects, snakes, animals and animal waste products and carcasses. Wear long sleeve shirts, gloves, and high top boots when hazards cannot be avoided. Proper first aid supplies, insect repellents shall accompany field crews.</p>
	<p>4D) Contaminated soils, buried power or gas lines, landfills and containment of spills</p>	<p>4D) Contaminated soils, buried power or gas lines, landfills and containment of spills</p> <ul style="list-style-type: none"> <li>▪ During drilling operations, always be aware of the possibility of encountering potentially hazardous materials, such as petroleum hydrocarbons, herbicides, pesticides, chemical manufacturing by-products or solid waste materials.</li> <li>▪ In the event that any unknown or questionable materials are encountered, then the drilling operations are to be suspended immediately until further instructions are received from supervision.</li> <li>▪ Do not handle any suspected contaminated materials unless trained to do so and proper protective methods are followed.</li> <li>▪ During drilling operations, always be aware of the possibility of striking an un-located or improperly located gas or power line.</li> <li>▪ In the event a buried utility line is struck, drilling operations are to be suspended <b>immediately</b>.                             <ul style="list-style-type: none"> <li>- If the utility line is electric, keep personnel at least 10 feet from all metal surfaces connected with the drill rig.</li> <li>- If the utility is gas, then the area is to be evacuated and secured. Immediate notification to the utility company is MANDATORY.</li> </ul> </li> <li>▪ In the event of a gas or oil spill, the proper authorities are to be contacted immediately so that containment operations can be implemented.</li> </ul>
<p>5. General Contractor                      Mixing grout on site and filling/placing in</p>	<p>5A) Lifting                      5B) Chemical exposure</p>	<p>5A) Size the load of materials to be moved and utilize appropriate help for lifting and moving. Use proper ergonomic and body mechanics to move materials (bags of grout, etc.). Use</p>

**Job Hazard Analysis - Short Form HASP**

**Job Title:** Geoprobe Investigation – Oversight and Sample Collection ONLY. It should be noted that AMEC will not be operating the Geoprobe drill rig. AMEC will only be describing and collecting soil / water samples.

**Date of Analysis:** 4/21/06

**Minimum Recommended PPE\*:** High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection, proper hand protection for soil sampling

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
hole between the well pipe and bore hole wall		mechanical mixer for large quantities of grout. 5B) PPE – Safety glasses, safety shoes, gloves, optional tyvek/coveralls.
6. General Contractor cutting soil acetate sleeve open to sample soil	6A) cutting of hand with a razor blade	6A) AMEC personnel must let the general contractor cut the sample liners as they have the appropriate tools to do so. 6B) General Contractor must be aware of where hands are placed prior and during cutting with hand saw
7. General Contractor driving drilling rig offsite.	22A) Reference item # 1	22A) Reference item #1.

**Job Title:** Sub-Slab-Indoor Air Sampling **Date of Analysis:** 11/1/2007  
**Minimum Recommended PPE\*:** steel-toed boots, safety glasses, chemical resistant gloves-nitrile, flashlight/lamp

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization	8A) SEE JHA Mobilization/Demobilization/Site Preparation	8A) See JHA Mobilization/Demobilization/Site Preparation
2. General Site Hazards	9A) See JHA Field Work - General	9A) See JHA Field Work – General
	9B) Chemical exposure	9B) Chemical Exposure <ul style="list-style-type: none"> <li>▪ Read HASP and determine air monitoring and PPE needs.</li> </ul>
3. Calibrate monitoring equipment	10A) Exposure to calibration gases	10A) Exposure to calibration gases <ul style="list-style-type: none"> <li>▪ Review equipment manuals.</li> <li>▪ Calibrate in a clean, well ventilated area.</li> </ul>
4. Access Residence	11A) Tripping hazards	11A) Observe floors/stairs for potential tripping hazards
	11B) Back strain	11B) Watch back when carrying equipment into residence
	11C) Chemical Hazard	11C) Be careful when identifying residential chemicals <ul style="list-style-type: none"> <li>▪ Wear PPE as described in the HASP.</li> </ul>
5. Drill Hole in basement floor	12A) Electrocutation	12A) Electrocutation <ul style="list-style-type: none"> <li>▪ A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits.</li> <li>▪ Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off.</li> <li>▪ Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water.</li> <li>▪ Do not stand in wet areas while operating power equipment.</li> <li>▪ Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced.</li> <li>▪ When unplugging a cord, pull on the plug rather than the cord.</li> <li>▪ Never do repairs on electrical equipment unless you are both authorized and qualified to do so.</li> </ul>
	12B) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated Soil Vapor).	12B) Exposure to hazardous substances <ul style="list-style-type: none"> <li>▪ Wear PPE as identified in HASP (steel-toed boots, safety glasses, nitrile gloves and a flashlight or lamp).</li> <li>▪ Review hazardous properties of site contaminants with workers before sampling operations begin.</li> <li>▪ Immediately monitor breathing zone using a PID after drilling hole to determine exposure and verify that level of PPE is adequate – see Action Levels in HASP.</li> </ul>
	12C) Back strain due to lifting and from moving equipment	12C) Back strain <ul style="list-style-type: none"> <li>▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items.</li> <li>▪ Use proper lifting techniques.</li> </ul>
	12D) Foot injuries from dropped equipment/drill bit	12D) Foot Injuries <ul style="list-style-type: none"> <li>▪ Be aware when moving objects, ensure you have a good grip when lifting and carrying objects.</li> <li>▪ Do not carry more than you can handle safely.</li> <li>▪ Watch feet when drilling and hold drill firmly.</li> <li>▪ Wear Steel toed boots.</li> </ul>

Key Work Steps	Hazards/Potential Hazards	Safe Practices
6. Collecting Sub-Slab sample	13A) Burn Hazard/fire Hazard	13A) Burn Hazard/Fire Hazard from Melting Wax <ul style="list-style-type: none"> <li>▪ Place hot plate in safe location away from flammable material.</li> <li>▪ Be careful with exposed skin when working around hot plate and hot wax.</li> <li>▪ Poor wax with spoon and avoid splatter.</li> </ul>
	13B) Cutting Hazard	13B) Be careful with sharp knives when cutting tubing
	13C) Exposure to contaminants	13C) Exposure to Contaminants <ul style="list-style-type: none"> <li>▪ Monitor breathing zone with appropriate monitoring equipment (see HASP).</li> <li>▪ Wear chemical resistant PPE as identified in HASP.</li> <li>▪ See section 5B) under Safe Practices above.</li> </ul>
7. Collecting Indoor Air sample	14A) Pinching Hazard	14A) Pinching Hazard from attaching regulators/tubing <ul style="list-style-type: none"> <li>▪ Be careful when using wrenches to attach regulator and or tubing to cans to not pinch fingers.</li> </ul>

<b>Job Hazard Analysis - HASP Format</b>		
<b>Job Title:</b> Sampling Activities (Surface Water and Sediment Sampling) from a General Contractor’s Barge		
<b>Date of Analysis:</b> 12/19/11		
<b>Minimum Recommended PPE:</b> Safety boots; Personal Flotation Device; Safety Glasses; Nitrile Gloves; Glove Liners; Work Clothing Appropriate for the Weather Conditions; a change of clothing.		
<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
1) Prepare for site visit	1B) Slips, trips, falls	1B) Slips, trips, falls <ul style="list-style-type: none"> <li>▪ Familiarize self with site prior to visit.</li> <li>▪ Complete appropriate training before going on site.</li> <li>▪ Ensure the General Contractor has appropriate trained staff to operate the barge.</li> <li>▪ Provide the Project Manager your field work itinerary so that he/she knows your daily schedule.</li> <li>▪ Prepare listing of emergency phone numbers, both on and offsite. See HASP.</li> <li>▪ Identify site/activity PPE needs – see HASP.</li> <li>▪ Ensure that First Aid/CPR training is current.</li> </ul>
2. Working at the site	2A) General Field Work – Walking and working in the field, Environmental conditions, communication	2A) See JHA for Field Work – General.
3. Weather Extremes	3A) Weather extremes (thunder, wind, snow, etc.)	3A) See JHA for Field Work – General.
4. Working Near or on the Water	4A) Drowning Hazards	4A) Drowning Hazards <b>The General Contractor must:</b> <ul style="list-style-type: none"> <li>▪ Have appropriate safety training for operation of the vessel (e.g., barge).</li> <li>▪ A float plan must be prepared and implemented. For this task since AMEC will maintain an employee on shore to watch and be in communication with vessel operations, the Float Plan is comprised of the HASP and the emergency call numbers. The shore-person is responsible for notifying emergency services if necessary.</li> <li>▪ Notify the local emergency services (Fire Department) so that they are aware AMEC and TG&amp;B will be operating a vessel on the water.</li> <li>▪ Inspect the vessel to ensure it is safe to use (no holes, defects, etc.).</li> <li>▪ Ensure that the anchors are adequate weight and the anchor ropes are adequate lengths to securely anchor the vessel in the water at each sampling location.</li> <li>▪ Attach a safety line anchored to a stable point on shore to the vessel if the body of water is fast moving.</li> </ul>

<b>Job Hazard Analysis - HASP Format</b>		
<p><b>Job Title:</b> Sampling Activities (Surface Water and Sediment Sampling) from a General Contractor’s Barge  <b>Date of Analysis:</b> 12/19/11  <b>Minimum Recommended PPE:</b> Safety boots; Personal Flotation Device; Safety Glasses; Nitrile Gloves; Glove Liners; Work Clothing Appropriate for the Weather Conditions; a change of clothing.</p>		
Key Work Steps	Hazards/Potential Hazards	Safe Practices
		<ul style="list-style-type: none"> <li>▪ Not overload the vessel.</li> <li>▪ Distribute the weight of people and equipment evenly to keep the vessel stable.</li> <li>▪ Keep the load as low as possible and secure equipment to prevent it from shifting and affecting the stability of the vessel.</li> </ul> <p><b>All personnel accessing and working on the vessel shall:</b></p> <ul style="list-style-type: none"> <li>• When entering or exiting the vessel, maintain three points of contact (with the vessel) and stay low to maintain balance.</li> <li>▪ Don a Coast Guard approved personal flotation device (PFD) rated for your weight when working within 6 feet of the water’s edge. Keep the PFD fastened at all times. Due to the amount of gear, equipment, etc. that personnel will need to transport, a Coast Guard-approved inflatable PFD may be used in lieu of the standard type PFD.</li> <li>▪ Do not lean your shoulders too far outside of the vessel as this can capsize the vessel.</li> <li>▪ Stay away from dams. It is illegal and dangerous to boat near them.</li> <li>▪ Stay clear of “strainers” (fallen trees, branches, etc.).</li> </ul> <p><b>Rescue Procedures</b></p> <ul style="list-style-type: none"> <li>▪ If you fall out of the vessel, hold onto the vessel - unless it presents a life-threatening situation. If floating in current, position yourself on the upstream side of the capsized vessel. Keep your feet up (on the surface) and pointed downstream and swim to shore.</li> <li>▪ Swim to calm water before attempting to stand up in the water.</li> <li>▪ The on-shore AMEC person will notify emergency services immediately.</li> </ul>
5. Load/carry equipment to the site.	5A) Slips, trips, falls	5A) Slips, trips, falls ▪See JHA Field Work – General.

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<b>Date of Analysis:</b> 12/19/11		
<b>Minimum Recommended PPE:</b> Safety boots; Personal Flotation Device; Safety Glasses; Nitrile Gloves; Glove Liners; Work Clothing Appropriate for the Weather Conditions; a change of clothing.		
Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5B) Struck by traffic – General Contractor launches vessel.	5B) Struck by traffic – General Contractor launches vessel. <ul style="list-style-type: none"> <li>▪ Wear high-visibility safety vest, use buddy system.</li> <li>▪ Use traffic cones and a lookout. Have the General Contractor launch the vessel from public boat launch facilities if available.</li> </ul>
	5C) Battery handling – acid exposure	5C) Battery handling – acid exposure <ul style="list-style-type: none"> <li>▪ AMEC personnel shall not touch nor operate any of the General Contractor’s vessel equipment.</li> </ul>
	5D) Working on the vessel (e.g., boat/barge): Capsize	5D) Working on the vessel: Capsize <ul style="list-style-type: none"> <li>▪ Ascertain from the General Contractor supervisor the vessel’s maximum weight and person capacity limits. Do not overload the vessel.</li> <li>▪ Balance the gear and people on the vessel.</li> <li>▪ All personnel near the water or on water must wear approved, properly sized and buckled Coast Guard-approved PFD suited to their weight.</li> <li>▪ Ensure vessel lines and body parts are out of the water before the vessel engine is turned on.</li> <li>▪ General Contractor should provide signal flags and communication to protect the public of vessel activities where applicable.</li> <li>▪ General Contractor should test the motor prior to shoving away from the launch dock/pier/platform.</li> <li>▪ The General Contractor must ensure that all appropriate equipment (e.g., fire extinguisher, life ring with at least 90 feet of rope, etc.) is provided and accessible according to Coast Guard safe boating recommendations. The General Contractor must include a bailer, anchor, second means of propulsion, line and throwable flotation, etc. See the AMEC EH&amp;S Manual – Boating Safety for examples of these equipment.</li> </ul>

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<b>Date of Analysis:</b> 12/19/11		
<b>Minimum Recommended PPE:</b> Safety boots; Personal Flotation Device; Safety Glasses; Nitrile Gloves; Glove Liners; Work Clothing Appropriate for the Weather Conditions; a change of clothing.		
Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5E) Noise – engine (if applicable – noise at 85 decibels or greater)	5E) Noise – engine (if applicable – noise at 85 decibels or greater)  ▪ Wear hearing protection.
6. Collecting Field parameters	6A) Falling into water and capsize	6A) Falling into water and capsize  ▪ General Contractor shall use equipment that facilitates reaching the sampling location from a safe distance (extensions, etc.).  ▪ Work using the buddy system.  ▪ Wear PFD when working on the water.  ▪ The General Contractor must balance equipment and people and anchor or secure the vessel at the sample location.  ▪ AMEC person should remain in an area on the vessel that is out of the way of operating equipment, etc.  ▪ Avoid leaning over the side of the vessel.  ▪ General Contractor should steer vessel to meet waves on the bow.  ▪ If moving about, keep weight low.
	6B) Slips trips and falls	6B) Slips trips and falls  ▪ Wear appropriate safety-toe, non-slip footwear.  ▪ Survey and clear walking area.  ▪ Do not walk on slippery surfaces.  ▪ Maintain good housekeeping.  ▪ Provide walkways, platforms or secure walking surface.  ▪ Use the buddy system and maintain communications with on-shore person.

