REMEDIAL ACTION WORKPLAN

Drum Crushing Area

LAWRENCE AVIATION INDUSTRIES SITE
Village of Port Jefferson, Town of Brookhaven, Suffolk County, NY

Site ID: NS

Prepared for

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1.0 Introduction:

The United States Environmental Protection Agency (EPA) is conducting a remedial action at the Lawrence Aviation Industries (LAI) Site located in Brookhaven, Suffolk County, New York. This work is being completed in accordance with the Record of Decision (ROD) for this Site, which was signed on September 29, 2006. The following sections have been developed as an outline of the work which will be completed under this action. The remedial action will address contamination in the former drum crushing area (DCA), which was identified during previous remedial investigations. The possible contaminants which may be encountered during the completion of this remedial action are included in a later section of this document.

This Remedial Action Workplan (RAW) has been prepared to generally outline the anticipated remediation measures required to mitigate the contaminants identified within the DCA. Due to actual conditions encountered in the field, changes or modifications may be required.

2.0 Property Description/History:

The LAI Site is located in the Village of Port Jefferson Station, Town of Brookhaven, Suffolk County, New York (Attachment A, Figure 1). LAI was a manufacturer of titanium sheeting for the aeronautics industry. The company was founded at its present location in 1959. The property was previously a turkey farm owned by LAI's corporate predecessor, Ledkote Products Company of New York. In 1991, LAI indicated that its titanium mill was operating in a 200,000-square-foot plant complex on a 160-acre site. The site is located on a topographic high point and is surrounded by residential areas and a few commercial properties. The Port Jefferson harbor, an outlet to the Long Island Sound, lies approximately one mile to the north, in the direction of groundwater flow. Groundwater from the underlying Upper Glacial/Magothy aquifer is the only source of drinking water in the site vicinity. There are 47 public supply wells, serving an estimated 120,500 people within 4 miles of the site.

Past disposal practices and releases from leaking drums at LAI have resulted in numerous violations cited by both Suffolk County Department of Health Services (SCDHS), New York State Department of Environmental Conservation (NYSDEC) and EPA. In 1980, the company crushed more than 1600 drums, allowing the liquid content to spill on unprotected soil. The drums contained trichloroethylene (TCE), tetrachloroethylene (PCE), spend acid sump sludges, salt wastes, hydraulic oils, hydrofluoric acid, nitric acid, and other plant wastes. SCDHS also observed numerous discharges from various plant activities to the ground surface and to two unlined lagoons.

2.1 Site Investigations

CDM Federal Programs Corporation (CDM) conducted a Feasibility Study (FS) at the LAI Site which identified a surface soil sample, SBD-03-A collected in the DCA to contain the polychlorinated biphenyl (PCB) Aroclor-1254 at concentrations above the

Soil Cleanup Objective (SCO) of 1,000 micrograms per kilogram (µg/kg) or 1 part per million (ppm), as specified in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046.

In March and October 2007, personnel from the Lockheed Martin Response Engineering and Analytical Contract (REAC) in consultation with the EPA's Environmental Response Team (ERT) Work Assignment Manager (WAM), collected soil samples within the DCA using a judgmental sampling design and analyzed the samples at the REAC Laboratory for PCBs. The majority of the DCA sample locations were spaced approximately 75 feet apart in a grid design. Analytical results of the samples indicated the presence of PCBs above the SCO at numerous locations. A complete summary of the sampling activities and analytical results was issued in two separate trip reports dated July 19, 2007 and March 7, 2008, which are included as Attachment B.

In order to accurately define the extent of PCB contamination within the DCA, additional horizontal and vertical sampling was conducted. Sampling events were executed in November and December of 2008 and January 2009. The sampling frequency was developed taking into account the Division of Environmental Remediation (DER) -10 Technical Guidance for Site Investigations and Remediation, section 5.4(b) 3. Due to the extensive size of the area, the entire DCA was sampled at a frequency of approximately one location for every 37.5 linear feet of surface area. At each location, grab samples were collected at specific depth intervals (0-6", 12-18", 18-24", etc.), with the intent of attaining concentrations that meet the SCO. Attachment A, Figure 2 provides the location of each sampling point. Attachment C, Table 1-3 is a compilation of sampling event concentrations collected thus far.

Based on the analytical results obtained thus far, the majority of the PCB contamination is located within the first two feet of soil. However, within localized areas, contamination has been documented to exist to 4.5 feet below grade. A detailed description of the remediation cutlines is provided in Section 3.4 of this document.

2.2 Further investigations

During the completion of remediation activities, the collection of additional delineation samples may be required to assess the extent of contamination between perimeter sampling points. This sampling will be used to prevent the excavation and subsequent disposal of un-contaminated material.

3.0 Scope of Work

This scope of work has been developed to outline the measures to be taken in order to effectively access, delineate, remove, stage and disposal of PCB contaminated soils present at the Site that exceeding the SCO of 1,000 µg/kg or 1 ppm as identified in the ROD.

3.1 Site Setup/Mobilization Work

Site setup/mobilization work includes all tasks required to be completed prior to excavation and consists of, but not limited to, the following tasks:

a) identification (markout) and securing all utilities, both underground and aboveground;
b) conducting a Site inspection with On-Scene Coordinator (OSC), Response Manager (RM) and Response Support Team (RST);
c) placement of support facilities (office trailer, port-a-johns, etc.);
d) development of a health and safety plan (HASP), Attachment D;
e) identification and marking out areas to be addressed;
f) clearing and grubbing of anticipated work areas as defined by the OSC;
g) identification of temporary soil storage area;
h) pre-excavation survey of the entire work area by a NY State-licensed land surveyor (including perimeter fence, topography and New York State Department of Transportation (NYSDOT) right-of-way (ROW)); and
i) installation of silt and/or high visibility fencing along portions of the work area.

3.2 Site Contaminants

Concentrations of PCBs have been identified within the DCA during previous investigations. The table below provides a summary of the hazardous substances, pollutants or contaminants identified along with the concentration range identified:

Compound of Concern	**Conc. Range Identified**
PCB	Non-Detect to **247** ppm

The concentrations noted above are based upon the analytical results obtained during recent Site investigations and are intended to provide a “worse case” scenario. This sampling location has been identified as a “hotspot” area. It should be noted that the actual average concentration is greatly lower.

3.3 Drum Crushing Area (DCA) Ownership and Access

Based upon local tax maps of this area, the NYSDOT currently owns a portion of the affected 2.5 acre DCA property. The entire DCA is currently a vacant grass and debris covered portion of the property. The NYSDOT property consists of a 135-foot wide by 700-foot long area which extends from the southwest portion to the northeast portion of the area. NYSDOT is currently anticipating this area to be used for the construction of a multi-use bike path. Figure 3 provides the approximate location and ownership of each parcel within the anticipated work area.

On January 6, 2009, EPA and NYSDEC representatives met with NYSDOT permitting, environmental, construction and design officials to discuss the remedial action and resolve matters relating to access, sampling results and restoration. In addition, the meeting focused on a series of questions presented to EPA relating to the planned activities. Following the meeting, NYSDEC issued a letter to NYSDOT dated January 7, 2009 addressing each of the questions raised at the meeting and the proposed resolution of each. A copy of this letter is provided as Attachment E.

In summary, EPA fully anticipates complying with all applicable portions of NYSDOT's Standard Specifications Section 200 - Earthwork during the completion of the remediation. At a minimum, EPA anticipates the following sections to apply:

- Section 201-3.02 (Clearing and Grubbing);
- Section 203-2 (Materials) ;
- Section 203-3.04 (Drainage and Grading); and
- Section 203-3.12 (Compaction)

3.4 Site Remediation

Soil remediation will occur within the southern portion of the property and encompass approximately 2 acres. Attachment A, Figure 4 provides the location of each area to be excavated. However, actual soil volumes may change based upon actual conditions encountered at the time of excavation. Prior to implementing soil excavation activities, the cut lines within each area to be addressed will be marked by EPA.

Once all substantial vegetation has been removed from the DCA, excavation activities will begin. The approach will be to begin along the northern portion of the DCA and continue southward to the rear of the property. All excavated materials will be consolidated within the northwest portion of the DCA for further evaluation.

During cleanup activities, contractor personnel will adhere to the protocols recommended in the approved HASP for this Site. A copy of the HASP is provided as Attachment D and will be maintained on-site at all times by the Health and Safety Officer (HSO).

During soil remediation activities, all post-excavation samples collected for PCB analysis will be collected in accordance with the Quality Assurance Project Plan (QAPP), provided as Attachment F, using the following standard operating procedures (SOPs):

EPA/ERT General Field Sampling Guidelines #2001;
EPA/ERT Sampling Equipment Decontamination #2006; and
EPA/ERT Soil Sampling #2012.

All referenced SOPs are included in the QAPP as Attachment F of this RAW.

3.5 Waste Handling/Disposal

Excavated material generated during the remedial action will be placed onto and covered with 6-milimeter polyethylene sheeting. Actual disposition of soil will be based on analytical results. According to the ROD, soils exceeding the SCO will be transported off-site and disposed of at an appropriate facility.

3.6 Site Security/Truck Traffic/Haul Route

Vehicular access to the property is restricted to the access gate off of Sheep Pasture Road. This gate is manned by a security service 24-hours a day, 7-days a week. This access point will be used for truck traffic entering the property in support of remediation activities. Figure 5 depicts the anticipated haul route to Route 347, which will be used by trucks removing the waste from the premises.

Traffic signs indicating “Trucks Entering Roadway” will be placed approximately 150 feet away from the access gate and facing oncoming traffic. In addition, a flagman will be used to direct trucks departing the site onto Sheep Pasture Road.

When possible, truck traffic from the site will be restricted to non-rush hour periods.

4.0 Site Restoration

The exact nature of restoration activities within the DCA is unknown at this time. EPA anticipates backfilling all excavations greater than 2 feet to a depth corresponding to one foot below pre-excavation elevations using Site derived bankrun. This departure from backfilling to grade is consistent with NYSDOT future construction activities. Additional NYSDOT considerations may include compaction, placement of topsoil and planting of specific grass seed mixtures.

At this time, the soil to be used for backfilling will be excavated from a sand pit located on the LAI property. Historically, this area has never been used in association with the on-site manufacturing operation. A representative composite sample (LAI-BR-01) of this material has been collected, which has verified the absence of contaminants above the NYSDEC Unrestricted Use Soil Cleanup Objectives (6NYCRR Part 375, Table 375-6.8a). The analytical results of the backfill sample LAI-BR-01 and a picture of the bankrun are provided as Attachment G.

Originally, it was anticipated that a representative composite sample of this excavated material will be collected at a frequency of one per every 1,000 cubic yards. However, EPA is recommending that a second sample of this material be collected and analyzed. If the sample is found to contain concentrations meeting the SCO referenced above, no additional samples will be collected of this material and the source considered free of contamination. Based upon current volume calculations, approximately 5,000 cubic yards of backfill will be required to restore the DCA.

5.0 Community Air Monitoring

Community air monitoring, as well as worker exposure monitoring will be conducted by a representative of the RST as defined in the Community Air Monitoring Plan (CAMP). A copy of the CAMP is provided as Attachment H of this RAW.

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DATE: July 19, 2007

TO: Jeff Catanzarita, U.S. EPA/ERT Work Assignment Manager

FROM: Christopher Sklaney, REAC Task Leader

SUBJECT: REVISION - TRIP REPORT SUMMARIZING SURFACE SOIL SAMPLING ACTIVITIES CONDUCTED IN MARCH 2007
LAWRENCE AVIATION INDUSTRIES SITE
PORT JEFFERSON STATION, NEW YORK
WORK ASSIGNMENT R1A00242

This revised trip report presents the results of an environmental investigation conducted at the Lawrence Aviation Industries site in March 2007 by personnel from the Lockheed Martin Response Engineering and Analytical Contract (REAC) in consultation with the Environmental Protection Agency (EPA) Environmental Response Team (ERT) Work Assignment Manager (WAM). The purpose of this investigation was to determine the extent of polychlorinated biphenyl (PCB) contamination in near-surface soils at two areas where historical analytical results exceeded New York State Department of Environmental Conservation (NYSDEC) benchmarks. The contents of this report are limited to the soil sampling event conducted in March 2007 and subsequent analysis for PCBs. Additional activities conducted during the March 2007 field event will be summarized in a future report. The project was initiated under REAC Work Assignment (WA) No. R1A00242. The original trip report was submitted to ERT on June 18, 2007.