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<b>Date of Analysis:</b> 12/19/11		
<b>Minimum Recommended PPE:</b> Safety boots; Personal Flotation Device; Safety Glasses; Nitrile Gloves; Glove Liners; Work Clothing Appropriate for the Weather Conditions; a change of clothing.		
Key Work Steps	Hazards/Potential Hazards	Safe Practices
	6C) Vermin, leaches, Insect/animal born disease	6C) Vermin, leaches, Insect/animal born disease <ul style="list-style-type: none"> <li>▪ Survey the area for dens, nests, etc.</li> <li>▪ Identify areas where biological hazards may be present.</li> <li>▪ Be aware of your surroundings.</li> <li>▪ Wear insect netting clothing or apply insect repellent on all exposed skin surfaces as appropriate – consider sample contamination.</li> <li>▪ Wear long sleeve shirt and full-length pants.</li> <li>▪ Do not put hand/arm into/under an area that you cannot see into/under clearly.</li> <li>▪ Do not touch any suspected contaminant without appropriate hand PPE.</li> <li>▪ Wash hands as soon as possible upon completion of task.</li> <li>▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers. Ticks may be present during colder months.</li> <li>▪ Remain vigilant and respectful of wildlife. (See JHA for Insects, Stings and Bites.)</li> <li>▪ Wear wind impervious outerwear.</li> </ul>
	6D) Run aground – shifting or unbalanced vessel - equipment/personnel/slip/fall/overboard	6D) Run aground – shifting or unbalanced vessel – equipment/personnel/slip/fall/overboard <ul style="list-style-type: none"> <li>▪ The General Contractor must operate the vessel at a safe speed.</li> <li>▪ The General Contractor should post a look out for shallow or submerge obstacles.</li> <li>▪ Remain seated (if applicable) when under way.</li> <li>▪ The General Contractor should be aware and alert for signs of tides, flooding, flash floods, and dam releases.</li> <li>▪ The General Contractor should use the anchor line or a pole/paddle to pull the vessel back toward the way direction of deeper water.</li> </ul>

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<b>Job Title:</b> Sampling Activities (Surface Water and Sediment Sampling) from a General Contractor’s Barge		
<b>Date of Analysis:</b> 12/19/11		
<b>Minimum Recommended PPE:</b> Safety boots; Personal Flotation Device; Safety Glasses; Nitrile Gloves; Glove Liners; Work Clothing Appropriate for the Weather Conditions; a change of clothing.		
<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
7. Sample collection	7A) Same as Item #6 above.	7A) Same as Item #6 above.
	7B) Bending, pulling, twisting	7B) Bending, pulling, twisting <ul style="list-style-type: none"> <li>▪ Use a proper lifting technique.</li> <li>▪ Do not lift more than 50 pounds. Ask for assistance.</li> </ul>
	7C) Splash	7C) Splash <ul style="list-style-type: none"> <li>▪ Wear safety glasses (tinted for sun if applicable).</li> <li>▪ Be aware if sampling water through a filter (if applicable), if it becomes plugged with sediment it may unexpectedly “blow off” the hose and splash.</li> <li>▪ Change filter prior to sedimentation back-pressure.</li> <li>▪ Minimize pouring distance to limit the splash between containers.</li> </ul>
	7D) Chemical exposure	7D) Chemical exposure <ul style="list-style-type: none"> <li>▪ Wear PPE including protective gloves and safety glasses as appropriate.</li> <li>▪ Review and understand material safety data sheet (MSDS) for all chemicals being handled.</li> <li>▪ Work slowly and carefully when handling acids and caustic substances.</li> <li>▪ Wash hands after completion of task.</li> </ul>

<b>Job Hazard Analysis - HASP Format</b>		
<b>Job Title:</b> Sampling Activities (Surface Water and Sediment Sampling) from a General Contractor’s Barge		
<b>Date of Analysis:</b> 12/19/11		
<b>Minimum Recommended PPE:</b> Safety boots; Personal Flotation Device; Safety Glasses; Nitrile Gloves; Glove Liners; Work Clothing Appropriate for the Weather Conditions; a change of clothing.		
<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
8. Vessel Operations	8A) Lack of boating skills, boating incident	8A) Lack of boating skills, boating incident <ul style="list-style-type: none"> <li>▪ The General Contractor must have completed Coast Guard –approved safety boating course or other equivalent and recognized boating course and have a HASP that describes the hazards and hazard controls for vessel operation.</li> <li>▪ All employees must wear PFDs while the vessel is underway.</li> <li>▪ The General Contractor must maintain vessel and proper safety equipment.</li> <li>▪ Carry a cell phone or two-way radio.</li> <li>▪ If on navigable waterway, file a float plan with the Project Manager.</li> <li>▪ Always follow the buddy system.</li> </ul>



### Job Hazard Analysis

**Job Title:** Soil Sampling Using Hand Tools

**Date of Analysis:** 06/11/2012

**Minimum Recommended PPE\*:** High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
8. Prepare for sampling event	1A) Chemical exposure	1A) Chemical Exposure <ul style="list-style-type: none"> <li>▪ Read HASP and determine air monitoring and PPE needs.</li> </ul>
9. Carrying/lifting/using sampling equipment	2A) Back or muscle strain	2A) Back or muscle strain <ul style="list-style-type: none"> <li>▪ Use proper lifting techniques when lifting hand tools</li> <li>▪ Use 2 person lift for heavy items</li> </ul>
	2B)	4A)
	2C) Foot injuries from dropped equipment	4B) Foot Injuries <ul style="list-style-type: none"> <li>▪ Be aware when moving objects, ensure you have a good grip when lifting and carrying objects.</li> <li>▪ Do not carry more than you can handle safely</li> <li>▪ Wear steel toed boots</li> </ul>
10. Calibrate monitoring equipment	1A) Exposure to calibration gases	3A) Exposure to calibration gases <ul style="list-style-type: none"> <li>▪ Review equipment manuals</li> <li>▪ Calibrate in a clean, well ventilated area</li> </ul>
11. Preparing sampling location	4A) Contact with poisonous plants or the oil from poisonous plants	4C) See JHA Poisonous Plans.
	4B) Contact with biting insects (i.e., spiders, bees, etc.)	4D) See JHA Insects Stings and Bites
12. Collecting soil samples	5A) Encountering underground or overhead utilities	5A) Encountering underground or overhead utilities <ul style="list-style-type: none"> <li>▪ Have all utilities located, and the Utility Locate Form signed off by Project Manager and Office Manager. Keep form with HASP.</li> </ul>
	5B) Exposure to contaminants	5B) Exposure to Contaminants <ul style="list-style-type: none"> <li>▪ Monitor breathing zone with appropriate monitoring equipment (see HASP)</li> <li>▪ Wear chemical resistant PPE as identified in HASP</li> </ul>
	5C) Exposure to preservatives	5C) Exposure to preservatives <ul style="list-style-type: none"> <li>▪ Work in a well ventilated area, upwind of samples</li> <li>▪ Wear chemical resistant PPE as identified in HASP</li> <li>▪ Review MSDSs</li> </ul>

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5D) Slips/trips/falls	5D) Slips/trips/falls <ul style="list-style-type: none"> <li>▪ Ground can become wet/muddy, wear sturdy slip resistant footwear that provides ankle support</li> <li>▪ Watch where you place your feet</li> </ul>
	5E) Eye injury	5E) Eye Injury <ul style="list-style-type: none"> <li>▪ Wear eye protection when using hand tools that can cause debris (e.g., loose soil, rock bits, etc.) to become airborne</li> </ul>
13. Using Manual Tools	6A) Hand Tools <ul style="list-style-type: none"> <li>• Weather conditions</li> <li>• Slip trip</li> <li>• Electrocutation</li> <li>• Mechanical malfunctions</li> <li>• Tight conditions</li> <li>• Pinch points (such as drum lids)</li> <li>• Exposure to chemicals</li> <li>• Site obstacles such as debris, stored materials, drums, and structures</li> <li>• Strain when lifting tool</li> </ul>	6A) Hand Tools <ul style="list-style-type: none"> <li>• Work using hand tools can continue in light rain, but shall be stopped in the event of severe weather, heavy rain, lightning, tornadoes, etc.</li> <li>• Inspect all tools daily and document the results of the inspections. Damaged equipment will be discarded or repaired if possible.</li> <li>• When carrying hand tools, be observant of walking/working surfaces – steep slopes should not be descended. Wear sturdy slip resistant steel toe boots that provides adequate ankle protection.</li> <li>• Be attentive to holes in walking/working surfaces - if necessary, fill in before work.</li> <li>• Good housekeeping – clean up debris and move or flag obstructions.</li> <li>• Wear PPE as required in the HASP</li> <li>• Wear work gloves over chemically-protective gloves when using hand tools. Avoid pinch points.</li> <li>• Lift with legs, not back. Do not twist. Get assistance when carrying hand tools (&gt;50 pounds) if necessary.</li> <li>• When using, knives, or other tools, direct the tools away from other people working in close proximity.</li> <li>• Knives and scissors must be sharp; dull tools can cause more hazards than sharp ones.</li> <li>• The wooden handles of tools must not be splintered or cracked.</li> </ul>

Completed by:                     Annette McLean                    

Date:   06/11/2012  



## Job Hazard Analysis

**Job Title:** Insect Stings and Bites

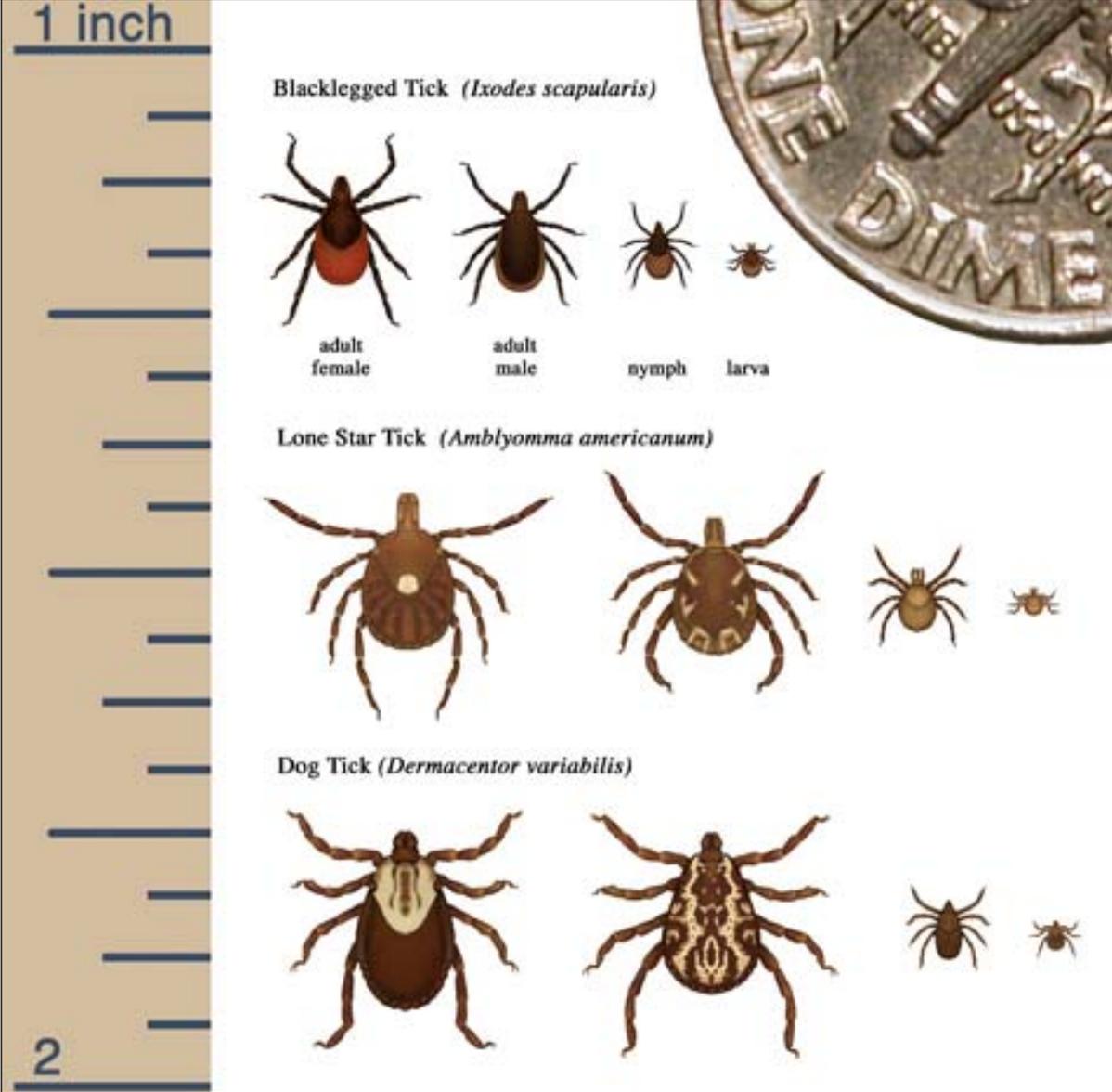
**Date of Analysis:** 06/11/2012

**Minimum Recommended PPE\*:** Long sleeved shirt and pants, light colored clothing

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
<p>While adult ticks are the easiest to identify by species, immature stages of ticks may also transmit some pathogens. In addition, male and female ticks of the same species may look different. Of the many different tick species found throughout the world, only a select few bite and transmit disease to humans. Ticks common to the <b>northeast</b> are shown below. The maps provide expected distribution of ticks that cause disease.</p>		
 <p><b>American Dog Tick</b></p>	<p>American dog tick is the most commonly identified species responsible for transmitting <i>Rickettsia rickettsii</i>, which causes Rocky Mountain spotted fever in humans. The American dog tick can also transmit tularemia. This tick is widely distributed east of the Rocky Mountains. Larvae and nymphs feed on small rodents. Dogs and medium-sized mammals are the preferred hosts of adult <i>D. variabilis</i>, although it feeds readily on other large mammals, including humans. Distribution areas are shown in yellow (Center for Disease Control).</p> 	
 <p><b>Blacklegged Tick (a/k/a Deer Tick)</b></p> <p>See additional pictures of Deer Tick on next page.</p>	<p>The blacklegged tick (<i>Ixodes scapularis</i>), commonly known as the "<b>deer tick</b>", can transmit the organisms responsible for anaplasmosis, babesiosis, and Lyme disease. This tick is widely distributed in the northeastern and upper midwestern United States. Larvae and nymphs feed on small mammals and birds, while adults feed on larger mammals and will bite humans on occasion. It is important to note that the pathogen that causes Lyme disease is maintained by wild rodent and other small mammal reservoirs, and is not transmitted everywhere that the blacklegged tick lives. In some regions, particularly in the southern U.S., the tick has very different feeding habits that make it an unlikely vector in the spread of human disease. Distribution areas are shown in yellow (CDC).</p> 	

Key Work Steps	Hazards/Potential Hazards	Safe Practices				
	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p><b>The Deer tick ( <i>Ixodes scapularis</i> )</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 10px;">   <b>Larva</b> </td> <td style="text-align: center; padding: 10px;">   <b>Nymph</b> </td> </tr> <tr> <td style="text-align: center; padding: 10px;">   <b>Adult male</b> </td> <td style="text-align: center; padding: 10px;">   <b>Adult female</b> </td> </tr> </table> </div> <p><b>Note: Ticks are shown larger than actual size.</b></p>	 <b>Larva</b>	 <b>Nymph</b>	 <b>Adult male</b>	 <b>Adult female</b>	
 <b>Larva</b>	 <b>Nymph</b>					
 <b>Adult male</b>	 <b>Adult female</b>					
<div style="border: 1px solid black; padding: 5px;">  </div> <p><b>Lone star tick</b></p>		<p>The lone star tick (<i>Amblyomma americanum</i>) transmits <i>Ehrlichia chaffeensis</i> and <i>Ehrlichia ewingii</i>, causing human ehrlichiosis, tularemia, and STARI. The lone star tick is primarily found in the southeastern and eastern United States. White-tailed deer are a major host of lone star ticks and appear to represent one natural reservoir for <i>E. chaffeensis</i>. Larvae and nymphs feed on birds and deer. Both nymphal and adult ticks may be associated with the transmission of pathogens to humans. Distribution areas are shown in yellow (CDC).</p> <div style="border: 1px solid gray; padding: 5px;">  </div>				

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	 <p>The image displays three species of ticks with their life stages. On the left is a vertical ruler marked from 0 to 1 inch. On the right is a dime coin for scale. The ticks are arranged in three rows:</p> <ul style="list-style-type: none"> <li><b>Blacklegged Tick (<i>Ixodes scapularis</i>):</b> Shows an adult female with a red body and black legs, an adult male with a dark body and black legs, a nymph, and a larva.</li> <li><b>Lone Star Tick (<i>Amblyomma americanum</i>):</b> Shows an adult female with a white star on its back, an adult male with a white star on its back, a nymph, and a larva.</li> <li><b>Dog Tick (<i>Dermacentor variabilis</i>):</b> Shows an adult female with a white patch on its back, an adult male with a white patch on its back, a nymph, and a larva.</li> </ul>	
<p>Most ticks go through four life stages: egg, six-legged larva, eight-legged nymph, and adult. After hatching from the eggs, ticks must eat blood at every stage to survive. Ticks that require this many hosts can take up to 3 years to complete their full life cycle, and most will die because they don't find a host for their next feeding. The above picture shows the life stages of the Blacklegged Tick (Deer Tick), Lone Star Tick, and the American Dog Tick.</p>		

Key Work Steps	Hazards/Potential Hazards	Safe Practices
<p>1. Traveling/working in areas with potential Tick Bites –Example outdoor wooded areas or fields.</p>	<p>1. Lyme Disease, Rocky Mountain Spotted Fever, etc.</p>	<p>1A) Spray clothing with insect repellent containing DEET or Permethrin as a barrier. Treat outer layer of field clothing by spraying with tick repellent product such as “Tick Stuff” (which contains permethrin) and allowing the treated clothing to dry before wearing it is advisable. <b>Follow the manufacturer’s instructions for the specific tick repellent used.</b></p> <p>1B) Wear light colored clothing that fits tightly at the wrists, ankles, and waist.</p> <p>1C) Each outer garment should overlap the one above it.</p> <p>1D) Cover trouser legs with high socks or boots.</p> <p>1E) Tuck in shirt tails.</p> <p>1F) Search the body on a regular basis, especially hair and clothing; ticks generally do not attach for the first couple of hours.</p> <p>1G) Conduct a full-body tick check using a hand-held or full-length mirror to view all parts of your body upon return from the field.</p> <p>1H) Examine field gear. Ticks can ride into the home on clothing, boots, bags, etc., then attach to a person later. Tumble clothes in a dryer on high heat for an hour to kill remaining ticks.</p> <p>1I) Bathe or shower as soon as possible after coming indoors (preferably within two hours) to wash off and more easily find ticks that are crawling on you.</p> <p>1J) If a tick becomes attached, pull it by grasping it as close as possible to the point of attachment and pull straight out with gentle pressure. Wash skin with soap and water then cleanse with rubbing alcohol. Place the tick in an empty container for later identification, if the victim should have a reaction. Record dates of exposure and removal.</p> <p>1K) Do not try to remove the tick by burning with a match or covering it with chemical agents.</p> <p>1L) If you can not remove the tick, or the head detaches, seek prompt medical help.</p> <p>1M) Watch for warning signs of illness: a large red spot on the bite area; fever, chills, headache, joint and muscle ache, significant fatigue, and facial paralysis are reactions that may appear within two weeks of the attack. Symptoms specific to Lyme disease include: confusion, short-term memory loss, and disorientation.</p>

Key Work Steps	Hazards/Potential Hazards	Safe Practices
2. Working/traveling in areas with potential bee and wasp stings- Example wooded areas and fields	2. Allergic reactions, painful stings	2A) Be alert to hives in brush or in hollow logs. Watch for insects travelling in and out of one location. 2B) If you or anyone you are working with is known to have allergic reactions to bee stings, tell the rest of the crew and your supervisor. Make sure you carry emergency medication with you at all times. 2C) Wear long sleeve shirts and trousers; tuck in shirt. Bright colors and metal objects may attract bees. 2D) If you are stung, cold compresses may bring relief. 2E) If a stinger is left behind, scrape it off the skin. Do not use a tweezers as this squeezes the venom sack, worsening the injury. 2F) If the victim develops hives, asthmatic breathing, tissue swelling, or a drop in blood pressure, seek medical help immediately. Give victim antihistamine, (Benadryl, chloamine tabs).
3. Traveling/working in areas of potential Mosquito Bites- Example- Woods, fields, near bodies of water and etc.	3. Skin irritation, encephalitis	3A) Wear long sleeves and trousers. 3B) Avoid heavy scents. 3C) Use insect repellants. If using DEET, do not apply directly to skin, apply to clothing only. 3D) Carry after-bite medication to reduce skin irritation.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
<p>4. Traveling/Working in areas of potential Spider Bites</p> <p><b>Brown Recluse Spider</b></p>  <p>Found in spaces with secluded, dry, sheltered areas such as underneath structures logs, or in piles of rocks or leaves, or indoors in dark closets, shoes, or attics.</p> <p><b>Black Widow</b></p>  <p>Found in spaces containing undisturbed areas such as woodpiles, under eaves, fences, and other areas where debris has accumulated. They may also be found living in outdoor toilets where flies are plentiful.</p>	<p>4. Itching, rash, pain, blisters, difficulty breathing, nausea and vomiting, high blood pressure, etc.</p> <p><b>Brown Recluse:</b>                  Cannot bite humans without some form of counter pressure, for example, through unintentional contact that traps the spider against the skin. Bites may cause a stinging sensation with localized pain. A small white blister usually develops at the site of the bite. The venom of a brown recluse can cause a severe lesion by destroying skin tissue.  <b>This skin lesion will require professional medical attention.</b></p> <p><b>Black Widow:</b> Pain at the bite area and then spreads to the chest, abdomen, or the entire body.</p>	<p>4A) Inspect or shake out any clothing, shoes, towels, or field equipment/gear before use.</p> <p>4B) Wear protective clothing such as a long-sleeved shirt and long pants, hat, gloves, and boots when handling stacked or undisturbed piles of materials.</p> <p>4C) Minimize the empty spaces between stacked materials.</p> <p>4D) Remove and reduce debris and rubble from around the work areas.</p> <p>4E) If possible, trim or eliminate tall grasses from around long-term work areas. Avoid these areas whenever possible.</p> <p>4F) Store clothing/gear and field equipment in tightly closed plastic bags.</p> <p>4G) Keep your tetanus boosters up-to-date (every 10 years). Spider bites can become infected with tetanus spores.</p>

Completed by:           Annette McLean           Date   06/11/2012  



### Job Hazard Analysis

Job Title: Poisonous Plants

Date of Analysis: 06/11/2012

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1) Mobilization	1A) See JHA Mobilization/Demobilization/Site Preparation	1A) See JHA Mobilization/Demobilization/Site Preparation
2) Preparation	2A) Training – Identifying Poisonous Plants	2A) Provide training on identifying the specific poisonous plants that could be present at the site
 <p><b>POISON IVY</b> (<i>Rhus toxicodendron</i> L.)      <b>POISON OAK</b> (<i>Rhus diversiloba</i>)      <b>POISON SUMAC</b> (<i>Rhus toxicodendron vernix</i>)</p>		
	2B) Poison Ivy 	2B) Poison Ivy: <ul style="list-style-type: none"> <li>▪ Grows everywhere in United States except Hawaii and Alaska.</li> <li>▪ In the East, Midwest, and the South, it grows as a vine.</li> <li>▪ In the Northern and Western United States, it grows as a shrub.</li> <li>▪ Each leaf has three leaflets.</li> <li>▪ Leaves are green in the summer and red in the fall.</li> <li>▪ In the late summer and fall, white berries may grow from the stems.</li> </ul>
	2C) Poison Oak 	2C) Poison Oak: <ul style="list-style-type: none"> <li>▪ Oak-like fuzzy leaves in clusters of three.</li> <li>▪ It has two distinct kinds:                             <ul style="list-style-type: none"> <li>▪ Eastern poison oak (New Jersey to Texas) grows as a low shrub.</li> <li>▪ Western poison oak (Pacific Coast) grows to six-foot-tall clumps or vines up to 30 feet long.</li> </ul> </li> <li>▪ It may have clusters of yellow berries.</li> </ul>
	2D) Poison Sumac 	2D) Poison Sumac <ul style="list-style-type: none"> <li>▪ Grows in standing water in peat bogs in the Northeast and Midwest and in swampy areas in parts of the Southeast.</li> <li>▪ Each leaf has clusters of seven to 13 smooth-edged leaflets.</li> <li>▪ The plants can grow up to 15 feet tall.</li> <li>▪ The leaves are orange in spring, green in summer and red, and orange or yellow in fall.</li> <li>▪ There may be clumps of pale yellow or cream-colored berries.</li> </ul>