The following modifications were made to the original trip report:

- In the document text, the reporting unit "microgram per kilogram" was defined by the acronym "mg/kg." The conventional acronym is "µg/kg," and was incorporated globally.
- In the third paragraph of the "Background" section, the second sentence stated, "Port Jefferson Harbor is located at approximately the same elevation as the site." The sentence was corrected to describe the linear distance from the site to Port Jefferson Harbor. The reference to elevation was removed.

BACKGROUND

The Lawrence Aviation Industries site is an industrial property located south of Sheep Pasture Road in Port Jefferson Station, Suffolk County, New York (NY). Since 1959, the site has been owned and occupied by Lawrence Aviation Industries, Inc., a manufacturer of titanium-containing products such as sheet metal, golf clubs, and various aeronautic parts. Historically, the site was operated as a turkey farm. The site was operated by Ledkote Products Co. (Ledkote) prior to ownership by Lawrence Aviation Industries. As part of its normal operations, Ledkote reportedly manufactured lead gutters and spouts for roof drains, although it is unknown whether Ledkote conducted manufacturing activities at the site.

The site is comprised of several parcels totaling an estimated 126 acres. Ten buildings associated with manufacturing processes are located on the site. Flannery Pond, a 1-acre surface water impoundment, is located approximately 1,200 feet northeast of the large manufacturing building designated "Building G." Aerial photographs dated between 1955 and 1982 indicate the presence of disturbed ground on portions of the unimproved parcels,

although the specific activities conducted are unknown. A right-of-way owned by the New York Department of Transportation transects the southeastern corner of the site. The surrounding area is mostly residential and locally commercial. Primary site features are outlined on Figure 1.

The site is located on a local topographic high on the Harbor Hill Moraine at approximate elevation of 230 feet above mean sea level (amsl). Port Jefferson Harbor is located approximately 1.2 miles north of the site. The water table in the uppermost aquifer is approximately 50 feet amsl at the site.

Substances that have been historically detected in on-site soil and water samples that may be attributable to manufacturing activities include titanium and numerous other metals, cyanide, PCBs, and various aromatic and chlorinated volatile organic compounds (VOCs). During the Feasibility Study conducted by CDM Federal Programs Corporation under the EPA Response Action Contract (RAC), two surface soil samples, SBD-03-A and SBS-27-A, contained the PCB Aroclor-1254 at concentrations above the Soil Cleanup Objective (SCO) of 1,000 micrograms per kilogram (µg/kg), as specified in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046 (NYSDEC, 1994).

ACTIVITIES

In response to the elevated concentrations of PCBs reported during the CDM Feasibility Study, ERT tasked Lockheed Martin/REAC to conduct additional soil sampling around sample locations SBD-03-A and SBS-27-A (Figure 1). On March 26 and 27, 2007, REAC personnel collected 108 grab soil samples in these areas. Thirty sample locations were selected in the area of SBD-03-A, and 15 sample locations were selected in the area of SBS-27-A. In addition, eight sample locations were selected around the transformers located west of the Electro-Melt Facility in the vicinity of SBS-27-A. A Geoprobe® Systems (Geoprobe) Model 6620DT direct-push unit was used to advance boreholes and retrieve soil cores. Two samples were collected from each borehole at depth intervals of 0 to 6 inches and 12 to 36 inches. Samples around the transformers were collected directly from 0- to 6-inch interval using stainless steel trowels; no samples were collected from the 12- to 36-inch interval at these locations. The samples were hand-delivered to the REAC Laboratory in Edison, New Jersey (NJ) for analysis of PCBs.

A Trimble™ global positioning system (GPS) unit was used to collect positional data for all sample locations. The data were recorded using the New York System, Zone 18 North, based on the North American Datum (NAD) 1983, State Plane Coordinates, Easting and Northing (meters). GPS data are presented in Table 1.

RESULTS

The REAC Laboratory analyzed 108 soil samples, including 10 field quality assurance/quality control (QA/QC) samples, for PCBs according to the analytical method outlined in REAC Standard Operating Procedure (SOP) 1801. The primary purpose of the analysis was to determine whether the concentration of total PCBs was greater than or equal to the SCO of 1,000 µg/kg. Two PCB compounds, Aroclor-1254 and Aroclor-1260, were present in the samples. In general, Aroclor-1254 was found at concentrations several times greater than Aroclor-1260. Aroclor-1254 was quantitatively reported for all samples. Aroclor-1260 was quantitatively reported only for those samples in which the preliminary analytical result for Aroclor-1254 was between 500 µg/kg and 1,000 µg/kg. The modifications to standard analytical reporting procedures were implemented at the request of the WAM.

The concentration of total PCBs exceeded the SCO in 28 of the 98 field samples (not including the 10 QA/QC samples). The greatest concentration was Aroclor-1254 at 12,800 µg/kg in sample ERT-SS03-16A. Twenty-one of the samples above the SCO were collected from the area around SBD-03-A, and seven were collected from the area around SBS-27-A. Twenty-five of the 28 samples that exceeded the SCO were collected from the 0- to 6-inch interval. All three of the samples in the 12- to 36-inch interval that exceeded the SCO were collected from the area around SBD-03-A. No samples collected in the 12- to 36-inch interval from the area around SBS-27-A contained total PCBs above the SCO. Analytical results of samples collected from the 0- to 6-inch and 12- to 36-inch intervals around SBD-03-A are presented on Figures 2 and 3, respectively. Analytical results of samples collected from the 0- to 6-inch and 12- to 36-inch intervals around SBS-27-A are presented on Figures 4 and 5, respectively.

At the request of the WAM, a data validation review was only conducted for a portion of the samples. Seventy-six of the 108 samples were included in the data validation review. The complete analytical report for validated data is presented in Appendix A. Data for the 32 samples for which a validation review was not conducted are considered preliminary. The preliminary analytical data report is presented in Appendix B. In the analytical reports, samples collected from the 0- to 6-inch interval are designated with an "A" suffix, and samples collected from the 12- to 36-inch interval are designated with a "B" suffix. Field duplicate samples are designated with a "D" suffix in addition to the depth interval label.

REFERENCES

CDM Federal Programs Corporation. 2006. Final Feasibility Study Report, Remedial Investigation/Feasibility Study, Lawrence Aviation Industries Site. U.S. Environmental Protection Agency Response Action Contract, Work Assignment 147-RICO-02PF. July.

New York State Department of Environmental Conservation. 1994. Determination of soil cleanup objectives and cleanup levels. Technical and Administrative Guidance Memorandum #4046.

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DATE: March 7, 2008

TO: Jeff Catanzarita, U.S. EPA/ERT Work Assignment Manager

THROUGH: Dennis Miller, REAC Operations Section Leader

FROM: Christopher Sklaney, REAC Task Leader

SUBJECT: LAWRENCE AVIATION INDUSTRIES SITE, PORT JEFFERSON STATION, NEW YORK
WORK ASSIGNMENT EAC00242 – TRIP REPORT
CATCH BASIN/CESSPOOL AND SURFACE SOIL SAMPLING (OCTOBER 2007)

PURPOSE

This trip report presents the results of an environmental investigation conducted at the Lawrence Aviation Industries site in October 2007 by Lockheed Martin Response Engineering and Analytical Contract (REAC) personnel in consultation with the Environmental Protection Agency (EPA) Environmental Response Team (ERT) Work Assignment Manager (WAM). The purpose of this investigation was to determine the extent of polychlorinated biphenyl (PCB) and volatile organic compound (VOC) contamination at several areas of the site. The project was initiated under REAC Work Assignment (WA) No. 0-242.

BACKGROUND

The Lawrence Aviation Industries (LAI) site is an industrial property located south of Sheep Pasture Road in Port Jefferson Station, Suffolk County, New York (NY). Since 1959, the site has been owned and occupied by LAI, Inc., a manufacturer of titanium-containing products such as sheet metal, golf clubs and various aeronautic parts. Historically, the corporate predecessor of LAI, Ledkote Products Co., operated the site as a turkey farm. Substances that have been historically detected in on-site soil and water samples that may be attributable to manufacturing activities include titanium and numerous other metals, cyanide, polychlorinated biphenyls (PCBs), and various aromatic and chlorinated VOCs.

The site is comprised of several parcels totaling an estimated 125 acres. Ten buildings previously or currently associated with manufacturing processes are located on the site. Aerial photographs dated between 1955 and 1982 indicate the presence of disturbed ground on portions of the unimproved parcels, although the specific activities conducted are unknown. A right-of-way owned by the New York Department of Transportation transects the southeastern corner of the site. The surrounding area is mostly residential and locally commercial. The site is located on a local topographic high on the Harbor Hill Moraine at approximate elevation of 230 feet above mean sea level (amsl). The groundwater surface in the uppermost aquifer is approximately 50 feet amsl at the site. Primary site features are outlined on Figure 1.

During the Feasibility Study conducted by CDM Federal Programs Corporation under the EPA Response Action Contract (RAC), two surface soil samples, SBD-03-A collected in the Drum Crushing Area and SBS-27-A collected near the Electro-Melt Facility, contained the PCB Aroclor-1254 at concentrations above the Soil Cleanup Objective (SCO) of 1,000 micrograms per kilogram (µg/kg), as specified in NYSDEC Technical and Administrative Guidance

Memorandum (TAGM) #4046 (NYSDEC, 1994). In March 2007, REAC personnel collected approximately 100 soil samples around SBD-03-A and SBS-27-A and analyzed the samples at the REAC Laboratory for PCBs. Analytical results of the samples indicated the presence of PCBs above the SCO in 28 samples.

ACTIVITIES

In response to the elevated concentrations of PCBs reported during the sampling event in March 2007, ERT tasked REAC to conduct additional soil sampling in both areas. REAC also collected samples from several catch basins and cesspools at the site. Catch basin/cesspool sampling was conducted on October 1 and 2, 2007, and surface soil sampling was conducted on October 23, 2007.

Catch Basin/Cesspool Sampling

Various types and designs of catch basins and cesspools were observed during completion of this task, ranging from shallow storm-sewers to deep, wide cesspools. All were covered with a conventional manhole cover or modified iron plate. The type, precise dimensions, and integrity of individual catch basins or cesspools could not be determined in most instances. General observations are presented in Table 1.

Fourteen samples were collected from soil and sediment in 12 on-site catch basins and cesspools using stainless steel bucket augers. Sediment in the catch basins and cesspools ranged from 2 to 22 feet below grade. Samples were collected and analyzed for VOCs and PCBs. At each location, a decontaminated stainless steel auger was advanced into sediments at the bottom of each catch basin or cesspool. In some cases, several auger extensions were coupled to reach the required depth. Upon retrieval of the auger, the sample fraction to be analyzed for VOCs was collected by transferring sediment directly into a sample container. The remainder of the sediment was emptied into a stainless steel pan or bowl and homogenized prior to collection of the sample fraction to be analyzed for PCBs. Samples were hand-delivered to the REAC Laboratory in Edison, NJ for analysis of VOCs by EPA/SW-846 Method 8260B and PCBs by EPA/SW-846 Method 8081A. The spatial location of the protective manhole cover over the opening to each catch basin or cesspool was recorded using Global Positioning System (GPS) technology. GPS data and sample collection data are outlined in Table 1. Catch basin/cesspool sample locations are presented on Figure 2.

Surface Soil Sampling

REAC personnel collected 63 grab samples from surface soils in the Drum Crushing Area and around CDM sample locations SBD-03-A and SBS-27-A. Including field duplicate samples, 51 samples were collected from 47 locations in the area of SBD-03-A and the Drum Crushing Area, and 12 samples were collected from 11 locations in the area of SBS-27-A. In the areas around both SBD-03-A and SBS-27-A, sample locations were selected based on analytical results of samples collected by REAC personnel in March 2007. In addition, a 75-foot square grid was established in the Drum Crushing Area with primary axes oriented approximately parallel and perpendicular to the asphalt-paved access road located between Building "F" and Building "G."

All samples were collected from 0 to 6 inches below the ground surface. At each location, organic material was removed and soil from the entire interval was transferred to a stainless steel pan or bowl and homogenized prior to collection. The samples were hand-delivered to the REAC Laboratory in Edison, New Jersey (NJ) for analysis of PCBs by EPA/SW-846 Method 8081A. Spatial data are presented in Table 2. Sample locations in the area around SBD-03-A and in the Drum Crushing Area are presented on Figure 3. Sample locations in the area around SBS-27-A are presented on Figure 4.

RESULTS

Catch Basins/Cesspools

VOCs were detected above laboratory reporting limits (RLs) in samples collected from two catch basins/cesspools, CB-10 and CB-13. Locations CB-10 and CB-13 are cesspools located south of the Electro-Melt Facility and east of Building "F," respectively. Nine compounds were detected in samples collected from CB-10 above RLs, including *p,m*-xylene, *o*-xylene, isopropylbenzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, sec-butylbenzene, *p*-isopropyltoluene, 1,4-dichlorobenzene, and naphthalene. Acetone and 2-butanone were detected in CB-13 at

concentrations above RLs. No VOCs were reported at concentrations above SCOs, although SCOs for several compounds detected above RLs, including 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, sec-butylbenzene, *p*-isopropyltoluene, and isopropylbenezene have not been promulgated by NYSDEC. In addition, the concentration in any single sample did not exceed the recommended SCO for total VOCs of 10,000 µg/kg.

Non-detect results for several samples were rejected due to problems encountered during initial and continuing calibrations. No positive results were rejected. Refer to the case narrative in the final analytical report (Appendix A) for a detailed explanation of data validation procedures.

At the request of the ERT WAM, analytical results for PCBs were not segregated into individual congeners and were reported as total PCBs. The concentration of total PCBs exceeded the recommended SCO of 1,000 µg/kg in samples collected from five of the 12 catch basins/cesspools. The maximum reported PCB concentration was 9,320 µg/kg in CB-04. Locations where PCBs were reported above the SCO included CB-01, CB-03, CB-04, CB-05, and CB-07. The final analytical report for all samples collected from catch basins or cesspools is presented in Appendix A.

Surface Soils

The primary purpose of the surface soil analysis was to determine whether the concentration of total PCBs was greater than or equal to the SCO of 1,000 µg/kg. The concentration of total PCBs exceeded the SCO at 37 of 58 sample locations. The greatest concentration was 17,300 µg/kg in sample SS127, collected from the Drum Crushing Area. The final report containing surface soil analytical results are presented in Appendix A. In the analytical reports, the five field duplicate samples are designated with a "D" suffix. Analytical results for samples collected from the Drum Crushing Area and the area around SBD-03-A are presented on Figures 5 and 6. Analytical results for samples collected from the area around SBS-27-A are presented on Figure 7. PCB analytical results for samples collected in March 2007 are also presented on both figures.

REFERENCES

CDM Federal Programs Corporation. 2006. Final Feasibility Study Report, Remedial Investigation/Feasibility Study, Lawrence Aviation Industries Site. U.S. Environmental Protection Agency Response Action Contract, Work Assignment 147-RICO-02PF. July.

New York State Department of Environmental Conservation. 1994. Determination of soil cleanup objectives and cleanup levels. Technical and Administrative Guidance Memorandum #4046.

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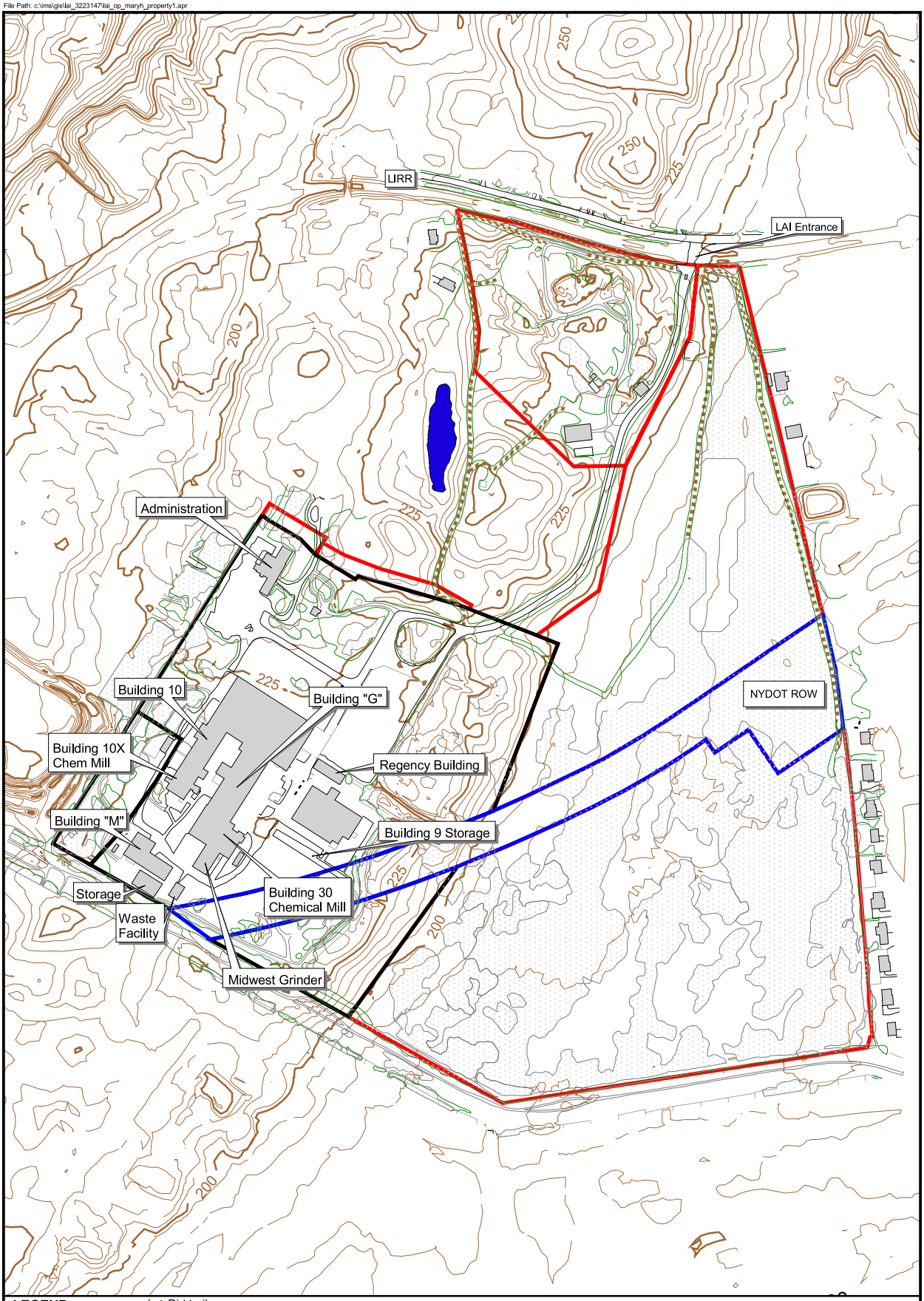

LEGEND

- Pond
- Ground obscured
- Tree Line
- Unpaved Drive
- Paved Drive
- Wall
- Building Ruins
- Dirt trail
- NYDOT Right Of Way Property
- LAI Properties
- Outlying Parcel Properties
- 5-Foot Contour Labels, Site Location Map
- Index Topographic Contour, 25 Foot Intervals
- Topographic Contour, 5-Foot Intervals
- Building
- Long Island Railroad

Topographic Elevation Data is in Feet above Mean Sea Level (datum is NAVD88)
Site features prepared from aerial photograpy taken April 2003

N

0 200 400 Feet

1:4200

Figure 1
Site Map
Remedial Investigation/Feasibility Study
Lawrence Aviation Industries Superfund Site
Port Jefferson Station, New York

CDM

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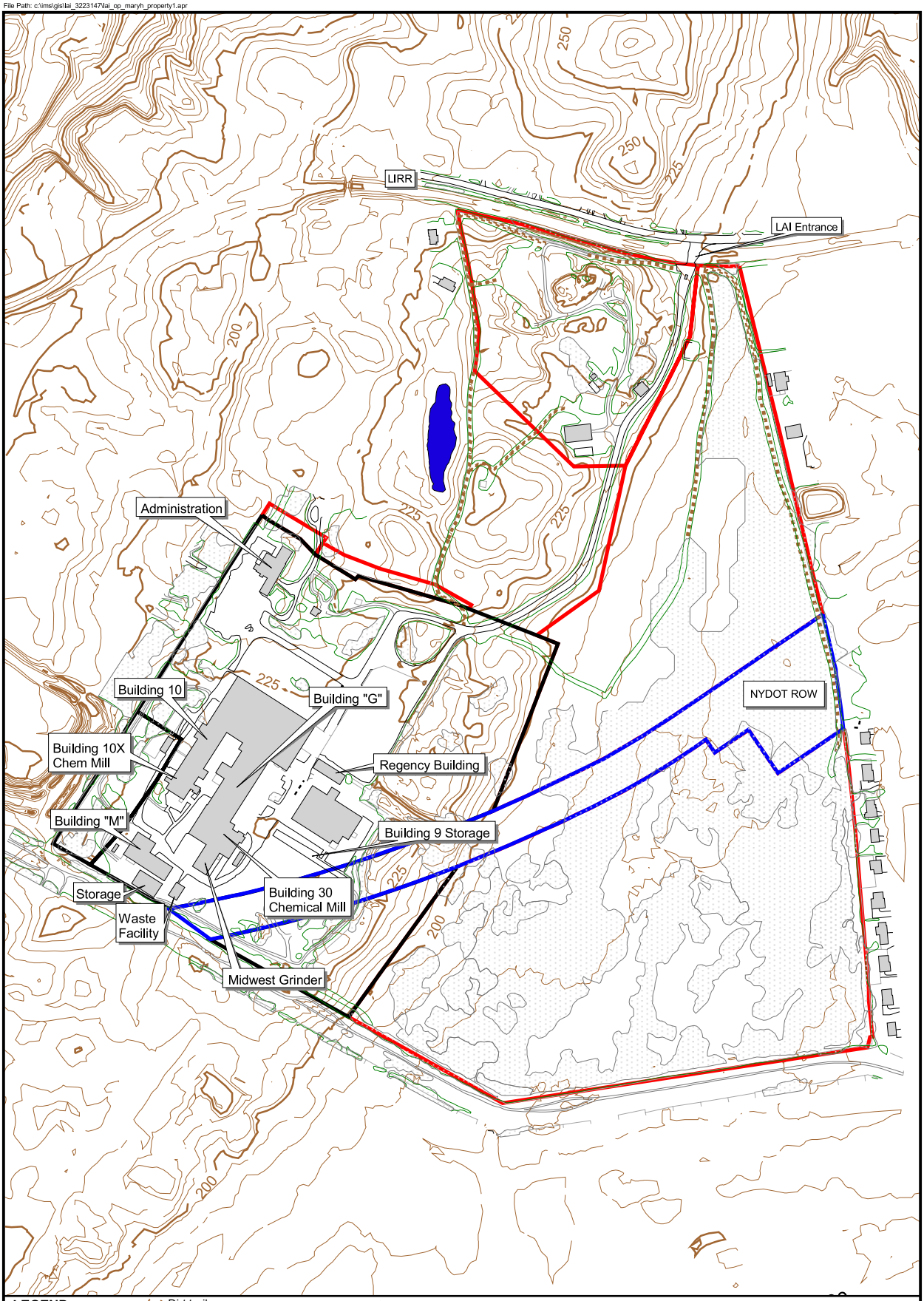


LEGEND

- Pond
- Ground obscured
- Tree Line
- Unpaved Drive
- Paved Drive
- Wall
- Building Ruins
- Dirt trail
- NYDOT Right Of Way Property
- LAI Properties
- Outlying Parcel Properties
- 5-Foot Contour Labels, Site Location Map
- Index Topographic Contour, 25 Foot Intervals
- Topographic Contour, 5-Foot Intervals
- Building
- Long Island Railroad