Key Work Steps	Hazards/Potential Hazards	Safe Practices
<p>Giant Hogweed</p>  <p>Giant Hogweed</p>  <p>Giant Hogweed</p>  <p>Giant Hogweed Flower (clusters may reach up to 2.5 feet across)</p>  <p>Giant Hogweed Flower Leaves</p>  <p>Giant Hogweed Stem Thick stem with coarse hairs, Blistery dark purple splotches.</p>	<ul style="list-style-type: none"> <li>■ 2E) Giant Hogweed is a public health hazard. It's clear, watery sap has toxins that cause photo-dermatitis. Skin contact followed by exposure to sunlight produces painful, burning blisters that may develop into purplish or blackened scars. Contact with the eyes can cause temporary or permanent blindness. Since its introduction into North America, this plant has become established in rich moist soils along roadsides, stream banks and waste ground. It is present in eastern US. A biennial or perennial herb growing 8 to 15 feet tall, giant hogweed usually has a taproot or occasionally fibrous root. The hollow stems are 2 to 4 inches in diameter with dark reddish-purple splotches and coarse white hairs. The deeply incised compound leaves grow up to 5 feet in width. Hairs on the underside of the leaf are stiff, dense and stubby. The large umbrella-shaped flower heads are up to 2 1/2 feet in diameter across a flat top with numerous small flowers produced in mid-May through July. Some plants die after flowering; others flower for several years. The plant produces flattened, 3/8 inch long, oval dry fruits that have a broadly rounded base and broad marginal ridges. Plants sprout in the early spring (or late winter in mild years) from the roots or from seed. Grows in standing water in peat bogs in the Northeast and Midwest and in swampy areas in parts of the Southeast. Each leaf has clusters of seven to 13 smooth-edged leaflets. The plants can grow up to 15 feet tall. The leaves are orange in spring, green in summer and red, and orange or yellow in fall. There may be clumps of pale yellow or cream-colored berries.</li> </ul>	

<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
3A) Contact with poisonous plants	3A) Hand Contact	3A) Hand Contact <ul style="list-style-type: none"> <li>▪ Apply IvyX (or similar product) to hands, forearms and other potentially exposed parts of the body, prior to starting work in the morning and again right after lunch.</li> <li>▪ Leather Gloves must be worn at all times when digging, screening or carrying field equipment.</li> <li>▪ Leather gloves should be of sufficient length to cover the entire wrist and cuff of the shirt.</li> <li>▪ Carefully remove gloves, without touching the exterior surface, when taking notes and prior to lunch or restroom breaks.</li> <li>▪ Gloves that become worn should be replaced immediately.</li> <li>▪ Do not scratch or rub the face or other exposed skin while wearing gloves.</li> <li>▪ Workers will apply Tecnu (or similar product) to the hands and forearms immediately after removing their gloves, prior to lunch and again at the end of the day. Tecnu will help cleanse the urushiol oil from the skin before it can be absorbed. Sensitive individuals can also apply prior to showering in the evening.</li> </ul>
	3B) Arm Contact	3B) Arm Contact <ul style="list-style-type: none"> <li>▪ Apply IvyX (or similar product) to hands, forearms and other potentially exposed parts of the body, prior to starting work in the morning and again right after lunch.</li> <li>▪ Wear light weight, long sleeved shirts as the sleeves will provide a physical barrier between the skin and any urushiol oil encountered. Disposable gauntlets may we worn over arms to keep oil from clothing as well.</li> <li>▪ Have the sleeves pulled down to the base of the hand, covering the forearm and wrist (all exposed skin).</li> <li>▪ Workers will apply Tecnu (or similar product) to the hands and forearms immediately after removing their gloves, prior to lunch and again at the end of the day. Tecnu will help cleanse the urushiol oil from the skin before it can be absorbed. Sensitive individuals can also apply prior to showering in the evening.</li> </ul>
	3C) Leg Contact	3C) Leg Contact <ul style="list-style-type: none"> <li>▪ Wear long pants and boots.</li> <li>▪ Assume boots are contaminated with the urushiol oil and only handle with gloved hands.</li> </ul>
4) Handling Contaminated Equipment and Clothing	4A) Exposure from Handling Contaminated Equipment	4A) Exposure from Handling Contaminated Equipment <ul style="list-style-type: none"> <li>▪ Do not handle any field equipment that may have come in contact with poison ivy/oak/sumac without gloves.</li> <li>▪ Decontaminate all equipment at the end of each workday with a solution of water and dish soap.</li> <li>▪ Scrub all surfaces of the screens and shovels with a brush.</li> <li>▪ Rinse with cool water using a portable garden sprayer.</li> </ul>

<b>Key Work Steps</b>	<b>Hazards/Potential Hazards</b>	<b>Safe Practices</b>
	4B) Exposure from Handling Contaminated Clothing	4B) Exposure from Handling Contaminated Clothing <ul style="list-style-type: none"><li>▪ Wash clothing potentially contaminated with urushiol oil prior to wearing again.</li><li>▪ Handle contaminated clothing with gloves as the oil can remain on environmental surfaces for up to 5 years.</li></ul>

Completed by:           Annette McLean          

Date:   06/11/2012  



### Job Hazard Analysis - Short Form HASP

**Job Title:** Clearing weeds, brush and trees - Oversight ONLY. It should be noted that AMEC will not be performing the clearing and grubbing activities, but will be in the general work area.

**Minimum Recommended PPE\*:** Hard hat, chaps, safety glasses/goggles, steel toed boots, long pants, long sleeve shirt,

cotton or leather gloves

\*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Going to site, work preparation	1A) General	1A) See Mobilization/demobilization and Site Preparation JHA
	1B) Chemical Exposures	1B) If clearing is to be conducted at a hazardous waste site, see HASP for monitoring procedures and required PPE.
2. Clearing light brush with Machete  <b>NOTE:</b> AMEC will not be conducting this task; the general contractor will be doing the clearing of weeds, brush, and small trees. AMEC has included this JHA for informational purposes only.	2A) Cuts and Lacerations	2A) Cuts and Lacerations <ul style="list-style-type: none"> <li>▪ The machete should be used only to cut light brush. Do not use machetes for heavy cutting. Use long-handed lopping shears or brush hooks instead of machetes for cutting thorny bushes and briars.</li> <li>▪ Remove vines and low hanging limbs that might catch machete and cause it to fly out of your hand or strike your body.</li> <li>▪ Never use a machete while in a tree.</li> <li>▪ Always use sharp tools. Dull tools are likely to slip or rebound. Sharpen machete blades only from six (6) inches from the butt of the handle to within two (2) inches of the point. The end of the machete blade should not be sharpened. To reduce the possibility of injury, it can even be blunted.</li> <li>▪ Station machete users at no closer than ten (10) feet intervals. Under no conditions should party members who are using sharp-edged tools simultaneously be within 10 feet of each other. Protect yourself by retaining this minimum safety zone.</li> <li>▪ Always have a firm footing before swinging the machete. While chopping, if possible, lean forward.</li> <li>▪ Strokes should be made away from the body. No cut should ever be directed downward toward the feet or toward any other part of the body.</li> <li>▪ Swing with a full swing at an approximate 45°, but do not over-swing or swing too hard.</li> <li>▪ Right-handed: Right foot forward - when swinging downward toward the left or when swinging upward to the right. Left foot forward - when swinging downward toward the right or when swinging upward to the left.</li> <li>▪ Left-handed - reverse the right-handed procedure.</li> <li>▪ When not in use, the machete should be placed in a stout scabbard to reduce the chance of injury and to protect its cutting edge.</li> </ul>
	2B) Eye Injury	2B) Eye Injury <ul style="list-style-type: none"> <li>▪ Maintain a distance of at least 10 feet between party members when walking through dense vegetation or woods so that rebounding branches don't cause eye injuries.</li> <li>▪ Wear eye protection.</li> </ul>
	2C) Slips/Trips/Falls	2C) Slips/Trips/Falls <ul style="list-style-type: none"> <li>▪ Be particularly careful when walking along a cleared survey line having protruding sharp stubs. They can cause serious injury if fallen upon.\</li> <li>▪ Wear sturdy work boots with high ankles and with good traction.</li> </ul>

Key Work Steps	Hazards/Potential Hazards	Safe Practices
3. Clearing small trees or limbs with Axes	3A) Cuts/Lacerations	3A) Cuts/Lacerations <ul style="list-style-type: none"> <li>▪ Axes are for cutting trees with trunks or limbs greater than one inch in diameter.</li> <li>▪ Remove vines and low hanging limbs that might catch the axe and cause it to fly out of your hand or strike your body.</li> <li>▪ Make sure that the head of the axe is tight on the handle.</li> <li>▪ Always use sharp tools. Dull tools are likely to slip or rebound.</li> <li>▪ Never use an axe while in a tree.</li> <li>▪ Proper grip of the handle is important. Where working space is ample and full-force chopping is necessary, place one hand near the end of the handle and move the other toward the head as the axe is being lifted; on the down stroke, this hand should slide toward the end of the handle. In crowded locations, hold the handle near its center with both hands. Strokes with this grip are easily controlled but are not too powerful.</li> <li>▪ Keep your eyes on the spot you're aiming for.</li> <li>▪ Warm the blade of an axe slightly before using it in cold weather. This can be done by holding the axe in gloved hands for a short period of time. A tempered steel blade, when cold, can fracture and cause particles of metal to fly.</li> <li>▪ Do not chop frozen wood or very hard knots. They can cause the blade to rebound.</li> <li>▪ When cutting a dead, hardwood tree, be very careful because many of them are extremely hard.</li> <li>▪ To trim limbs from a fallen tree trunk, stand to the side of the tree opposite the limb.</li> <li>▪ Carry an axe by gripping the handle just behind the head and turning the sharp edge outward. The axe should be sheathed.</li> </ul>
	3B) Eye Injury	3B) Eye Injury <ul style="list-style-type: none"> <li>▪ Maintain a distance of at least 10 feet between party members when walking through dense vegetation or woods so that rebounding branches don't cause eye injuries.</li> <li>▪ Wear eye protection.</li> </ul>
	3C) Slips/Trips/Falls	3C) Slips/Trips/Falls <ul style="list-style-type: none"> <li>▪ Be particularly careful when walking along a cleared survey line having protruding sharp stubs. They can cause serious injury if fallen upon.</li> <li>▪ Wear sturdy work boots with high ankles and with good traction.</li> </ul>

Key Work Steps	Hazards/Potential Hazards	Safe Practices
4. Clearing brush using a Brush Hook	5A) Cuts/Lacerations	4A) Cuts/Lacerations <ul style="list-style-type: none"> <li>▪ The brush hook functions like an axe that has its cutting head reversed. It is used for rough work in brush too thick for an axe and finds its best use in thick underbrush where a low cut, requiring a long cutting edge, is needed.</li> <li>▪ Always use sharp tools. Dull tools are likely to slip or rebound.</li> <li>▪ Remove vines and low hanging limbs that might catch brush hooks and cause them to fly out of your hand or strike your body.</li> <li>▪ Never use a brush hook while in a tree.</li> <li>▪ To keep the head solidly on the handle, workers should carry a tool to adjust the collar or clamp.</li> <li>▪ Hold the brush hook like you would an axe, except keep your upper hand a little more toward the cutting edge to give better balance when making a low cut.</li> <li>▪ When cutting, try not to fight the foliage but, rather, strike at the base of the plants. Aim carefully and keep your body balance.</li> <li>▪ Make sure adequate clearance is maintained. The brush hook can be more easily deflected than the axe because of the shape of its blade.</li> <li>▪ Carry a brush hook like you would carry an axe. Keep your hand close to the head. Because the beak easily catches on vines and wires when the brush hook is carried with its head pointing backward, always point the head to the front. Never carry a brush hook on your shoulder.</li> <li>▪ Because of their shape, brush hooks are difficult to store in trucks or tool houses unless special provisions are made. Sheathes should be provided to protect workmen and to keep the blades from being nicked.</li> </ul>
	5B) Eye Injury	4B) Eye Injury <ul style="list-style-type: none"> <li>▪ Maintain a distance of at least 10 feet between party members when walking through dense vegetation or woods so that rebounding branches don't cause eye injuries.</li> <li>▪ Wear eye protection.</li> </ul>
	5C) Slips/Trips/Falls	4C) Slips/Trips/Falls <ul style="list-style-type: none"> <li>▪ Be particularly careful when walking along a cleared survey line having protruding sharp stubs. They can cause serious injury if fallen upon.\</li> <li>▪ Wear sturdy work boots with high ankles and with good traction.</li> </ul>