Topographic Elevation Data is in Feet above Mean Sea Level (datum is NAVD88)
Site features prepared from aerial photograpy taken April 2003

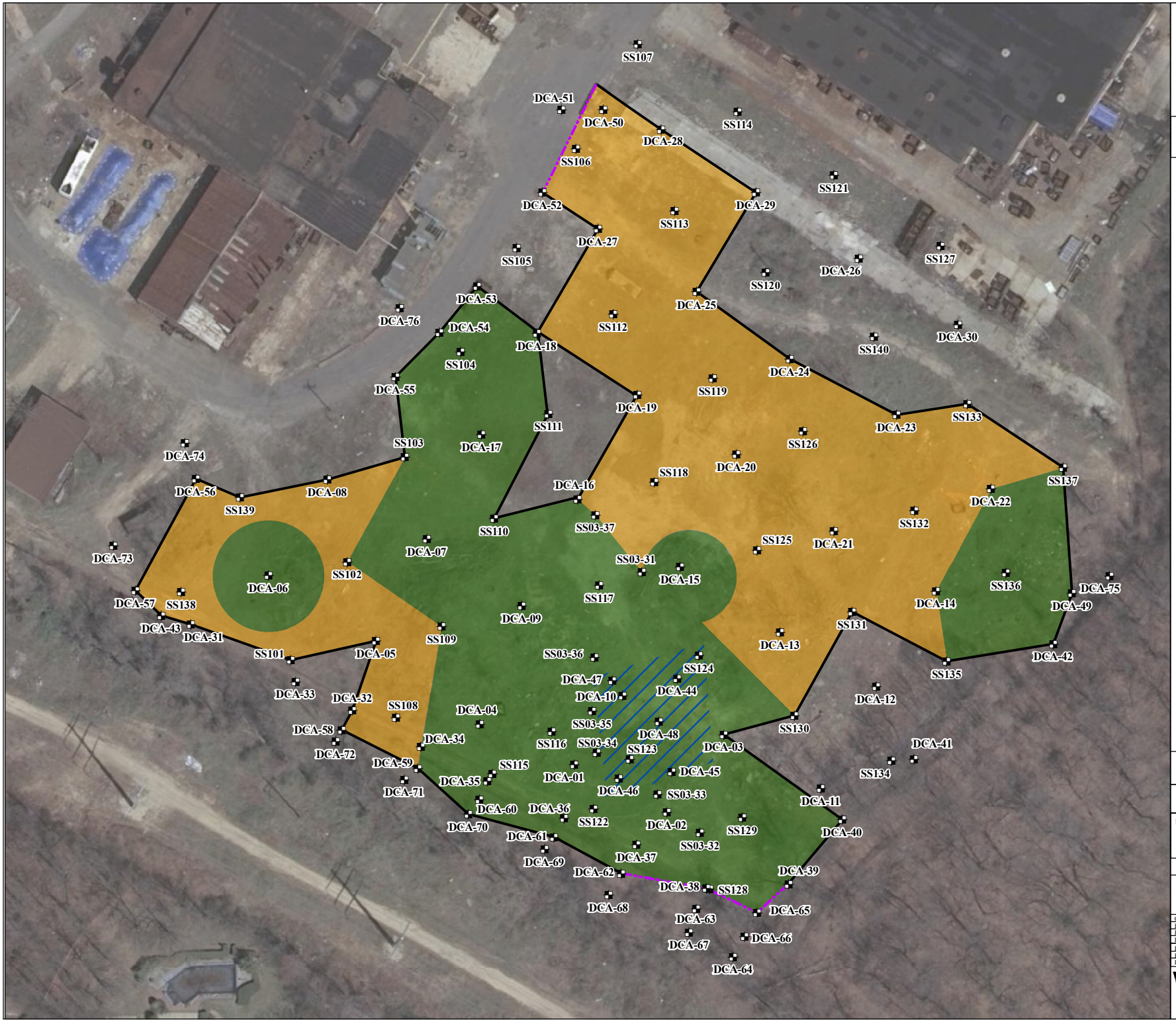
N

0 200 400 Feet

1:4200

Figure 1
Site Map
Remedial Investigation/Feasibility Study
Lawrence Aviation Industries Superfund Site
Port Jefferson Station, New York

CDM



SCALE

1:970

LEGEND

- Sample Location
- Confirmed Extent of Contamination
- Potential Extent of Contamination
- Deeper than 24" Excavation Area
- 24" Excavation
- 12 " Excavation

Excavation Areas

LAWERENCE AVIATION SITE
PORT JEFFERSON, NEW YORK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REMOVAL SUPPORT TEAM 2
CONTRACT # EP-W-06-072

Weston Solutions, Inc.

In Association With
Scientific and Environmental Associates, Inc.,
Innovative Technical Solutions, Inc. &
Avatar Environmental, LLC

GIS ANALYST:	F. CAMPBELL
EPA OSC:	M. TABAYOYONG
RST 2 SPM:	S. RICHARDS
FILENAME:	SAMPLE LOCATION MAP.MXD
FIGURE:	1
REVISION:	0
DATE MODIFIED	01/14/2009

WESTON SOLUTIONS

Table 1

Larence Aviation Industries Sampling Events (results in ppb)

March 2007 Sampling Event by REAC

Depth	Sample	SS03-01	SS03-02	SS03-03	SS03-04	SS03-05	SS03-06	SS03-07	SS03-08	SS03-09	SS03-10
0-6"	**A**	343	**4100**	**2200**	**1090**	475	789	376	**1320**	**2690**	**2450**
12-36"	**B**	34.9J	685	13.7J	24.0J	120	35.8U	35.8U	35.5U	609	13.0J

Depth	Sample	SS03-11	SS03-12	SS03-13	SS03-14	SS03-15	SS03-16	SS03-17	SS03-18	SS03-19	SS03-20
0-6"	**A**	**1950**	924	**3680**	**7030**	**9030**	**12800**	**2790**	**5730**	**1060**	**2180**
12-36"	**B**	110	113	**2470**	262	725	51	7.32J	**1270E**	64.2	**2060E**

Depth	Sample	SS03-21	SS03-22	SS03-23	SS03-24	SS03-25	SS03-26	SS03-27	SS03-28	SS03-29	SS03-30
0-6"		**1690**	68.4	227	9.00J	123	151	148	876	**1600**	**1710**
12-36"		36.6U	35.5U	35.5U	35.8U	35.8U	35.5U	36.2U	237	35.8U	233

Table 3

Larence Aviation Industries Sampling Events (results in ppb)
October 2007 by ERT/REAC, November - December 2008 by RAB/ERT/REAC/RST
January 2009 by RAB & RST

Depth	Sample	DCA-01	DCA-02	DCA-03	DCA-04	DCA-05	DCA-06	DCA-07	DCA-08	DCA-09	DCA-10
0-6"	A	1,910	7,040	573	476	832	407	1,490	245	637	
12-18"	B	4,210	667	U	3,620		2,950	3,370		3,140	
18-24"	C	27,610			1,920		U	30,700		2,230	
24-30"	F	28,100			949			855		644	
30-36"	E	11,000									
36-42"	D	12,300									
42-48"	J	1,010									
48-54"	G	Sampled									
54-60"	H										

Depth	Sample	DCA-11	DCA-12	DCA-13	DCA-14	DCA-15	DCA-16	DCA-17	DCA-18	DCA-19	DCA-20
0-6"	A	U	123	1,020	3,480	525	627	641	213	U	U
12-18"	B			974	909	2,250	U	3440	U	U	U
18-24"	C					705		6,670			
24-30"	F							1,940			
30-36"	E							22,600			
36-42"	D							5,030			
42-48"	J							Sampled			
48-54"	G										

Depth	Sample	DCA-21	DCA-22	DCA-23	DCA-24	DCA-25	DCA-26	DCA-27	DCA-28	DCA-29	DCA-30
0-6"	A	1,080	2,160	608	385	203	U	402	3,290	485	690
12-18"	B	U	768		222	362		194	U		
18-24"	C										

Depth	Sample	DCA-31	DCA-32	DCA-33	DCA-34	DCA-35	DCA-36	DCA-37	DCA-38	DCA-39	DCA-40
0-6"	A	U	939	58 J	1,990	1,160	1,300	1,570	13,000	879	64 J
12-18"	B				988	1,700	7,110	U	1,360		
18-24"	C				917	502	1,620		1,070		
24-30"	F						127 J		255		

KEY

PCBs < 1,000 ppb	Sampled	Not needed to define extent of contamination
PCBs > 1,000 ppb	HOLD	Within Nov 08 Deep Sampling Grid
Not Validated		

Table 2

Larence Aviation Industries Sampling Events (results in ppb)
October 2007 by ERT/REAC & November 2008 by RAB

Depth	Sample	SS101	SS102	SS103	SS-104	SS105	SS106	SS107	SS108	SS109	SS110
0-6"		503	1,010	893	1,220 J	318	1,190	602	11,100	1,260	901
12-18"	B		211 J		3,450		517		904	U	
18-24"	C				U						
24-30"	F				U						

Depth	Sample	SS111	SS112	SS113	SS114	SS115	SS116	SS-117	SS118	SS119	SS120
0-6"		960	3,740 J	1,460	164 J	1,910	12,500 J	1,690	2,240	1,040	111 J
12-18"	B		649	34.7 J		351	5,940	1,260	U	34.0 J	
18-24"	C						189	790			

Depth	Sample	SS121	SS122	SS123	SS124	SS125	SS126	SS127	SS128	SS129	SS130
0-6"		867 J	922	2,820	11,400 J	139 U	1,050	17,300 J	6,450 J	2,480	111 J
12-18"	B						405	28.2 J	U	U	
18-24"	C										

Depth	Sample	SS131	SS132	SS133	SS134	SS135	SS136	SS137	SS138	SS139	SS140
0-6"		244	896	737	136 U	558	1,340	738	2,640	242	343
12-18"	B						7,540		U		
18-24"	C						386				

Depth	Sample	SS03-31	SS03-32	SS03-33	SS03-34	SS03-35	SS03-36	SS03-37
0-6"		1,530 J	5,470 J	5,040 J	1,390	1,190	1,040	1,710 J
12-18"	B	314	20,700					335
18-24"	C		604					

KEY

PCBs < 1,000 ppb	Sampled	Not needed to define extent of contamination
PCBs > 1,000 ppb	HOLD	Within Nov 08 Deep Sampling Grid
Not Validated		

Table 3 (con't)

Larence Aviation Industries Sampling Events (results in ppb)
November - December 2008 by RAB/ERT/REAC/RST
January 2009 by RAB & RST

Depth	Sample	DCA-41	DCA-42	DCA-43	Depth	Sample	DCA-44	DCA-45	DCA-46	DCA-47	DCA-48
0-6"	A	U	U	454	36-42"	D	U	U	**247000**	U	U
12-18"	B				42-48"	E			**128,000**	U	U
					48-54"	G			**49,500**		
					54-60"	H			110		
					60-66"	I			82.1 J		
					66-72"	K			125 J		
					78-84"	L			144		

Depth	Sample	DCA-49	DCA-50	DCA-51	DCA-52	DCA-53	DCA-54	DCA-55	DCA-56	DCA-57	DCA-58
0-6"	A	194	**1,060**	122	273	U	271	U	807	974	670
12-18"	B		U								

Depth	Sample	DCA-59	DCA-60	DCA-61	DCA-62	DCA-63	DCA-64	DCA-65	DCA-66	DCA-67	DCA-68
0-6"	A	895	**2,218**	929	842	**4,310**		**1,940**	514	**14,000**	
12-18"	B		**1,520**			183		U		**3,830**	
18-24"	C		**1,110**							**1,470**	
24-30"	F		608							**1070**	
30-36"	E		**8360**							Sampled	
36-42"	D		276								

Depth	Sample	DCA-69	DCA-70	DCA-71	DCA-72	DCA-73	DCA-74	DCA-75	DCA-76	DCA-77	DCA-78
0-6"	A		U						131	**6,500**	U
12-18"	B	418								128	U
18-24"	C									393	

Depth	Sample	DCA-79	DCA-80	DCA-81	DCA-82						
0-6"	A	Sampled	Sampled	Sampled	Sampled						
12-18"	B										
18-24"	C										

KEY

PCBs < 1,000 ppb	**Sampled**	Not needed to define extent of contamination
PCBs > 1,000 ppb	**HOLD**	Within Nov 08 Deep Sampling Grid
Not Validated		

SECTION 02900

SITE RESTORATION

PART 1 GENERAL

1.1 SCOPE OF WORK

The Contractor shall furnish all labor, equipment, material, and incidentals necessary to restore the site as specified herein and/or as directed by the Contracting Officer.