Key Work Steps	Hazards/Potential Hazards	Safe Practices
5. Clearing brush /trees with a chainsaw	5A) Cuts/Lacerations	5A) Cuts/Lacerations <ul style="list-style-type: none"> <li>▪ The brush hook functions like an axe that has its cutting head reversed. It is used for rough work in brush too thick for an axe and finds its best use in thick underbrush where a low cut, requiring a long cutting edge, is needed.</li> <li>▪ Always use sharp tools. Dull tools are likely to slip or rebound.</li> <li>▪ Remove vines and low hanging limbs that might catch brush hooks and cause them to fly out of your hand or strike your body.</li> <li>▪ Never use a brush hook while in a tree.</li> <li>▪ To keep the head solidly on the handle, workers should carry a tool to adjust the collar or clamp.</li> <li>▪ Hold the brush hook like you would an axe, except keep your upper hand a little more toward the cutting edge to give better balance when making a low cut.</li> <li>▪ When cutting, try not to fight the foliage but, rather, strike at the base of the plants. Aim carefully and keep your body balance.</li> <li>▪ Make sure adequate clearance is maintained. The brush hook can be more easily deflected than the axe because of the shape of its blade.</li> <li>▪ Carry a brush hook like you would carry an axe. Keep your hand close to the head. Because the beak easily catches on vines and wires when the brush hook is carried with its head pointing backward, always point the head to the front. Never carry a brush hook on your shoulder.</li> <li>▪ Because of their shape, brush hooks are difficult to store in trucks or tool houses unless special provisions are made. Sheathes should be provided to protect workmen and to keep the blades from being nicked.</li> </ul>
	5B) Cuts, Hearing Loss, Eye Injuries, Head injuries	5B) Cuts, Hearing Loss, Eye Injuries, Head injuries <ul style="list-style-type: none"> <li>▪ Wear gloves, chaps, hard hat, safety glasses, hearing protection, and sturdy boots with slip resistant soles.</li> <li>▪ Stop saw before carrying.</li> <li>▪ Point bar forward when going downhill and the saw is at the side.</li> <li>▪ Point bar to the rear when going uphill and the saw at the side.</li> <li>▪ Pack and guard bar and dogs when carrying saw on the shoulder.</li> <li>▪ Maintain minimum 10 feet walking space between crewmembers.</li> <li>▪ Ensure fuel cap on saw is secure.</li> <li>▪ Keep shirt collar up while carrying saw on shoulder.</li> <li>▪ Leg protection (chaps) shall cover the full length of the thigh to the top of the boots.</li> </ul>
	5C) Cuts, eye injury, hearing damage Kickback	5C) Cuts, eye injury, hearing damage Kickback <ul style="list-style-type: none"> <li>▪ Wear gloves, eye and hearing protection, steel-toed shoes. Follow procedures in owner manual.</li> <li>▪ There are two recognized methods for safely starting a saw. In both methods, the trigger lock should not be used.                             <ul style="list-style-type: none"> <li>▪ On Ground starting.</li> <li>▪ Stand starting.</li> </ul> </li> <li>▪ Drop Starting is prohibited.</li> </ul>
	5D) Cuts, eye injury, hearing damage, back strain, falling debris	5D) Cuts, eye injury, hearing damage, back strain, falling debris <ul style="list-style-type: none"> <li>▪ Wear gloves, eye and hearing protection, steel-toed shoes, back support, hard hat.</li> <li>▪ Be aware of surroundings (i.e., power lines, vehicles, other employees).</li> <li>▪ Use line or wedge to guide fall.</li> </ul>

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5E) Tree Falling	5E) Area Size up Surrounding <ul style="list-style-type: none"> <li>▪ Determine natural lean and condition of tree (rot, splits, loose bark etc.) and the best direction to be felled.</li> <li>▪ Be aware of other trees leaning into the tree being felled.</li> <li>▪ Be aware of snags in the area.</li> <li>▪ Do not cut during shifting, high or gusty wind conditions.</li> <li>▪ Clean materials away from the tree's base that may pose a hazard.</li> <li>▪ Avoid cutting above your shoulders.</li> <li>▪ Before cutting determine your primary and secondary escape routes to a predetermined safe area.</li> <li>▪ Using the saw, prepare your escape route by cutting all tripping hazards.</li> <li>▪ Keep proper spacing between operators (at least two tree lengths).</li> </ul>
	5F) Making undercuts; Falling Materials Saw Cuts and Flying Material	5F) Saw Cuts and Flying Material <ul style="list-style-type: none"> <li>▪ The cut depth must be a minimum of 1/3 the tree's diameter.</li> <li>▪ The cut width must be a minimum of 1/5 of the diameter and at 45-degree angle.</li> <li>▪ Leave no Dutchman.</li> </ul>
	5G) Back cut Wedging and Falling Material	5G) Back cut Wedging and Falling Material <ul style="list-style-type: none"> <li>▪ Announce Felling</li> <li>▪ Notify others in the area that the tree is about to fall.</li> <li>▪ Make the back cut slightly above (approximately 2 inches under cut), must be level and even.</li> <li>▪ Remove loose bark before beginning back cut.</li> <li>▪ Utilize swamper lookout under adverse conditions.</li> <li>▪ Wedge tree as soon as possible after beginning back-cut continue with the back-cut and tamp in wedges periodical.</li> </ul>
	5H) Being hit by Falling Trees/Branches/Pieces	5H) Being hit by Falling Trees/ Branches/ Pieces <ul style="list-style-type: none"> <li>▪ When the tree begins to fall, withdraw the saw from cut and shut off.</li> <li>▪ Retreat to your safety area at an angle, not straight back.</li> <li>▪ Do not turn your back on a falling tree.</li> <li>▪ Continue to watch for falling limbs and/or other trees after the tree hits the ground.</li> <li>▪ Try to avoid hanging tree up in standing timber.</li> <li>▪ Do not attempt to fall trees without all the essential equipment. This equipment includes: PPE, chainsaw, small axe and swamper.</li> </ul>
	5I) Kickback, Puller/swamper, uneven terrain, Fatigue	5I) Kickback, Puller/swamper, uneven terrain, Fatigue <ul style="list-style-type: none"> <li>▪ Secure firm footing.                             <ul style="list-style-type: none"> <li>▪ Keep feet spread apart in a wide balanced stance.</li> <li>▪ Feet should be placed so as to keep feet and legs away from saw chain.</li> <li>▪ Keep a firm grip on saw with both hands.</li> </ul> </li> <li>▪ Look up for widow makers and other loose debris.                             <ul style="list-style-type: none"> <li>▪ Don't cut under a hazard.</li> <li>▪ Remove the hazard or relocate the cutting location.</li> <li>▪ Flush cut limbs and stems.</li> </ul> </li> <li>▪ Never cut with engine higher than your chest.</li> <li>▪ Clear debris from cutting location so that the guide bar tip is not accidentally stubbed.</li> </ul>

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	15A) Bucking Felled Trees and Kickback	15A) Bucking Felled Trees and Kickback <ul style="list-style-type: none"> <li>▪ When bucking logs, be aware of the direction the logs may roll or move after bucking.</li> <li>▪ Do not stand on the downhill side of logs.</li> </ul>
	5J) Explosion, fire, hazardous vapors, splashing fuel in eyes, spills	5J) Explosion, fire, hazardous vapors, splashing fuel in eyes, spills <ul style="list-style-type: none"> <li>▪ Wear eye protection</li> <li>▪ Shut off engine and let cool before refueling</li> <li>▪ Refuel in well ventilated area on bare ground or other non-combustible surface</li> <li>▪ Wipe fuel off saw</li> <li>▪ Keep fuel away from sparks or open flame, never start saw within 10 feet of fueling area. No smoking during fueling.</li> <li>▪ Do not start the saw at the point of fueling.</li> <li>▪ Transport fuel in approved containers</li> <li>▪ Have spill kit ready in case of fuel spill.</li> <li>▪ Use proper saw gas and oil fuel mixture. Never use motor oil or bar lubricant to mix with saw gas.</li> <li>▪ Fix pinched bar guide rails, bent bars or damaged tips immediately.</li> <li>▪ Keep chain sharp and with proper tension at all times.</li> <li>▪ Use gloves whenever working with the chain.</li> <li>▪ Beware of hot muffler.</li> <li>▪ Ensure chain brake is working properly.</li> <li>▪ Ensure the carburetor is adjusted properly so the chain doesn't run at an idle.</li> <li>▪ Stop saw If the bar oil runs out before the saw gas does.</li> </ul>
	5K) Lightning, Rain, Strong winds, Darkness	5K) Lightning, Rain, Strong winds, Darkness <ul style="list-style-type: none"> <li>▪ All work shall terminate and each employee shall move to a place of safety when environmental conditions create a hazard for the employee.</li> </ul>

**ATTACHMENT C**  
**SITE SAFETY ORIENTATION**

## SITE SAFETY ORIENTATION

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Project: Site: \_\_\_\_\_

Project Number: \_\_\_\_\_ Date: \_\_\_\_\_

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*All applicable items listed below are to be reviewed ( ✓ ) on the first day of site activities and when new workers arrive on site. Training provider, please initial each item covered in the training, or note “NA” as applicable.*

- Field Operations Leader (also known as the AMEC General Supervisor): \_\_\_\_\_
  - Site Health and Safety Officer (also known as the Site Safety and Health Supervisor): \_\_\_\_\_
  - Local Health and Safety Representative (LHSR): \_\_\_\_\_
  - Employees’ direct supervisor(s): \_\_\_\_\_
  - Location of HASP and MSDS on Site \_\_\_\_\_
  - HazCom labeling system if different from Local Operation \_\_\_\_\_
  - Site-specific medical surveillance requirements \_\_\_\_\_
  - Site control measures (location of exclusion zone, etc.) \_\_\_\_\_
  - Safety and health hazards on site \_\_\_\_\_
  - The Level of Protection and specific PPE to be used: \_\_\_\_\_
  - Work practices to be used on site to minimize exposure: \_\_\_\_\_
  - Decontamination procedures: \_\_\_\_\_
  - How to effectively use site/task engineering controls: \_\_\_\_\_
  - Applicable elements of the Site emergency response plan: \_\_\_\_\_
  - Any other site-specific health and safety related requirements: \_\_\_\_\_
- 

Participating employees must print and sign their name in the spaces provided below:

_____	_____
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**ATTACHMENT D**  
**RECORD OF SITE SAFETY MEETING**

## RECORD OF SITE SAFETY MEETING

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Project: Site: \_\_\_\_\_

Project Number: \_\_\_\_\_ Date: \_\_\_\_\_

Safety Meeting Conducted by (print name): \_\_\_\_\_

Safety Meeting Conducted by (signature): \_\_\_\_\_

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List of topics discussed this meeting:

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Participating employees must print and sign their name in the spaces provided below:

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TEXTRON, INC.  
FORMER GORHAM MANUFACTURING FACILITY, PROVIDENCE, RI  
REMEDIAL ACTION WORK PLAN – PHASE I SOIL CAPPING: PARCEL C-1

## **APPENDIX F**

### **ENVIRONMENTAL LAND USE RESTRICTION AND SOIL MANAGEMENT PLAN**

*(Draft ELUR being reviewed by RIDEM)*

**Appendix G**  
**ENVIRONMENTAL LAND USAGE RESTRICTION**

This Declaration of Environmental Land Usage Restriction ("~~Restriction~~") (ELUR) is made on this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, 2011, by ~~[property owner]~~, and its successors and/or assigns (hereinafter, "~~the Grantor~~").

**WITNESSETH**

WITNESSETH:

WHEREAS, ~~the~~ Grantor \_\_\_\_\_ (name) is the ~~Ownerowner~~, in fee simple of certain real property identified as ~~[specify Plat, Lot(s), address and Town or City] Rhode Island~~ (the "~~Property~~"); known as 425 Adelaide Avenue located in the City of Providence, designated as Phase I of Parcel C-1, Plat 51 on the tax map of the City of Providence, more particularly described ~~in~~ Exhibit A (Legal Description) of Property pending completion of remedial activities and as-built plans [AMEC to prepare based on stamped City Survey Plat with bearing & distance] which is attached hereto and made a part hereof; and

WHEREAS, the Property (or portion thereof identified in the Class I survey which is attached hereto as Exhibit 2A and is made a part hereof) has been determined to contain soil and/or groundwater which is contaminated with certain Hazardous Materials and/or petroleum in excess of applicable ~~[residential or industrial/commercial Direct Exposure Criteria, and/or applicable groundwater objective]~~ criteria pursuant to the Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases ("~~Remediation Regulations~~");

WHEREAS, the Grantor and the Department have determined that the ~~environmental land use restrictions~~ Environmental Land Use Restriction set forth below ~~are~~ is consistent with the regulations adopted by the ~~Rhode Island~~ Department of Environmental Management ("~~the Department~~") pursuant to ~~R.I.G.L. § Section 23-19.1-14~~ of the Rhode Island General Laws and that this restriction shall be a Conservation Restriction pursuant to R.I.G.L. § 34-39-1 et. seq. and shall not be subject to the 30 year limitation provided in R.I.G.L. § 34-4-21; and

WHEREAS, the Grantor believes that this environmental land use restriction will effectively protect public health and the environment from hazardous substances; and

WHEREAS, the ~~Department's~~ Department's written approval of this ~~Restriction~~ environmental land use restriction is contained in the document entitled: ~~[Remedial Decision Letter/ Settlement Agreement/ Order of Approval/ Remedial Approval Letter] dated December 12, 2011, a copy which is attached hereto as Exhibit B and issued pursuant to the Remediation Regulations; and~~

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WHEREAS, the Property [or portion thereof identified in the Class I survey which is attached hereto as Exhibit C and is made a part thereof] has been determined to be a Contaminated-Site and contains hazardous substances; and

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WHEREAS, to prevent exposure to or migration of Hazardous Substances and to abate hazards to human health and/or the environment, and in accordance with the [Remedial Decision Letter/ Remedial Agreement/ Order of Approval/ Remedial Approval Letter], the Grantor desires to impose certain restrictions upon the use, occupancy, and activities of and at the [Property/Contaminated-Site]; and

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WHEREAS, the Grantor believes that this Restriction will effectively protect public health and the environment from such contamination; and

WHEREAS, the Grantor intends that such restrictions shall run with the land and be binding upon and enforceable against the Grantor and the Grantor's successors and assigns.