1.1.1 The Contractor shall furnish all labor, equipment, materials and incidentals necessary to place topsoil, finish grade, apply lime and fertilizer, and apply seed for all disturbed areas except as otherwise specified herein. The Contractor shall furnish all labor, equipment, materials and incidentals necessary to provide erosion control as specified in SECTION 02370 – EROSION CONTROL AND STORMWATER MANAGEMENT.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. Where reference is made to one of the standards below, the revision in effect at the time of contract award shall apply.

U.S. DEPARTMENT OF AGRICULTURE (USDA)

USDA 01 Federal Seed Act of August 9, 1939 (53 Stat. 1275) Rules and Regulations

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC)

New York State Standards and Specifications for Erosion and Sediment Control, August 2005

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with SECTION 01330 - SUBMITTAL PROCEDURES:

1.3.1 Material Certificates; Certificates; GA

The Contractor shall submit the certificates of compliance that materials meet the specified requirements, prior to the delivery of materials. Certified copies of the material certificates shall include the following:

- Seed: Classification, botanical name, common name, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested

- pH Adjuster: Calcium carbonate equivalent and sieve analysis
- Fertilizer: Chemical analysis and composition percent

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Fertilizer

Fertilizer shall be commercial, mixed, free flowing granules or pelleted fertilizer, 10-20-10 (N-P205-K20) grade for lawn and naturalized areas. Fertilizer shall be delivered to the site in original unopened containers each showing the manufacturer's guaranteed analysis conforming to applicable state fertilizer laws. At least 40 percent of the nitrogen in the fertilizer shall be in slowly available (organic) form.

2.1.2 Lime

Lime shall be ground limestone containing not less than 90% calcium and magnesium carbonates and be ground to such fineness that at least 90% shall pass a 10-mesh sieve and at least 50% shall pass a 60-mesh sieve.

2.1.3 Temporary Seed Species

Temporary seedings may be necessary to provide cover when permanent seedings are likely to fail due to mid-summer heat or drought. Fertilizer and lime are not typically used for temporary seedings. Temporary seed species shall be as specified by NYSDEC according to season of installation.

2.1.4 Permanent Seed Species and Mixtures

Permanent seed species and mixtures shall be as specified by NYSDEC. The general purpose erosion control seed mix (Mix #6) is suggested and listed below in Table 02900-1.

Table 02900-1
Permanent Seed Species and Mixtures

Variety	***Common Name***	***Planting Rate (lbs/acre)***
Ensylva, Pennlawn, Boreal	Creeping red fescue	20
KY-31/Rebel	Tall fescue	20
Pennfine, Linn	Perennial ryegrass	5
Empire, Pardee	Birdsfoot trefoil	10

2.1.5 Hay Mulch

Hay mulch shall consist of cured hay. When air dried in the loose state, the contents of a representative bale shall lose not more than 15 percent of the resulting air dry weight of the bale. It shall be free from primary noxious weed seeds and rough or woody materials.

2.1.6 Straw Mulches

Straw mulches shall be stalks from oats, wheat, rye, barley, or rice and shall be furnished in air-dry condition and with a consistency for placing with commercial mulch blowing equipment. Mulches shall be free from weeds, mold, and other deleterious materials, in addition to meeting the requirements of state regulations.

2.1.7 Erosion Control Material

Soil erosion control shall conform to the following sub-paragraphs.

2.1.7.1 Soil Erosion Control Blanket

Machine-produced mat of wood excelsior formed from a web of interlocking wood fibers, covered on one side with either plastic netting or twisted kraft paper cord netting.

2.1.7.2 Soil Erosion Control Fabric

Knitted construction of polypropylene yarn with uniform mesh openings 3/4 to 1 inch square with strips of biodegradable paper. Filler paper strips should last 6 to 8 months.

PART 3 EXECUTION

3.1 SEEDING TIME

Seed shall be sown from March 1 to December 1 or as directed by the Contracting Officer.

3.2 SITE PREPARATION

3.2.1 Preparation of Seeding Areas

3.2.1.1 Grading

The Contracting Officer shall verify the finished grades as indicated on drawings, and that the placing of topsoil and the smooth grading has been completed in accordance with SECTION 02300 – EARTHWORK.

3.2.1.2 Unsatisfactory Environmental Conditions

Site preparation work shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped when directed.

3.2.2 Application of Soil Amendments

3.2.2.1 Soil Test

A soil test shall be performed for pH, chemical analysis and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of turf specified.

3.2.2.2 Lime

Lime shall be applied at the rate in tons per acre, as recommended by the soil pH test for the following soil type:

Initial Soil pH	Sands	Sandy Loams	Loams and Silt Loams	Silty Clay Loams
4.5	1.25	3.0	4.75	6.5
4.6-4.7	1.25	3.0	4.5	6.25
4.8-4.9	1.25	2.75	4.25	6.0
5.0-5.1	1.0	2.5	3.75	5.25
5.2-5.3	0.75	2.0	3.25	4.25
5.4-5.5	0.5	1.5	2.0	3.0
5.6-5.7	0.5	1.0	1.5	2.25
5.8-5.9	0.35	0.75	1.25	1.75
6.0-6.1	0.3	0.75	1.0	1.5
6.2-6.3	0.2	0.5	0.75	1.0
6.4-6.5	0.15	0.35	0.5	0.75
6.6-6.7	0.1	0.25	0.35	0.5

Lime shall be incorporated into the soil to a minimum depth of 4 inches or may be incorporated as part of the tillage operation.

3.2.2.3 Fertilizer

Fertilizer shall be applied as determined by the soil test. Fertilizer shall be incorporated into the soil to a minimum depth of 4 inches or may be incorporated as part of the tillage.

3.2.3 Tillage

3.2.3.1 Minimum Depth

Soil shall be tilled to a minimum depth of 4 inches by plowing, disking, harrowing, rototilling or other method approved by the Contracting Officer. On slopes 2 horizontal to 1 vertical and steeper, the soil shall be tilled to a minimum depth of 2 inches by scarifying with heavy rakes, or other method approved by the Contracting Officer. Rototillers shall be used where soil conditions and length of slope permit. On slopes 1 horizontal to 1 vertical and steeper, no tillage is required.

3.2.3.2 Applying Lime and Fertilizer

Lime and fertilizer, as specified previously, may be applied during tillage.

3.2.4 Finished Grading

3.2.4.1 Preparation

Turf areas shall be filled as needed or have surplus soil removed to attain the finished grade. Drainage patterns shall be maintained as indicated on the Contract Drawings. Turf areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of erosion or grade deficiencies shall conform to topsoil requirements specified in SECTION 02300 – EARTHWORK. Finished grade shall be 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas.

3.2.4.2 Debris

Lawn areas shall have debris and stones larger than 1 inch in any dimension removed from the surface.

3.2.4.3 Protection

Finished graded areas shall be protected from damage by vehicular or pedestrian traffic and erosion.

3.3 SEEDING

3.3.1 General

Prior to seeding, any previously prepared seedbed areas compacted or damaged by interim rains, traffic, or other cause, shall be reworked to restore the ground condition previously specified. Do not broadcast seed, or hydroseed, when the wind velocity is such as to prevent uniform seed distribution.

3.3.2 Applying Seed

3.3.2.1 Broadcast Seeding

Seed shall be uniformly broadcast at the rate of 10 pounds per 1000 square feet using broadcast seeders. Half of the seed shall be broadcast in one direction, and the remainder at

right angles to the first direction. Seed shall be covered to an average depth of 1/4 inch by disk harrow, steel mat drag, cultipacker, or other approved device.

3.3.2.2 Drill Seeding

Seed shall be uniformly drilled to an average depth of 1/2 inch and at the rate of 10 pounds per 1000 square feet using equipment having drills not more than 6-1/2 inches apart. Row markers shall be used with the drill seeder.

3.3.3 Applying Mulch

3.3.3.1 Mulch With Asphalt Adhesive

Straw or hay mulch shall be applied simultaneously with asphalt adhesive at the rate of 1-1/2 tons per acre by using a hydro-mulcher. The entire area shall be spread evenly. Do not bunch the mulch.

3.4 EROSION CONTROL

3.4.1 Temporary Turf Cover

When there are contract delays in the turfing operation, the areas designated for turf shall be straw mulched with a temporary seed mixture, and emulsified asphalt as previously specified, to prevent erosion as directed by the Contracting Officer.

3.5 RESTORATION AND CLEAN UP

Excess and waste material shall be removed and disposed off the site. Adjacent areas shall be cleaned. Existing turf areas which have been damaged during the contract operations shall be restored to original conditions.

3.6 PROTECTION OF TURFED AREAS

Immediately after seeding, the area shall be protected against traffic or other use by erecting barricades and providing signage as required or as directed by the Contracting Officer.

3.7 TURF ESTABLISHMENT PERIOD

3.7.1 Length of Period

On completion of the last day of the turfing operation, the Turf Establishment Period will be in effect or as directed by the Contracting Officer.

3.7.2 The turf establishment period shall be a minimum of 8 weeks. The Contracting Officer will inspect all work for provisional acceptance at the end of the turf establishment period.

3.7.3 Maintenance During Establishment Period

3.7.3.1 General

Maintenance of the turfed areas shall include eradicating weeds, protecting embankments and ditches from erosion, maintaining erosion control material, and protecting turfed areas from traffic.

3.7.3.2 Repair

Turf condition shall be reestablished as specified herein for eroded areas, damaged or barren areas. Mulch shall be repaired or replaced as required.

3.7.3.3 Mowing

Turfed areas shall be mowed to a minimum height of 3 inches when the average height of the turf becomes 5 inches. Clippings shall be removed when the amount of cut turf is heavy enough to damage the turfed areas.

3.7.3.4 Watering

Watering shall be at intervals to obtain a moist soil condition to a minimum depth of 2 inches. Frequency of watering and quantity of water shall be adjusted in accordance with the growth of the turf. Run-off, puddling and wilting shall be prevented.

3.8 FINAL ACCEPTANCE

At the end of the Turf Establishment Period, a final inspection will be made. Final acceptance of the turf will be based upon a satisfactory stand of turf as defined in the Paragraph 3.7 - Turf Establishment Period. Rejected areas shall be replanted or repaired as directed by the Contracting Officer, at the Contractor's expense.

3.8.1 The Contractor shall remove all equipment and materials used during the project operation including, but not limited to, temporary wastewater treatment system, trailers, hay bales, silt fence, construction fence, electrical wiring, decontamination pad, etc., prior to demobilization from the site.

3.8.2 Prior to demobilization, all equipment shall be decontaminated in accordance to SECTION 01351 - SAFETY, HEALTH, AND EMERGENCY RESPONSE.

3.8.3 All materials removed during the site restoration activities shall be disposed of at an off-site disposal facility approved by the Contracting Officer.

3.8.4 The Contractor shall vacate the site in an orderly manner and to the satisfaction of the Contracting Officer.

END OF SECTION

SECTION 02300

EARTHWORK

PART 1 GENERAL

1.1 SCOPE OF WORK

1.1.1 The Contractor shall furnish all labor, materials, equipment, and incidentals required to perform all earthwork including excavation for building foundation and well vaults; trenching for pipelines and appurtenance; backfilling and compaction; disposal of surplus and unsuitable material; site grading; access road construction; and restoration of trench surfaces.

1.1.2 Excavation shall extend to the width and depth shown on the Contract Drawings or as specified herein and shall provide suitable room for installing pipe, structures and appurtenances.

1.1.3 The Contractor shall furnish and place all sheeting, bracing and supports and shall remove from the excavation all materials that the Contracting Officer may deem unsuitable for backfilling.

1.1.4 All excavation, trenching and related sheeting, bracing, etc. if required, shall comply with the requirements of Occupational Safety and Health Administration (OSHA) excavation safety standards as specified in 29 CFR Part 1926.650 Subpart P and all applicable Federal, State and local laws, regulations, and requirements. All excavation work shall be conducted in accordance with the Contractor's approved Site Safety and Health Plan (SSHP).

1.1.5 Dust control measures shall be employed at all times in accordance with SECTION 01351 - SAFETY, HEALTH, AND EMERGENCY RESPONSE.

1.1.6 Prior to the start of work, the Contractor shall submit the proposed method of backfilling and compaction to the Contracting Officer for review.

1.1.7 Prior to performing any trenching activities, the Contractor shall perform a geophysical survey to locate potential underground utilities and structures. If applicable, prior to performing any trenching activities, the Contractor shall contact the New York City and Long Island One Call system (1-800-272-4480) to mark out all underground utilities. The locations of utility lines are approximate on the Contract Drawings and shall be field verified by the Contractor prior to any excavation. Prior to any excavation work, utility clearances shall be documented with a completed Field Safety Checklist. An example of this checklist is provided at the end of SECTION 01351 – SAFETY, HEALTH AND EMERGENCY RESPONSE.

1.1.8 The Site soil is known to be contaminated with polychlorinated biphenyls (PCBs). It is assumed that cleanup efforts will be completed by others prior to commencement of earthwork under this contract. Post excavation soil samples will be collected by others to verify sufficient soil cleanup. The Government will provide the Contractor as-built details indicating the lateral and vertical extent of the cleanup activities. Due to the known PCBs contamination, excavated soils will be testing for PCB contamination prior to backfilling.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. Where reference is made to one of the below standards, the revision in effect at the time of contract award shall apply.

CODE OF FEDERAL REGULATION (CFR)

29 CFR 1926, Subpart P	Safety and Health Regulations for Construction - Subpart P: Excavations, Sections 650-652

AMERICAN SOCIETY OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

ASHTO M-43	Standard Specification for Sizes of Aggregate for Road and Bridge Construction

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 33	Standard Specification for Concrete Aggregates
ASTM D 421	Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants
ASTM D 422	Particle-Size Analysis of Soils
ASTM D 698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 1556	Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 2487	Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 4972	Standard Test Method for pH of Soils
ASTM D 5268	Standard Specification for Topsoil Used for Landscaping Purposes

NEW YORK STATE DEPARTMENT OF TRANSPORTATION (NYSDOT)

NYSDOTSS	New York State Department of Transportation 2006 Standard Specifications,

Section 200 – Earthwork, Section 600 – Incidental Construction, Section 700 - Materials

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA OSWER Directive No. 9355.4-01

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with SECTION 01330 - SUBMITTAL PROCEDURES:

1.3.1 Excavation, Trenching and Backfill Plan; Pre-Construction Data; GA

Submit to the Contracting Officer the proposed methods of construction, including excavation, trenching, excavation support systems designs, backfilling and filling and compaction for the various portions of the work. The Contractor shall remain responsible for adequacy and safety of construction means, methods, and techniques. The Plan shall be submitted at least 21 days prior to the Pre-Work Conference. The Contracting Officer will review the Excavation, Trenching and Backfill Plan and return it to the Contractor with comments. Deficiencies in the Excavation, Trenching and Backfill Plan will be discussed at the Pre-Work Conference. The Contractor shall make all necessary amendments required by the Contracting Officer and resubmit it for approval. This procedure shall continue until the Contracting Officer gives final written approval. The Contractor shall make necessary effort so that only one resubmittal is required.

1.3.2 Sources and Samples of Proposed Fill and Topsoil; Samples; GA

The Contractor shall submit to the Contracting Officer samples of earthen materials weighing approximately 50 pounds. The Contractor shall not use these materials as part of the contract work until receiving written authorization from the Contracting Officer.

1.3.3 Laboratory and Field Test Results; Test Reports; FIO

The Contractor shall submit the results of all laboratory and field testing, as specified in Paragraph 3.9 – Soil Testing, to the Contracting Officer within 24 hours of their receipt/ completion. These shall include the results of all chemical testing, sieve analyses performed, in-place density testing, moisture-density testing, and all other testing performed of backfill materials and compaction requirements.

1.3.4 Earthen Materials Certificates of Compliance; Certificates; FIO

The Contractor shall submit to the Contracting Officer certificates of compliance, furnished by the borrow material source facilities, stating the physical and chemical properties of the earthen materials to be used onsite, indicating their conformance to the requirements specified herein. Certificates shall be provided for all materials included in PART 2 - PRODUCTS.

1.3.5 Temporary Excavation Support System Design; Shop Drawings; GA

Excavation support system designs, if necessary, shall be prepared by a licensed Professional Engineer, registered in the State of New York, having a minimum of 5 years of professional experience in the design and construction of excavation support systems. Submit an original and three copies of the licensed Professional Engineer's certification stating that the excavation support systems design has been prepared by the Professional Engineer and that the Professional Engineer will be responsible for its execution. Design calculations shall be included with this submittal.

1.3.6 Utility Clearance Records; Certificates; FIO

The Contractor shall submit the results of the geophysical survey. Utility clearance records shall be submitted to the Contracting Officer prior to intrusive activities. Utility clearance shall be updated as necessary so that no intrusive activities are performed after the utility clearance period has expired.

1.4 DEFINITIONS

1.4.1 Satisfactory materials

Satisfactory materials for structural, common, or select fill shall comprise of uncontaminated onsite or offsite materials classified by ASTM D 2487 as GW, SW, GC, GM, SC and SM. The testing requirements for classifying materials shall be in accordance with the standards of ASTM D 4318 and ASTM D 422. All material specifed in PART 2 – PRODUCTS shall be free of organic material, frozen material, rubbish, or other unsuitable materials. Satisfactory materials shall meet the criteria outlined in Paragraph 1.5 – Certification of Materials and in PART 2 - PRODUCTS. Uncontaminated material shall be as defined in Section 3.5.3.

1.4.1.1 Structural fill

Any fill to be used beneath and adjacent to foundations and other structures or as specified on the Contract Drawings shall be considered structural backfill.

1.4.1.2 Common fill

Fill used in trenches other than those cases outlined in Paragraph 1.4.1.1 shall be considered common fill. Excavated material shall be used in place of imported common fill regardless of whether it meets the gradation requirement specified in Paragraph 2.1. Excavated material to be backfilled must be determined to be uncontaminated as defined in Paragraph 3.5.3 and shall be free of organic material, frozen material, rubbish, or other unsuitable materials.

1.4.1.3 Select fill

Fill used for pipe bedding shall be considered select fill.

1.4.2 Unsatisfactory Materials

Unsatisfactory materials shall comprise any materials not meeting the standards of Paragraph 1.4.1 – Satisfactory Materials. This shall include any contaminated materials/soils, trash/refuse, materials containing frozen or excessive organic matter, or materials classified by ASTM D 2487 as PT, OH and OL.

1.5 CERTIFICATION OF MATERIALS

All materials brought from off-site to be used as fill and topsoil shall be certified clean and tested to ensure they are free from chemical contamination by an offsite laboratory. The requirements and protocols for these determinations are provided in SECTION 01450-CHEMICAL DATA QUALITY CONTROL. A minimum of one chemical test shall be performed per every 5,000 cubic yards of each type of material to be used and no less than one test per borrow area. Additional tests shall be performed for each type of material used, at a frequency of one sample per every additional 5,000 cubic yards of material. The Contracting Officer shall accompany the Contractor for collecting these samples.

1.6 QUALITY ASSURANCE

The Contractor shall coordinate with the soils testing laboratory to verify the suitability of the existing subgrade soil at all structures and to perform in-place soil density tests as required to verify that the bearing capacity of the subgrade is sufficient. The Contractor shall coordinate with the soils testing laboratory to perform in-place soil density tests to verify that all backfill/fill material has been compacted in accordance with the compaction requirements specified elsewhere. The Contracting Officer may designate areas to be tested.

PART 2 PRODUCTS

2.1 COMMON BACKFILL

Common fill shall meet the requirements of Paragraph 1.4.1 – Satisfactory Materials, and shall meet the following gradation requirements:

Sieve Size	Percent Finer by Weight
4-in	100
No. 40	0-70
No. 200	0-15

2.2 STRUCTURAL BACKFILL

Structural fill shall meet the requirements of Paragraph 1.4.1 – SATISFACTORY MATERIALS, and shall be well graded within the following limits:

Sieve Size	Percent Finer by Weight
2-in	100
No. 4	20-70
No. 40	5-40
No. 200	0-20

2.3 CRUSHED STONE

2.3.1 No. 57 Stone

Crushed stone shall be sound, hard, durable and shall meet the following gradation requirements and conform to ASTM C33 Size No. 57.

Sieve Size	Percent Finer by Weight
1-1/2-in	100
1-in	95-100
1/2-in	25-60
No. 4	0-10
No. 8	0-5

2.3.2 No. 3 Stone

Crushed stone, if needed, shall be placed at all site entrances/exits to minimize mud/dirt tracked onto public streets by the construction vehicles as specified in SECTION 01500 – TEMPORARY CONSTRUCTION FACILITIES AND UTILITIES. The crushed stone shall be sound, hard, durable and shall meet the following gradation requirements and shall conform to NYSDOTSS Size No. 3.

Sieve Size	Percent Finer by Weight
2 1/2-in	100
2-in	90-100
1 1/2-in	35-70
1-in	0-15

2.4 SELECT FILL

The select fill shall meet the requirements of common fill specified in Paragraph 2.1 except the maximum diameter shall be 3/4 inch.

2.5 TOPSOIL

Topsoil shall meet the requirements of NYSDOTSS 713 and ASTM D 5268. Topsoil material shall not contain slag, cinders, stones, lumps, roots, plant parts, trash, or similar objects larger than 1.5-inch in any dimension and shall have not less than a 5.8 pH value. Topsoil material shall have a minimum organic content of 2.75 percent by weight. Topsoil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, and mechanical analysis. Certificates of compliance for the above parameters shall be provided from the source facility and submitted to the Contracting Officer. If certificates are not available for any parameter, the Contractor shall be responsible for providing soil testing to determine the material. The testing

shall determine whether any soil amendments are required to meet the growing requirements of landscaping features to be used.

2.6 GEOTEXTILE FABRIC shall be as specified in SECTION 02370 -EROSION CONTROL AND STORMWATER MANAGEMENT

2.7 GEOMEMBRANES

2.7.1 Geomembrane Liners

Geomembrane liners shall be double liners. Non-reinforced geomembrane liners shall have a minimum thickness of 20 mils. Scrim reinforced geomembrane double liners shall have a minimum weight of 40 lbs per 1000 square feet.

2.7.2 Geomembrane Covers

Non-reinforced geomembrane covers shall have a minimum thickness of 10 mils. Scrim reinforced geomembrane covers shall have a minimum weight of 26 lbs per 1000 square feet. The fabrics shall be mildew and rot resistant.

PART 3 EXECUTION

3.1 EXCAVATION SUPPORT SYSTEM

The Contractor shall furnish, install, monitor and maintain excavation support (e.g., sheeting, bracing, trench boxes, etc.) as required by Federal, State or local laws, ordinances, regulations and safety requirements. Where sheeting and bracing is required, the Contractor shall engage a Professional Engineer, registered in the State of New York, to design the sheeting and bracing. The sheeting and bracing installed shall be in conformity with the design. Submit P.E. Certification Form contained in SECTION 01330 – SUBMITTAL PROCEDURES to show compliance with this requirement.

3.2 TEST PITS

Excavation of test pits may be required for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work. Test pits shall be backfilled as soon as the desired information has been obtained.

3.3 TRENCH EXCAVATION PROCEDURES

3.3.1 Strip and stockpile topsoil from grassed areas crossed by trenches. At the Contractor's option, topsoil may be otherwise disposed of and replaced, when required, with approved topsoil of equal quality.