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NOW, THEREFORE, Grantor agrees as follows:

A. Purpose: In accordance with the Remedial Decision Letter, the purpose of this environmental land use restriction is to assure:

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1. That fill material and soil containing hazardous substances on the Property remains in a controlled or covered and isolated condition.
2. That the area of soils designated as Phase I of Parcel C-1 on Exhibit C be covered and isolated such that future conditions will prevent direct contact of the fill and soil by visitors to, and workers at the site, and will prevent runoff of contaminated fill or soil particles by stormwater.
3. That groundwater beneath Phase I of Parcel C-1 not be used for potable or non-potable purposes.
4. That water shall not be discharged or allowed to infiltrate through fill or soil containing hazardous substances in the ENVIRONMENTAL LAND USE RESTRICTION Phase I of Parcel C-1 indicated in Exhibit C, other than by natural precipitation and infiltration or by routine irrigation and maintenance of landscaped areas.
5. That there is adequate vegetation to prevent erosion.
6. That the Property remains used for recreational activities, and that building structures for residential, commercial, or institutional uses be prohibited.

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A.B. Restrictions Applicable to the [Property/Contaminated-Site]: In accordance with the [Remedial Decision Letter/ Remedial Agreement/ Order of Approval/ Remedial Approval Letter], the: In furtherance of the purposes of this environmental land use restriction, Grantor shall assure that use, occupancy, and activity of and at the [Property/Contaminated-Site] is are restricted as follows:

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- i. No residential use of the **[Property/Contaminated-Site]** shall be permitted that is contrary to Department approvals and restrictions contained herein;
- ii. No groundwater at the **[Property/Contaminated-Site]** shall be used as potable water;
- iii. No soil at the **[Property/Contaminated-Site]** shall be disturbed in any manner without written permission of the Department's Office of Waste Management, except as permitted in the Remedial Action Work Plan (RAWP) or Soil Management Plan (SMP) approved by the Department in a written approval letter dated \_\_\_\_\_ (date) Exhibit B and attached hereto;
- [iv. Humans engaged in activities at the **[Property/Contaminated-Site]** shall not be exposed to soils containing Hazardous Materials and/or petroleum in concentrations exceeding the applicable Department approved Direct Exposure Criteria set forth in the Remediation Regulations;
- [v. Water at the **[Property/Contaminated-Site]** shall be prohibited from infiltrating soils containing Hazardous Materials and/or petroleum in concentrations exceeding the applicable Department approved leachability criteria set forth in the Remediation Regulations;
- [vi. No subsurface structures shall be constructed on the **[Property/Contaminated-Site]** over groundwater containing Hazardous Materials and/or petroleum in concentrations exceeding the applicable Department approved GB Groundwater Objectives set forth in the Remediation Regulations;
- [vii. The engineered controls at the **[Property/ Contaminated-Site]** described in the **[RAWP or SMP]** contained in Exhibit B attached hereto shall not be disturbed and shall be properly maintained to prevent humans engaged in **[residential or industrial/commercial]** activity from being exposed to soils containing Hazardous Materials and/or petroleum in concentrations exceeding the applicable Department approved **[residential or industrial/commercial]** Direct Exposure Criteria in accordance with the Remediation Regulations; and
- [viii. The engineered controls at the **[Property/ Contaminated-Site]** described in the **[RAWP or Soil Management Plan SMP]** contained in Exhibit B attached hereto shall not be disturbed and shall be properly maintained so that water does not infiltrate soils containing Hazardous Materials and/or petroleum in concentrations exceeding the applicable Department approved leachability criteria set forth in the Remediation Regulations.
- 1. Excavation through, or alteration of, the soil cover and liner (Area I), on the Property which would expose or disturb the underlying soil or fill is restricted, unless such excavation or alteration is performed with appropriate measures to protect the health of workers, site visitors, and the environment, and with notification to the Department. The Soil Management Plan, attached hereto as Exhibit D, contains the measures which shall be employed to protect humans and the environment in the event that utilities need to be repaired or other activities occur which shall cause excavation through or alteration of*

the liner, soil cover and landscaped areas. The Soil Management Plan may be modified with the approval of the Department. Grantees shall be permitted to perform routine maintenance of the soil cover and landscaping without employing the Soil Management Plan.

- 2. Use of groundwater from the Property for potable, non-potable, fire protection, irrigation, or any other purpose is prohibited.
- 3. Grantee shall not construct a pond, dry well, leaching field, recharge gallery, or other structure intended to cause water to infiltrate through fill or contaminated soil unless such a design is conducted by a competent environmental professional and a registered Professional Engineer (P.E.) and such design is approved by the Department.
- 4. Building structures for residential, commercial, or institutional uses shall be prohibited.
- 5. The Property shall be posted to prevent digging or any other intrusive activity.
- 6. Access shall be provided to allow sampling of the compliance monitoring wells, or other actions identified in the Remedial Action Work Plan (RAWP) (including environmental investigation and remediation). Further, the Grantor shall be required to prevent damage to wells, and if such damage does occur, the Grantor shall repair or replace in a timely manner the damaged well(s) as necessary.
- 7. The owner of the Property is obligated to maintain and enforce the provisions of this ENVIRONMENTAL LAND USE RESTRICTION including but not limited to: maintenance of the liner and soil cover in Area I, and that building structures for residential, commercial, or institutional uses are prohibited.

**B.C. No action shall be taken, allowed, suffered, or omitted at the ~~Property~~ Contaminated Site if such action or omission is reasonably likely to:**

- ~~i. Create a risk of migration of Hazardous Materials and/or petroleum;~~
- ~~ii. Create a potential hazard to human health or the environment; or~~
  - 1. Result in the disturbance of any engineering controls utilized at the Phase I of Parcel C-1 liner or soil cover which would expose the ~~Property/Contaminated Site~~, except as permitted in underlying fill or contaminated soils, unless such activities are performed under the measures prescribed by the Soil Management Plan or with the Department's approval.
  - 2. Cause the discharge or infiltration of water (other than by natural precipitation or for routine irrigation of the landscaped areas) through the fill or contaminated soil on the property without approval of the Department-approved ~~RAWP or SMP~~ contained in Exhibit B. Stormwater retention basins present on the property which have been constructed in areas not underlain by fill or contaminated soil shall not be altered without the approval of the Department.

**C. Emergencies: In the event of any emergency which presents a significant risk to human health or to the environment, including but not limited to, maintenance and repair of utility lines or a response to emergencies such as fire or flood, the application of**

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Paragraphs A (iii.-viii.) and B above may be suspended, provided such risk cannot be abated without suspending such Paragraphs and the Grantor complies with the following:

- i. Grantor shall notify the Department's Office of Waste Management in writing of the emergency as soon as possible but no more than three (3) business days after Grantor's having learned of the emergency. (This does not remove Grantor's obligation to notify any other necessary state, local or federal agencies.);
- ii. Grantor shall limit both the extent and duration of the suspension to the minimum period reasonable and necessary to adequately respond to the emergency;
- iii. Grantor shall implement reasonable measures necessary to prevent actual, potential, present and future risk to human health and the environment resulting from such suspension;
- iv. Grantor shall communicate at the time of written notification to the Department its intention to conduct the Emergency Response Actions and provide a schedule to complete the Emergency Response Actions;
- v. Grantor shall continue to implement the Emergency Response Actions, on the schedule submitted to the Department, to ensure that the **{Property/Contaminated-Site}** is remediated in accordance with the Remediation Regulations (or applicable variance) or restored to its condition prior to such emergency. Based upon information submitted to the Department at the time the ELUR was recorded pertaining to known environmental conditions at the **{Property/Contaminated-Site}**; emergency maintenance and repair of utility lines shall only require restoration of the **{Property/Contaminated-Site}** to its condition prior to the maintenance and repair of the utility lines; and
- vi. Grantor shall submit to the Department, within ten (10) days after the completion of the Emergency Response Action, a status report describing the emergency activities that have been completed.

**D. Release of Restriction; Alterations of Subject Area:** The Grantor shall not make, or allow or suffer to be made, any alteration of any kind in, to, or about any portion of the **{Property/Contaminated-Site}** inconsistent with this Restriction unless the Grantor has received the Department's prior written approval for such alteration. If the Department determines that the proposed alteration is significant, the Department may require the amendment of this Restriction. Alterations deemed insignificant by the Department will be approved via a letter from the Department. The Department shall not approve any such alteration and shall not release the **{Property/Contaminated-Site}** from the provisions of this Restriction unless the Grantor demonstrates to the Department's satisfaction that Grantor has managed the **{Property/Contaminated-Site}** in accordance with applicable regulations.

**E. Notice of Lessees and Other Holders of Interests in the {Property/Contaminated-Site}:** The Grantor, or any future holder of any interest in the **{Property/Contaminated-Site}**:

~~Site], shall cause any lease, grant, or other transfer of any interest in the {Property/Contaminated-Site} to include a provision expressly requiring the lessee, grantee, or transferee to comply with this Restriction. The failure to include such provision shall not affect the validity or applicability of this Restriction to the {Property/Contaminated-Site}.~~

**F. Enforceability:** If any court of competent jurisdiction determines that any provision of this Restriction is invalid or unenforceable, the Grantor shall notify the Department in writing within fourteen (14) days of such determination.

**G. Binding Effect:** All of the terms, covenants, and conditions of this Restriction shall run with the land and shall be binding on the Grantor, its successors and assigns, and each Owner and any other party entitled to control, possession or use of the {Property/Contaminated-Site} during such period of Ownership or possession.

*3. Since soil in certain areas has been removed or is not contaminated, temporary disturbance of soil is allowed, and compliance with the Soil Management Plan is not required, when encountering soil for simple maintenance from ground surface to a depth of two feet. The disturbed area is to be returned to a similar condition as existed prior to the temporary disturbance.*

**H.D. Inspection & Non-Compliance:** It shall be the obligation of the Grantor, or any future holder of any interest in the {Property/Contaminated-Site}, to provide for annual inspections of the {Property/Contaminated-Site} for or compliance with the ELURENVIROMENTAL LAND USE RESTRICTION in accordance with Department requirements.

~~{An officer or Director of the company with direct knowledge of past and present conditions of the {Property/Contaminated-Site} (the "Company Representative"), or} A qualified environmental professional will, on the behalf of the Grantor or future holder of any interest in the {Property/Contaminated-Site}, will evaluate the compliance status of the {Property/Contaminated-Site} on an annual basis. Upon completion of the evaluation, the {Company Representative or} environmental professional will prepare and simultaneously submit to the Department and to the Grantor or future holder of any interest in the {Property/Contaminated-Site} an evaluation report detailing the findings of the inspection, and noting any compliance violations at the {Property/Contaminated-Site}. If the {Property/Contaminated-Site} is determined to be out of compliance with the terms of the ELURENVIROMENTAL LAND USE RESTRICTION, the Grantor or future holder of any interest in the {Property/Contaminated-Site} shall submit a corrective action plan in writing to the Department within ten (10) days of receipt of the evaluation report, indicating the plans to bring the {Property/Contaminated-Site} into compliance with the ELURENVIROMENTAL LAND USE RESTRICTION, including, at a minimum, a schedule for implementation of the plan.~~

~~In the event of any violation of the terms of this Restriction, which remains uncured more than ninety (90) days after written notice of violation, all Department approvals and~~

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agreements relating to the ~~{Property/Contaminated-Site}~~ may be voided at the sole discretion of the Department.

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**E. Release of Restriction; Alterations of Subject Area:** Grantor shall not make, or allow or suffer to be made, any alteration of any kind in, to, or about any portion of any of the Contaminated Site inconsistent with this Environmental Land Use Restriction unless the Grantor has first received the Department's written approval of such alteration. If the Department determines that the proposed alteration is significant it may require the amendment of this restriction. Insignificant alterations will be approved by the Department via a letter from the Department. The Department shall not approve any such alteration and shall not release the Property from the provisions of this Environmental Land Use Restriction unless the Grantor demonstrates to the Department's satisfaction that Grantor has managed the Property in accordance with the Remediation Regulations.

**F. Notice of Lessees and Other Holders of Interests in the Property:** Grantor, or any future holder of any interest in the Property, shall cause any lease, grant, or other transfer of any interest in the Property to include a provision expressly requiring the lessee, grantee, or transferee to comply with this Environmental Land Use Restriction. The failure to include such provision shall not affect the validity or applicability to the Property of this Environmental Land Use Restriction.

**G. Severability and Termination:** If any court of competent jurisdiction determines that any provision of this Environmental Land Usage Restriction is invalid or unenforceable, the Grantor shall notify the Department in writing within 14 days of such determination.

**H. Binding Effect:** All of the terms, covenants and conditions of this Environmental Land Use Restriction shall run with the land and shall be binding on the Grantor, the Grantor's successors and assigns, and each owner and any other party entitled to possession or use of the Property during such period of ownership or possession.

**I. Non-Compliance:** In the event that the terms of this Restriction are violated by the Grantor or any future holder of any interest in the Property, this Restriction and all other approvals and agreements relating to the contaminated site shall be null and void.

**I.J. Terms Used Herein:** The definitions of terms used herein shall be the same as the definitions contained in Section 3 (DEFINITIONS) of the Remediation Regulations.

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IN WITNESS WHEREOF, the Grantor has hereunto set (his/her) hand and seal on the day and year set forth above:

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{Name of Person(s), company, LLC or LLP}

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By: \_\_\_\_\_  
Grantor (signature) \_\_\_\_\_ Grantor (typed name)

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It is so agreed:

\_\_\_\_\_  
Grantor Date

So Sworn Before Me:

\_\_\_\_\_  
Notary Date

My ~~Comm-Commission~~ Expires: \_\_\_\_\_

\_\_\_\_\_

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RHODE ISLAND

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

235 Promenade Street, Providence, RI 02908-5767

TDD 401-222-4462

December 12, 2011

**REMEDIAL DECISION LETTER**

**CASE NO. 2006-011**

Mr. Gregory L. Simpson  
Project Manager  
Textron, Inc.  
40 Westminster Street  
Providence, RI 02903

RE: Former Gorham Manufacturing Facility – Park Parcel (a.k.a. Parcel D) – Phase I  
333 Adelaide Ave., Providence, RI  
**Case No. 2005-059 (Associated with Case No. 97-030)**

Dear Mr. Simpson:

On November 9, 2011, the Rhode Island Department of Environmental Management (the Department) amended the Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases, (the Remediation Regulations). The purpose of these regulations is to create an integrated program requiring reporting, investigation and remediation of contaminated sites in order to eliminate and/or control threats to human health and the environment in a timely and cost-effective manner. A **Remedial Decision Letter (RDL)** is a formal, written communication from the Department that approves a site investigation, identifies the preferred remedial alternative and authorizes the development of a Remedial Action Work Plan in order to achieve the objectives of the environmental clean-up.

The Department has the following documents on file in the matter of the above referenced “Site” (as defined in the Industrial Property Remediation and Reuse Act):

1. A Report on the Distribution of Organic Components and Trace Metals in Mashapaug Pond Sediments, prepared by James G. Quinn, James S. Latimer and John T. Ellis of the Graduate School of Oceanography at the University of Rhode Island, and dated April 1986;
2. Correspondence entitled, “*Gorham Manufacturing Co. Facility, Phase I Report*,” prepared by Buonicore-Cashman Associates, and dated July 13, 1987;
3. Environmental Assessment, Adelaide Avenue Plant, Providence, Rhode Island, prepared by Goldberg-Zoino & Associates, Inc., and dated April 1988;

4. Soil and Ground Water Contamination Site Assessment of the Gorham Manufacturing Facility, Providence, RI, prepared by Hunter, Inc., and dated May 25, 1989;
5. Site Investigation Report, Gorham/Textron Site, Providence, Rhode Island, prepared by Camp Dresser & McKee, Inc., and dated June 1993;
6. Correspondence entitled, “*Short-Term Response Action*,” and prepared by ABB Environmental Services, Inc., and dated July 11, 1997, (This correspondence also included laboratory analytical data provided under separate cover, entitled, “*Analytical Laboratory Report for Short-Term Response Action – Former Gorham Manufacturing Facility*”);
7. Site Investigation Summary Report and Risk Assessment, Former Gorham Manufacturing Property, 333 Adelaide Avenue, Providence, Rhode Island, prepared by Harding Lawson Associates (HLA), and dated July 29, 1999;
8. Responses to RIDEM Comments on Site Investigation Report and Risk Assessment, prepared by HLA, and received June 6, 2000;
9. Revised Development Plan and Application of Remedial Alternatives, prepared by HLA, and dated March 9, 2001;
10. Notification to Abutters of Completion of Site Investigation Activities, dated October 30, 2000, and received May 1, 2001;
11. Remedial Action Work Plan, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, RI, prepared by Harding ESE (Harding), and dated April 25, 2001;
12. Letter from Harding to the Department, Re: *Response to RIDEM Comments on the Remedial Action Work Plan, Former Gorham Manufacturing Property, 333 Adelaide Avenue, Providence, Rhode Island*, dated July 24, 2001;
13. Data Review for Mashapaug Pond, Providence, Rhode Island, prepared by the U.S. Environmental Protection Agency, and dated August 2001;
14. Letter from Harding to the Department, Re: *Response to RIDEM Comments Dated September 4, 2001, Remedial Action Work Plan, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, Rhode Island*, dated September 25, 2001;
15. Letter from IT Corporation (IT) to the Department, Re: *Remedial Action Work Plan, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, RI*, dated November 28, 2001;
16. Memorandum from Harding to the Department (delivered via e-mail), Re: *TPH soil issue at Gorham*, dated November 26, 2001, (revised December 18, 2001, at the request of the Department);

17. Letter from Textron to the Department, Re: *Response to RIDEM Comments, Remedial Action Work Plan, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, RI*, dated January 10, 2002;
18. Letter from IT to the Department, Re: *Remedial Action Work Plan Revisions, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, RI*, dated January 28, 2002;
19. Letter from IT to the Department, Re: *Remedial Action Work Plan Revisions, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, RI*, dated February 12, 2002;
20. Mashapaug Pond Data Report and Analysis, prepared by Environmental Science Services, Inc., and dated February 15, 2002;
21. Revised Site Map for Remedial Action Work Plan, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, RI, prepared by IT, and submitted March 5, 2002;
22. Supplemental Site Investigation Work Plan to Support Human Health and Ecological Risk Assessment Activities, Park Parcel/Mashapaug Cove, Former Gorham Manufacturing Property, 333 Adelaide Avenue, Providence, Rhode Island, prepared by MACTEC Engineering and Consulting, Inc. (MACTEC), dated November 2005, and received November 17, 2005;
23. Quality Assurance Project Plan, Short-Term Limited Site Investigation, Former Gorham Property and Mashapaug Cove, Providence, Rhode Island, prepared by Fuss & O'Neill (F&O), and dated December 2005;
24. Supplemental Site Investigation, Gorham Manufacturing Property & Mashapaug Cove, prepared by F&O, and dated April 2006;
25. Slag Removal Work Plan, Former Gorham Manufacturing Facility, Plat 51 – Lots 323, 324, and 326, 333 Adelaide Avenue, Providence, Rhode Island, 97-030 (Including Case No. 2005-029 and Case No. 2005-059), prepared by MACTEC, and dated May 24, 2006;
26. Supplemental Site Investigation Work Plan, Park Parcel/Mashapug Cove, Former Gorham Manufacturing Site, 333 Adelaide Avenue, Providence, Rhode Island, prepared by MACTEC, and dated June 2006;
27. Supplemental Site Investigation Report, Former Gorham Manufacturing Site, 333 Adelaide Avenue, Providence, Rhode Island (SSIR), prepared by MACTEC, dated July 31, 2006, and received August 9, 2006;
28. Letter from MACTEC to Robert Dorr, Re: *Historical Records, Former Gorham Site, 333 Adelaide Ave., Providence, RI*, dated September 12, 2006;

29. Letter from the City of Providence to the Department, Re: *Reply to Slag Pile Removal Letter Dated 21 September 2006, Former Gorham Manufacturing Facility – Park Parcel, 333 Adelaide Ave., Providence, Rhode Island*, and dated September 29, 2006;
30. Slag Removal Action Summary Report, Former Gorham Manufacturing Site, 333 Adelaide Avenue, Providence, Rhode Island, prepared by MACTEC, and dated September 29, 2006;
31. Submittal of Technical Report, Geophysical Survey, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, RI, prepared by MACTEC, and dated October 2, 2006;
32. Letter from Textron to the Department, Re: *Response to RIDEM Slag Pile Removal Comments, Former Gorham Manufacturing Facility, Providence, RI*, dated October 3, 2006;
33. Letter from Robert Dorr to EA Engineering Science and Technology, Inc. (EA), Re: *Alternative Route to Park Parcel*, dated October 6, 2006;
34. Park Parcel Consent Order Compliance - Summary of Soil & Debris Pile Removal, Former Gorham Manufacturing Facility, Plat 51 – Lots 323, 324, and 326, 333 Adelaide Avenue, Providence, Rhode Island, Case No. 97-030 (Including Case No. 2005-029 and 2005-059), prepared by EA, and dated October 19, 2006;
35. Former Slag Pile Area Supplemental Removal Action Work Plan, Former Gorham Manufacturing Facility, Plat 51 – Lots 323, 324, and 326, 333 Adelaide Avenue, Providence, Rhode Island, Case No. 97-030 (Including Case No. 2005-029 and 2005-059), prepared by MACTEC, and dated October 26, 2006;
36. Letter from Robert Dorr to Mactec Re: *MACTEC Files - Textron UST Closure Reports Jan '81 thru Jan '99*, dated October 28, 2006;
37. Electronic mail (e-mail) from Textron to the Department, Subject: *Former Gorham Manufacturing Site - Slag Information*, dated November 2, 2006, including attachments a) Letter from Kenneth Kastner (Hogan & Hartson) to Jamieson Schiff (Textron), and b) Enclosures to Letter from Kenneth Kastner to Jamieson Schiff, both dated November 1, 2006;
38. E-mail from Textron to the Department, Subject: *Response to RIDEM November 6, 2006 Letter*, dated November 7, 2006;
39. Letter from Robert Dorr to Textron Re: *Community Response to Textron's Assertion that the Gorham Manufacturing Smelter was a former "Primary Lead Processing Facility,"* dated November 14, 2006;
40. Remedial Project Information Sheet – July 2006, Supplemental Investigation of Parcels C & D and Mashapaug Cove, Former Gorham Manufacturing Facility, prepared by Textron, and Distributed at the December 4, 2006, Gorham/Textron Site Public Meeting;

41. Letter from Sylvia Aldredge to the Department, Re: *Textron Remediation Responsibilities – (former) Gorham Textron Dump Site, 333 Adelaide Avenue, Parcel D, the So-Called Park Parcel*, and dated December 7, 2006;
42. Former Slag Pile Area Supplemental Removal Action Work Plan, Former Gorham Manufacturing Facility, Plat 51 – Lots 323, 324, and 326, 333 Adelaide Avenue, Providence, Rhode Island, Case No. 97-030 (Including Case No. 2005-029 and 2005-059), prepared by MACTEC, and dated January 16, 2007;
43. Response to Comments, Supplemental Site Investigation Report, Former Gorham Manufacturing Site, 333 Adelaide Avenue, Providence, Rhode Island, July 2006, prepared by MACTEC, and dated February 1, 2007;
44. Response to Comments, Former Slag Pile Area Supplemental Removal Action Work Plan, Former Gorham Manufacturing Site, 333 Adelaide Avenue, Providence, Rhode Island, January 16, 2007, prepared by MACTEC, and dated February 26, 2007;
45. Letter from Robert Dorr to Textron Re: *Slag Pile Removal Action Work Plan – Community Comments*, dated April 22, 2007;
46. Community Information Session Newsletter, Former Gorham Manufacturing Site, 333 Adelaide Avenue, Providence, Rhode Island, prepared by MACTEC, and dated June 25, 2007;
47. Supplemental Site Investigation Report Addendum June 2007, Former Gorham Manufacturing Site, 333 Adelaide Avenue, Providence, Rhode Island, prepared by MACTEC, and dated June 28, 2007;
48. Letter from the Gorham area Community to Mactec, Re: *Park Parcel - Accelerated Phase 1 Remediation, Supplemental Site Investigation Report Addendum, Community Concerns and Comments*, dated July 11, 2007;
49. Letter from the Gorham area Community to Textron, Re: *Community Stakeholders*, dated July 23, 2007;
50. Letter from Textron to Robert Dorr Re: *Former Gorham Manufacturing Site, Providence, RI*, dated July 26, 2007;
51. Letter from the Gorham area Community to the Department, Re: *Textron's Park Parcel Remediation Plan, Community Stake holder's Comments, First Opportunity for Public Response*, dated September 5, 2007;
52. Gorham Public Questions & Answers, Park Parcel Public Meeting, Former Gorham Manufacturing Site, Providence, Rhode Island, August 23, 2007, prepared by MACTEC, and dated October 22, 2007;

53. December 2007 Investigation Activities, Building N Underground Storage Tanks, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, Rhode Island, prepared by MACTEC, and dated January 8, 2008;
54. Letter from Textron to the Department, Re: Phase I Park Parcel Closure, Former Gorham Manufacturing Site, prepared by Textron, and dated February 20, 2008;
55. Letter from Textron to the Department, Re: Park Parcel Remediation, Former Gorham Site, prepared by Textron, and dated March 12, 2008;
56. Building N Underground Storage Tanks Closure Report, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, Rhode Island, prepared by MACTEC, and dated April 3, 2008;
57. Letter from the Gorham area Community to RIDEM, Re: *Park Parcel Remediation - Incomplete Investigation – RAWP*, dated April 4, 2008;
58. Mashapaug Cove Groundwater Investigation, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, Rhode Island, prepared by MACTEC, and dated December 12, 2008;
59. Groundwater Investigation Work Plan, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, Rhode Island, prepared by MACTEC, and dated October 14, 2009;
60. Data Summary Report, Mashapaug Cove Groundwater Investigation, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, Rhode Island, prepared by MACTEC, and dated April 7, 2010;
61. Letter from Environmental Justice League of Rhode Island (EJLRI) to the Department, dated May 19, 2010;
62. Park Parcel Phase I, Recommended Remedial Action, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, Rhode Island, prepared by MACTEC, and dated May 17, 2011;
63. Notes from Textron Public Meeting on Parcel D Phase 1 Remediation Plan, July 12, 2011, 6pm-8pm, Renaissance Church, 77 Reservoir Avenue, prepared by the Environmental Justice League of Rhode Island (EJLRI), and received via e-mail on July 20, 2011;
64. E-mail comments - Subject: Gorham – Textron Public Meeting – Tuesday, July 12<sup>th</sup> 6pm, dated July 15, 2011, and forwarded to the Department by the EJLRI on August 8, 2011;
65. Comment letter, submitted on behalf of the EJLRI, dated August 8, 2011, and received via e-mail on August 8, 2011;

66. Comment letter, submitted on behalf of the Brown University Superfund Research Program Community Engagement Core, and received via e-mail on August 9, 2011;
67. Technical Review of Recommended Remedial Action, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, Rhode Island, prepared by GEI Consulting (GEI), dated August 9, 2011, and submitted via e-mail by the EJLRI on August 9, 2011; and
68. Response to Comments, July 12, 2011 Phase I Park Parcel Public Meeting, Former Gorham Manufacturing Facility, 333 Adelaide Ave., Providence, RI, prepared by AMEC Environment & Infrastructure (AMEC), and dated November 16, 2011.