3.3.2 All utilities and other property shall be protected as provided in the General Conditions and General Requirements.

3.3.3 Trenches shall be excavated to the depth indicated on the Contract Drawings and in widths sufficient for laying the pipe and bracing. The bottom of the excavations shall be firm and dry and in all respects acceptable to the Contracting Officer. The length of open trench shall be related closely to the rate of pipe laying. All excavation shall be made in open trenches.

3.3.4 Excavation shall be accomplished by methods that preserve the undisturbed state of subgrade soils. Clay and organic silt soils are particularly susceptible to disturbance due to construction operations. When excavation is to end in such soils, the Contractor shall use a smooth-edge bucket to excavate the last 1 foot of depth.

3.3.5 If unsuitable or unstable conditions are encountered near the invert elevation, an additional 12 inches of material shall be excavated and replaced with compacted select fill per the direction of the Contracting Officer. If the Contractor believes that such direction would increase its cost and would thereby entitle it to a change in Contract cost, the Contractor shall notify the Contracting Officer in accordance with the applicable article(s) in the General Conditions pertaining to changes in the work.

3.4 STRUCTURAL EXCAVATION PROCEDURES

3.4.1. The Contractor shall compact the top 12 inches of subgrade to at least 95 percent maximum density at or near its optimum moisture content (minus 2 to plus 3 percent) as determined by ASTM D698 (Standard Proctor).

3.4.2 Where existing subgrade contains a significant amount of clay or cohesive soils, the Contractor shall over-excavate sufficiently below the bottom of structure for placement of a lean concrete working mat. Prior to placing the lean concrete working mat, the Contractor shall compact the top 12 inches of subgrade to at least 95 percent maximum density at or near its optimum moisture content (minus 2 to plus 3 percent) as determined by ASTM D698 (Standard Proctor).

3.4.3 When excavations have reached the required subgrade, including any allowances for working mats or base materials, prior to the placement of working mats or base materials, the Contractor shall notify the soils testing laboratory to verify the suitability of the existing subgrade soils for the anticipated foundation and structural loadings. If the existing subgrade soils are determined to be unsuitable, direction will be provided by the Contracting Officer regarding removal and replacement with suitable materials. If the Contractor believes that such direction would increase its cost and would thereby entitle it to a change in Contract cost, the Contractor shall notify the Contracting Officer in accordance with the applicable article(s) in the General Conditions pertaining to changes in the work.

3.4.4 Over-excavation beyond the limits and depths required by the Contract Documents shall be replaced at no additional cost to the Government by lean concrete, structural fill, or other approved material subject to the prior approval of the Contracting Officer.

3.5 EXCAVATED SOIL CHARACTERIZATION

3.5.1 Excavated material shall be stockpiled without excessive surcharge on the trench bank. Unless soils are determined prior to excavation to be not contaminated, soil stockpiles shall be placed on a base lined with 20 mil HDPE lining and be completely covered with 10 mil. HDPE lining as specified in Paragraph 2.7. Excavated material shall be segregated for use in backfilling as specified below.

3.5.2 Due to known soil contamination at the site, soils shall be analyzed for polychlorinated biphenyls (PCBs) in accordance with SECTION – 01450 CHEMICAL DATA QUALITY CONTROL prior to backfilling. PCBs have been detected in the site soils at levels exceeding the EPA residential cleanup criteria for PCBs of 1,000 ug/kg (EPA OSWER Directive No. 9355.4-01) during previous field investigations. The Contractor shall sample and characterize the soils prior to excavation with a minimum of one sample per 100 cubic yards of soil. If the Contractor chooses to sample the stockpiled material after excavation, the samples shall be analyzed with a 24-hour turn around time to minimize the duration of open trenches. The proposed soil sampling plan shall be included as part of the Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) submitted under SECTION – 01450 CHEMICAL DATA QUALITY CONTROL. PCBs shall be analyzed using EPA Method 8082 or the most current version at the time of sampling.

3.5.3 Soil determined to be uncontaminated, defined as sample results below the EPA residential cleanup criteria for PCBs of 1,000 ug/kg (EPA OSWER Directive No. 9355.4-01), and that meet the requirements of Section 1.4.1 – Satisfactory Materials shall be used as backfill material.

3.5.4 Soil determined to be contaminated (sample results above the EPA residential cleanup criteria for PCBs of 1,000 ug/kg), or unsuitable for backfilling as specified in Section 1.4.2 – Unsatisfactory Materials shall be segregated and disposed of off-site in accordance with SECTION 02120 – OFFSITE TRANSPORTATION AND DISPOSAL.

3.6 BACKFILLING AND COMPACTION

Backfill material shall consist of satisfactory excavated material or imported fill material as required. Backfill shall be placed in layers not exceeding 6 inches loose thickness for compaction by hand operated machine compactors, and 8 inches loose thickness for other than hand operated machines, unless otherwise specified. Each layer shall be compacted to at least 95 percent maximum density for structural fill and 90 percent maximum density for common and select fill at or near its optimum moisture content (minus 2 to plus 3 percent) as determined by ASTM D698 (Standard Proctor), unless otherwise specified. The Contractor shall ensure that all foundation subbase is compacted to at least 95 percent maximum density. Compaction testing shall be performed as specified in Paragraph 3.9 – Soil Testing.

3.6.1 Trench Backfill

3.6.1.1 As soon as practicable, backfilling shall begin and thereafter be executed expeditiously. Select fill, as specified for the type of pipe installed, shall be placed a minimum of 1 foot over the pipe. Trenches shall be backfilled with the satisfactory excavated material to the grade shown on the Contract Drawings. Excavated material to be backfilled must be determined to be uncontaminated as defined in Paragraph 3.5.3 and shall be free of organic material, frozen

material, rubbish, or other unsuitable materials.

3.6.1.2 To prevent longitudinal movement of the pipe, dumping backfill material into the trench and then spreading will not be permitted until selected fill has been placed and compacted to a level 1 foot over the pipe.

3.6.1.3 Backfill shall be brought up evenly on all sides. Each layer of backfill material shall be thoroughly compacted by rolling, tamping, or vibrating with mechanical compacting equipment or hand tamping. If rolling is employed, it shall be by use of a suitable roller or tractor, being careful to compact the fill throughout the full width of the trench.

3.6.1.4 Where other methods are not practicable, compaction shall be by use of hand or pneumatic ramming with tools weighing at least 20 lb. The material shall be spread and compacted in layers not over 6 inches thick. If necessary, sprinkling shall be employed in conjunction with rolling or ramming.

3.6.1.5 Backfill around structures shall be structural fill material, may be compacted by puddling where approved by the Contracting Officer. All backfill shall be compacted, especially under and over pipes connected to the structures.

3.6.2 Structural Area Backfilling

3.6.2.1 Fill and backfill materials shall be placed in lifts to suit the specified compaction requirements to the lines and grades required, making allowances for settlement and placement of cover materials (i.e., topsoil, sod, etc.). Soft spots or uncompacted areas shall be corrected.

3.6.2.2 Fill and backfill materials shall not be placed on frozen surfaces, or surfaces covered by snow or ice. Fill and backfill material shall be free of snow, ice, and frozen earth. Fill and backfill shall not be placed and compacted when the materials are too wet to properly compact (i.e., the in-place moisture content of the soil at that time is no more than three percentage points above the optimum moisture content of that soil as determined by the laboratory test of the moisture-density relation appropriate to the specified level of compaction).

3.6.2.3 Compaction in structural or open areas may be accomplished by any of the following methods: compaction equipment, fully loaded 10-wheel trucks, tractor bulldozers weighing at least 30,000 lbs. and operated at full speed, or heavy vibratory rollers. Compaction in confined areas (including areas within a 45 degree angle extending upward and outward from the base of a wall) and in areas where the use of large equipment is impractical, shall be accomplished by hand operated vibratory equipment or mechanical tampers. Lift thickness shall not exceed 6 inches (measured before compaction) when hand operated equipment is used.

3.6.2.4 Structural fill beneath and within 10 feet of building slabs or slabs on grade shall be placed and compacted in 6 inch lifts. Structural fill in other areas shall be placed in 8 inch maximum lifts.

3.6.3 Excess Soil

Excess soil from site excavation and soil found to be unsuitable or contaminated shall be disposed of offsite in accordance with SECTION 02120 – OFFSITE TRANSPORTATION AND DISPOSAL.

3.7 TRENCH RESTORATION

In sections where the pipeline passes through grassed areas, the Contractor shall loam and seed the surface to the satisfaction of the Contracting Officer as specified in SECTION 02900 – SITE RESTORATION. In sections where the pipeline passes under the access road/parking area, the surface shall be restored in accordance with the Contract Drawings.

3.8 SPREADING TOPSOIL

Topsoil shall be placed at a thickness of 6 inches in areas to be hydroseeded. The surface shall be free of materials that would hinder planting or maintenance operations. The subgrade shall be pulverized to a depth of 2 inches by disking or plowing for the bonding of topsoil with the subsoil. Topsoil shall then be uniformly spread, graded, and compacted to the thickness, elevations, and slopes shown, and left free of surface irregularities. Topsoil shall be compacted by one pass of a cultipacker, roller, or equivalent. Topsoil shall not be placed when the subgrade is frozen, excessively wet, extremely dry, or in a condition otherwise detrimental to seeding, planting, or proper grading.

3.9 SOIL TESTING

3.9.1 Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or may be performed by the Contractor subject to approval by the Contracting Officer. The Contractor shall submit to the Contracting Officer for approval licenses or certifications of qualification for the performance of field and laboratory testing in accordance with SECTION 01450 - CHEMICAL DATA QUALITY CONTROL.

3.9.2 Chemical Testing: Prior to the use of any backfill on site, the Contractor shall be responsible for performing chemical testing, by an offsite laboratory. Chemical testing of materials to be brought from off-site shall be as specified in Paragraph 1.5 – Certification of Materials. Chemical testing of excavated soils shall be as specified in Paragraph 3.5 – Excavated Soil Characterization. Chemical testing shall be performed in accordance with SECTION 01450 - CHEMICAL DATA QUALITY CONTROL.

3.9.3 Sieve Analysis: Sieve analysis shall be performed in accordance with ASTM D 421 and ASTM D 422. A minimum retest for classification shall be performed every 3,000 cubic yards.

3.9.4 Density Testing: Field in-place density tests shall be determined in accordance with ASTM D 2922. A minimum of one test shall be performed per 500 cubic yards of material placed, with no less than one test per lift. In trenches, a minimum of one test shall be performed per 100 linear feet of material placed, with no less than one test per lift. Calibration curves shall be checked and adjusted if necessary by the procedure described in ASTM D 2922, Paragraph Standardization and Reference Check. ASTM D 2922 results in a wet unit weight of soil and, when using this method, ASTM D 3017 shall be used to determine the in place moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM 3017. The calibration checks of both the density and moisture gauges shall be made at the beginning of each working day and for each different type of material encountered. Calibration for in-place density shall consist of determining in-place density test in accordance with ASTM D 1556.

3.9.5 Moisture-Density Test: A moisture-density relationship for the soil shall be determined in accordance with ASTM D 698 (Standard Proctor). A minimum of one test per 5,000 cubic yards shall be performed, but no less than one test per borrow area. The Contracting Officer may direct additional tests should soil materials change during the course of work.

3.10 GRADING

3.10.1 The Contractor shall uniformly smooth and grade all filled areas to provide a finished surface that is reasonably smooth, compacted to the specified project requirements, free from irregular surface changes, and sloped to drain properly. Grading shall not create swales or areas where ponding of water will occur. After grading is completed and accepted by the Contracting Officer, no further filling or grading shall be permitted except with the approval of and inspection by the Contracting Officer.

3.10.2 The final grade of surfaces that will support foundations, or other structures will be achieved by backfilling excavated areas with structural fill. Lean concrete or capillary water barrier, where needed, shall be placed over the finished, compacted, structural fill as soon as possible after completion of backfill.

3.11 ACCESS ROAD

The access roads shall be constructed as shown on the Contract Drawings. The access roads shall be sloped for positive drainage.