Collectively, these documents define “Existing Contamination” at the Site, and fulfill the requirements of a Site Investigation Report (SIR) as described in Rule 7.08 of the Remediation Regulations. In addition, according to our records, public notice was conducted to all abutting property owners, tenants, members of the local community, the City of Providence and all utilities with easements on the property regarding the substantive findings of the completed investigation in accordance with Rules 7.07 and 7.09 of the Remediation Regulations. The Department has received documentation demonstrating that the requirements of Rhode Island General Laws (R.I.G.L.), Title 23, Health and Safety, Chapter 23-19.14, Industrial Property Remediation and Reuse Act, 23-19.14-5, Environmental Equity and Public Participation, have been fulfilled. The opportunity for public review and comment on the technical feasibility of the proposed remedial alternatives commenced with a Public Meeting on July 12, 2011, and following a requested 14 day extension, the period closed on August 9, 2011. Comments were received and responded to as documented in the previously referenced items 63 through 68.

The preferred remedial alternative, as stated in the SIR, involves a three phased approach to the remediation of the Park Parcel and Mashapaug Cove. **Phase I, which is the subject of this Remedial Decision Letter, includes the limited removal of surface soil with post-removal confirmation sampling at three locations in the western shoreline area, additional soil removal at two locations within the former slag pile area, and encapsulation of any soil exceeding a residential direct exposure criteria within the Park Parcel Phase I area, in order to contain historic fill material, prevent direct exposure, limit infiltration in the former slag pile area, and restrict wind erosion or surface run-off. Upon completion of the remedial activities, an Environmental Land Usage Restriction (ELUR) will be recorded on the deed for the Park Parcel. The ELUR shall include a post-construction Soil Management Plan (SMP), which will outline the procedures for managing the soils on site should disturbances below the cap be required. As part of the ELUR, it shall be the responsibility of the property owner to provide for annual inspections of the property by a qualified environmental professional, and to submit a report, subject to review by the Department, which shall certify that the property is in compliance with the Department approved remedy and the terms of the ELUR. The Department will also perform random audits of the remedy. Textron shall maintain and monitor the completed engineered cap in the Phase I area until the responsibility is taken over by the City of Providence or Providence Redevelopment Authority (PRA).**

**The proposed Phase I soil cap consists of three distinct components including a fill area cap, a wetland buffer cap, and a former slag area cap. The fill area extends along the top of the**

western slope and extends along the shoreline of Mashapaug Pond's inner cove. The fill area will be capped with a minimum of two feet of clean soil consisting of 18 inches of cover soil covered by six inches of top soil, then seeded or stabilized with erosion control matting. The portions of the fill area cap along the area of the Gorham site known as Parcel B (a.k.a. Alvarez High School) and Parcel C (a.k.a. the undeveloped lot to the west of Alvarez High School, formerly proposed for a YMCA), will match the existing grade at the High School boundary and the proposed future grade at the Parcel C boundary. The wetland buffer area consists of the area within the 50 foot wetland boundary (delineated approximately five to ten feet upland from the Mashapaug cove shoreline). An effort will be made to save as many large trees within the buffer zone as possible, however clearing and grubbing of the wetland buffer zone scrub material will be conducted to support the installation of the soil cap. One foot of soil at the toe of the wetland buffer zone will be removed to allow the soil cap to key into the existing grade above the wetland boundary. Twelve inches of clean soil will then be spread throughout the buffer zone to provide the soil cap. The finished surface for the wetland buffer cap will be stabilized with erosion control matting, and Department approved wetland vegetation will be planted as part of the wetland buffer area restoration.

All of the Phase I work will be conducted outside of the wetland boundary, with all of the remediation work within the freshwater wetlands to be conducted in the future as part of the Phase II cove sediment remediation. The cap design for the former slag area includes a geotextile membrane to limit infiltration and restrict contact with the underlying soils. The existing soil will be graded and capped with six inches of clean sand, followed by a 40-mil geotextile membrane, a drainage composite layer, twelve inches of clean cover soil, and an additional six inches of clean top soil, which will be seeded or stabilized with erosion control matting. The existing chain link fence will be relocated along the boundary between Parcels C and D, and temporary fencing will remain in place to restrict access to the steep slope down to the shoreline and until the cove sediments (Phase II) and remaining Parcel D surface soils (Phase III) have been remediated. All existing groundwater monitoring wells within the Phase I cap will be secured during construction activities and maintained for future groundwater monitoring purposes. Former groundwater monitoring well GZA-5 will be restored to its location within the former slag pile area, and one additional monitoring well will be installed downgradient of the former slag pile area for future groundwater monitoring purposes. The implementation and completion of the Phase I work shall in no way interfere with the eventual implementation and completion of Phase II, Phase III, or an eventual groundwater remedy for the overall Gorham site. Upon Textron's completion of remedial activities on the Park Parcel and stable establishment of the cap, responsibility for maintaining the remedy and any future development of the Park Parcel shall be assumed by the owner of the property, currently the City of Providence through the PRA.

The Department hereby approves the SIR, with the above identified preferred remedial alternative, and requires a Remedial Action Work Plan (RAWP) be submitted for review and approval, and implemented, to achieve the objectives of the environmental clean-up, in accordance with the following conditions:

1. In accordance with Sections 8.0 and 9.0 of the Remediation Regulations, a RAWP, a draft ELUR, and SMP shall be submitted for Department review and approval within 90 days

(February 28, 2012). The RAWP shall describe all technical details, engineer design elements, and schedules associated with the implementation of the proposed remedy. All of the subsections outlined in Section 9.0 of the Remediation Regulations must be included in order to facilitate the review and approval of the RAWP. If an item is not applicable to this Site, simply state that it is not applicable and provide an explanation in the RAWP.

2. Pursuant to Rule 10.02 of the Remediation Regulations, an application fee for Remedial Action Approvals in the amount of one thousand (\$1,000) dollars shall be made payable to the State of Rhode Island General Treasurer and remitted to this office with submission of the RAWP.
3. Once the Department reviews the RAWP for consistency with Sections 8.0 and 9.0 of the Remediation Regulations, any written comments generated and forwarded as a result of the review(s) shall be incorporated forthwith into a revised RAWP, to be re-submitted for final approval.
4. Upon finalization of the RAWP, the Department will issue a Remedial Approval Letter (RAL), signifying Department approval. All remedial measures required by the Department shall be implemented, in accordance with the approved schedule, to ensure all applicable exposure pathways at the Site are appropriately addressed.

**Please be advised that the Department reserves the right to require additional actions under the aforementioned Remediation Regulations at the Property should any of the following occur:**

- A. Conditions at the Site previously unknown to the Department are discovered;
- B. Information previously unknown to the Department becomes available;
- C. Policy and/or regulatory requirements change; and/or
- D. Failure by Textron or any future holder of any interest in the Property to adhere to the terms and conditions of the Department approved RAWP, schedule, RAL, ELUR and/or SMP for the Property.

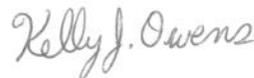
If you have any questions regarding this letter, please contact me by telephone at (401) 222-2797 extension 7109 or by e-mail at [joseph.martella@dem.ri.gov](mailto:joseph.martella@dem.ri.gov).

Sincerely,



Joseph T. Martella II  
Senior Engineer  
Rhode Island DEM  
Office of Waste Management

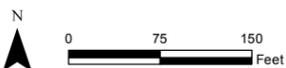
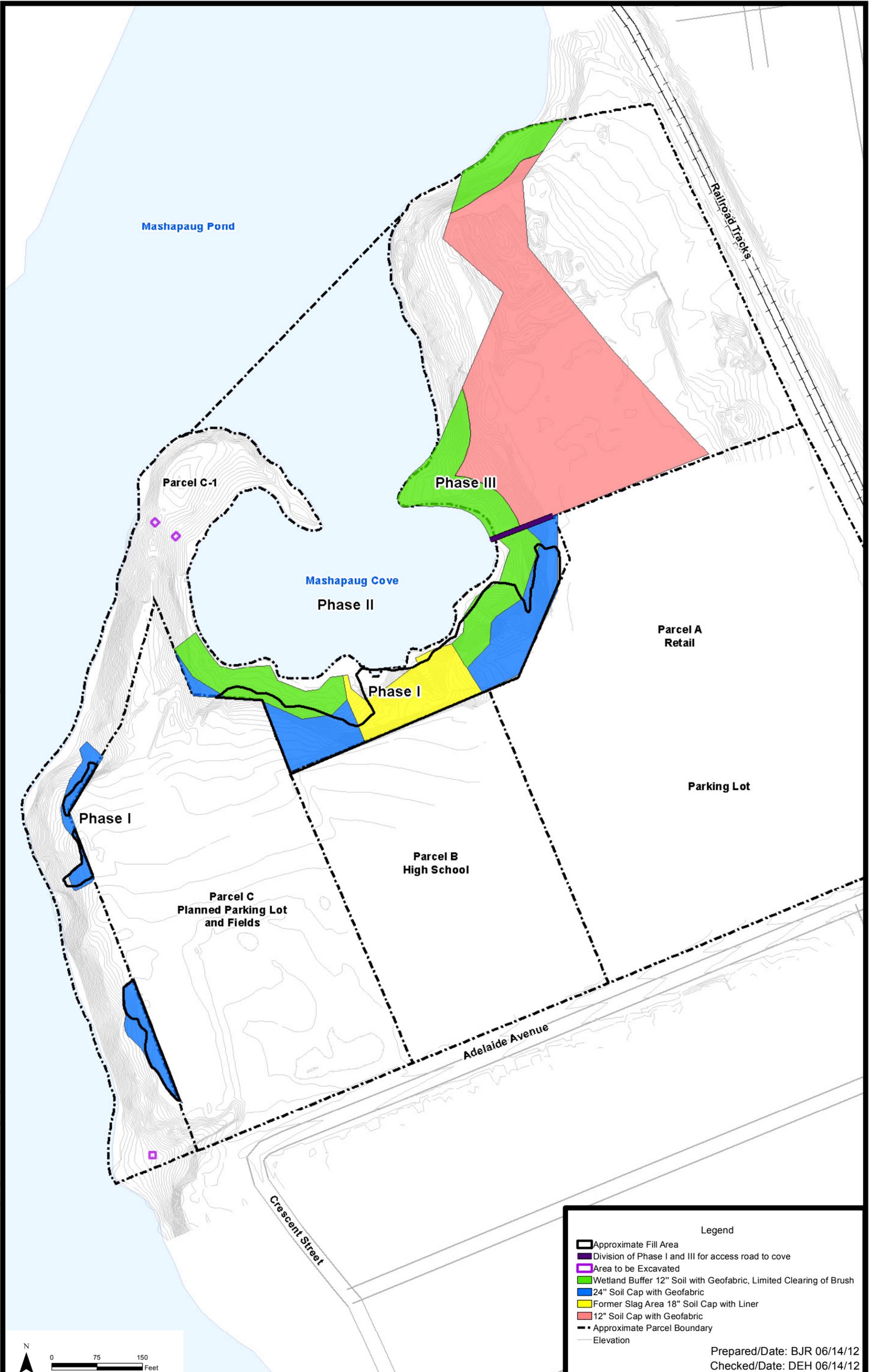
Authorized by,



Kelly J. Owens  
Supervising Engineer  
Rhode Island DEM  
Office of Waste Management

cc: Terrence D. Gray, P.E., Assistant Director, RIDEM/AW&C  
Susan Forcier, Esq., RIDEM/OLS  
Elizabeth Scott, RIDEM/OWR  
Ron Gagnon, RIDEM/OC&TA  
Jenna McIntyre, RIDEM/ OC&TA  
Robert Vanderslice, PhD, RIDOH  
Hon. Angel Taveras, Mayor, City of Providence  
Senator Juan M. Pichardo, District 2  
Representative Scott A. Slater  
Councilman Wilbur W. Jennings Jr., Ward 8  
Thomas Deller, City of Providence  
Robert F. McMahon, Providence Parks Department  
David Heislein, AMEC  
Amelia Rose, EJLRI  
Knight Memorial Library – Project Repository

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**Legend**

- Approximate Fill Area
- Division of Phase I and III for access road to cove
- Area to be Excavated
- Wetland Buffer 12" Soil with Geofabric, Limited Clearing of Brush
- 24" Soil Cap with Geofabric
- Former Slag Area 18" Soil Cap with Liner
- 12" Soil Cap with Geofabric
- Approximate Parcel Boundary
- Elevation

Prepared/Date: BJR 06/14/12  
Checked/Date: DEH 06/14/12

Parcel C-1  
333 Adelaide Avenue  
Providence, RI



Proposed Recreational Soil Cap  
Former Gorham Manufacturing Site  
Project 3650-11-0213  
Exhibit C