3.12 CAPILLARY WATER BARRIER

Capillary water barrier (screened gravel) under concrete floors and area-way slabs on grade shall be placed directly on the subgrade and shall be compacted with a minimum of two passes of hand-operated, plate-type, vibratory compactor. The thickness of the barrier shall be 6 inches. To prevent loss of barrier permeability during concrete placement, a 10 mil PVC plastic membrane (vapor barrier) shall be used to cover the compacted capillary water barrier.

3.13 SOIL EROSION AND SEDIMENT CONTROLS

All work shall be protected from erosion by installing soil erosion and sediment controls, as specified in SECTION 02370 – EROSION CONTROL AND STORMWATER MANAGEMENT and the Contractor's approved Soil Erosion and Sediment Control Plan.

END OF SECTION

SECTION 01110

SUMMARY OF WORK

PART I GENERAL

1.1 SITE DESCRIPTION

The Lawrence Aviation Industries Inc. (LAI) Superfund Site (Site) is located in Port Jefferson Station, Suffolk County, New York. Groundwater and soil at the Site is contaminated with chlorinated volatile organic compounds (CVOCs), particularly trichloroethene (TCE) and its degradation products. The remedy, as defined in the U.S. Environmental Protection Agency (EPA) September 2006 Record of Decision (ROD), addresses remediation of onsite contaminated soils and the site-wide contaminated groundwater plume.

The scope of this package consists of the design, construction and operation of a groundwater extraction and treatment system and the application of in-situ chemical oxidation (ISCO) at the LAI facility to achieve the goals of the ROD, as shown on the Contract Drawings and specified herein. The design and implementation of the soil remedy at the LAI facility and the downgradient groundwater treatment system near Old Mill Pond will be conducted by EPA Region 2 Emergency Response and Removal Section (ERRS) and are not part of this scope of work.

The Site (EPA ID #NYD002041531) encompasses approximately 126 acres and consists of the LAI Facility and the LAI Outlying Parcels. The Site location map is shown on the Contract Drawings, Cover Sheet. The Long Island Railroad and Sheep Pasture Road form the northern border of the Site, to the east are various residential single family houses, to the west are additional single family houses and a Garden Waste Disposal Facility, and to the south is a wooded area beyond which is a residential area with single family houses. The Village of Port Jefferson and Port Jefferson Harbor, an embayment of Long Island Sound, lie approximately one mile to the north.

The LAI Facility, approximately 42 acres in size, is an active manufacturer of titanium sheeting for the aeronautics industry. The LAI Facility consists of ten buildings located in the southwestern portion of the property. An abandoned, unlined earthen lagoon which formerly received liquid wastes lies west of the buildings, and a former drum crushing area is situated south of the buildings.

The northeastern and eastern portions of the property are referred to as the “Outlying Parcels”. These areas are mostly wooded areas and include a few small residential single family houses and three access roads.

Past disposal practices have resulted in a variety of contaminant releases including TCE, tetrachloroethene (PCE), acid wastes, oils, sludge, metals, and other industrial plant wastes. Previous investigations in the Site’s vicinity suggest that releases of hazardous substances from the facility have affected Site soils and groundwater, surface water and sediment downgradient of the Site. EPA prepared a hazard ranking system (HRS) report and proposed the Site for

inclusion on the National Priorities List (NPL) on October 22, 1999. The Site was listed on March 6, 2000.

Currently, the facility is operating at a small fraction of its capacity and many of the buildings are vacant and unused. LAI has implemented changes in its waste disposal practices and reportedly no longer discharges wastes at the Site.

1.2 SITE HISTORY

The section of the property currently occupied by LAI was previously a turkey farm owned by LAI's corporate predecessor, Ledkote Products Co. of New York (Ledkote). Originally located in Brooklyn, New York, Ledkote produced items that included lead gutters and spouts for roof drains. When the company moved to Port Jefferson Station in 1951, all the existing equipment and material from the original manufacturing processes were transferred to the new location. In 1959, Ledkote changed its name to Lawrence Aviation Industries, Inc. From approximately 1959 to the present, the LAI Facility manufactured products from titanium sheet metal, including golf clubs and products for the aeronautics industry.

Aerial photographs taken between 1955 and 1982 show disturbed ground in several areas of the Outlying Parcels. Regulatory bodies have investigated the facility since the 1970s. In April 2003, the New York State Department of Environmental Conservation (NYSDEC) performed a multimedia inspection of the LAI Site. Based on violations of air, soil, solid waste, chemical bulk storage, and hazardous waste regulations, LAI was ordered to cease production until all noted violations were resolved. In March and April 2004, EPA's ERRS unstacked and restaged approximately 1,300 drums/containers/cylinders containing various flammable solids, acids, bases, gas cylinders, and unknowns. A total of 1,205 samples of the various contents were collected for onsite hazardous categorization analysis. ERRS also inventoried the onsite laboratory area and identified at least 390 containers. The drums and containers were disposed at an off-site facility in October and November 2004.

1.2.1 Recent Progress

A remedial investigation/feasibility study (RI/FS) of the Site soils and groundwater was performed by CDM from August 2003 to May 2005. The RI included soil and groundwater screening, surface water and sediment sampling, soil sampling, and multiport monitoring well installation and sampling. The results of these investigations are presented in the Outlying Parcels Technical Memorandum (CDM 2004a), Final Technical Memorandum (CDM 2004b), and RI Report (CDM 2006a). The RI documented a CVOC plume originating at the LAI site and identified polychlorinated biphenyl (PCB)-contaminated soil at the Site. Figures 1 and 2 show the approximate extent of the PCB contaminated soil at the Site as delineated by the US EPA Environmental Response Team. The FS Report (CDM 2006b), which presented remedial alternatives, was completed in July 2006. The ROD was signed on September 29, 2006.

CDM conducted a Pre-design Investigation from November 2007 to June 2008 to collect additional information required for the Remedial Design (RD). The major elements of the field investigation included:

- Monitoring well installation including groundwater screening samples at selected screening depths to further refine information on groundwater contamination
- Geotechnical characterization for the design of the groundwater treatment facility (GWTF) building foundation and effluent discharge design
- Collection of two rounds of groundwater samples and synoptic water level measurements from monitoring wells
- Aquifer testing
- Subsurface soil sampling at the LAI facility

In addition, the EPA and ERRS contractor performed additional delineation of the PCB contaminated soil area by collecting samples in March and October 2007.

1.3 SITE GEOLOGY AND HYDROGEOLOGY

The following section summarizes the site-specific geology and hydrogeology in order to provide a framework for the remedial design at the LAI facility. Complete discussion of the regional and site-specific geology and hydrogeology are presented in the RI Report and the LAI Pre-design Investigation (PD) Technical Memorandum.

Cross-sections were developed from the data generated from the aforementioned borings and wells. Also included on the cross sections is potentiometric and groundwater chemistry (TCE) data. Figure 3 presents the plan-view locations of the cross-sections. Cross-section A-A' (Figure 4) focuses on potential source areas at the facility explored during the RD. Cross-section B-B' (Figure 5) presents a south to north view of the lithology from the Site to the Port Jefferson Harbor. Cross-sections C-C', D-D' and E-E' (Figures 6 to 8) present west to east cross-sectional views perpendicular to local ground water flow direction.

Geology

Three aquifers are present beneath the LAI site: the Upper Glacial aquifer, the Magothy aquifer and the Lloyd sand member of the Raritan Formation. The Magothy and underlying Lloyd Sand Aquifers are separated by the Raritan Clay member of the Raritan Formation. Consequently, water is interchanged much more readily between the Upper Glacial and Magothy aquifers than between the Magothy and Lloyd aquifers. The presence of the virtually impermeable Raritan Clay, directly underlying the Magothy aquifer, is the lower boundary of the upper flow system. Investigations at the site have only focused on the Upper Glacial and the top of the Magothy aquifers.

Magothy Aquifer: As seen on Cross section B-B' (Figure 5), the top of the Magothy formation, which underlies the Upper Glacial Aquifer, was at a depth of 324 feet bgs (99 feet below msl) in stratigraphic boring ST-3. This unit was also observed in the boring for MPW-09 at a depth of 108 feet bgs (98.34 feet below msl).

The Magothy aquifer consists of Upper Cretaceous Magothy deposits to the top of the confining clay unit of the Raritan Formation. The aquifer has a fluvio-deltaic depositional origin, is wedge shaped, and thickens progressively towards the south and southeast. The Magothy deposits were unconformably overlain by a veneer of Pliocene and Pleistocene deposits, chiefly of glacial origin. Deposition of the glacial deposits left the top of the Magothy Aquifer irregular and marked by discontinuous clay bodies within the deposits of the Pliocene-Pleistocene succession

(Upper Glacial Aquifer), Smithtown Clay Unit, or Magothy Formation. This upper portion of the Magothy will be referred to as the reworked Magothy.

Upper Glacial Aquifer: Cross section B-B' (Figure 5) shows the extent and lithology of the Upper Glacial Aquifer underlying the LAI Facility as compared to downgradient of the site. The LAI facility itself is directly underlain by the Pleistocene-age Harbor Hill moraine, a remnant of the most recent glaciation. The moraine is up to 70 ft thick and composed primarily of sand and gravel with occasional lenses of silty sand and silt. The moraine deposits thin to the south and to the north.

At the LAI facility, the moraine deposits are underlain by well graded fine to medium grained sands and silts with occasional layers of silt and clay or sand and gravel. The clay rich layers observed in this zone were thin and discontinuous, likely derived from Magothy formation materials (or Smithtown Clays) reworked and then re-deposited during the creation of the local moraine. This localized glacial activity at the site has reworked the upper layers of the Magothy Formation and left very complex heterogeneous glacial deposits at the base of the Upper Glacial aquifer, this material is not differentiated from the reworked Magothy material described above.

The aquifer test was performed in a test well in the area near MPW-02. The upper 60-ft (180-240 ft bgs) of the aquifer was screened by the test well and the piezometers were also screened within the zone from 205 to 225 ft bgs. The lithology observed in the screened zone was predominately mixtures of fine to medium grained sands with silt. In the lower half of the zone a silty clay layer was observed from ~ 214 to 219 ft bgs (7 ft to 2 ft AMSL) in the Test well. The layer appears to be somewhat continuous in the local area observed from 213 to 219 (8 to 2 ft AMSL) in PZ-PD-01, 219 to 225 ft bgs (-1 to -6 ft AMSL) in PZ-PD-03 and as clay and silt inter-fingered with silty sands from 216 to 248 ft bgs (3 to -27 ft AMSL) in MPW-02. It was not observed in other borings and wells at the facility. The layer may be related to the clay layer to the north discussed above, but the continuity of such a thin layer deposited in a high energy glacial environment is very questionable.

Hydrogeology

Groundwater Flow: Generally, the aquifer is under unconfined conditions and the upper limit of the aquifer is the water table. Synoptic groundwater elevation data collected in June 2008 was used to prepare a potentiometric surface map for the Upper Glacial aquifer at the LAI site and north of the site to the Village of Port Jefferson. In order to interpret vertical and horizontal flow potential the water level elevation data was contoured in cross section (Figures 2-3 to 2-6) and then projected to plan view. The June 2008 potentiometric surface map is shown on Figure 9. The map includes the approximate extent of the TCE plume investigated during the PD.

The potentiometric surface map shows that groundwater flow, in the vicinity of the LAI facility, is to the north towards Port Jefferson Harbor. Figure 5 shows that the depth to the water table is approximately 185 ft at the site and decreases as you move off the moraine towards the Port Jefferson Harbor. As expected there is a downward gradient observed under the moraine, but as you move off the moraine and towards the Port Jefferson Harbor, there is a significant upward hydrologic gradient driving groundwater towards the ground surface (at MPW-09 the

Upper Glacial Aquifer is under artesian conditions). These observations are consistent with previous studies.

Estimates of Hydraulic Conductivity and Transmissivity: During the RI/FS, CDM performed a series of packer tests at the Site to estimate hydraulic conductivity and transmissivity. Packer tests are used to isolate vertical sections of the well with inflatable bladders to define the vertical distribution of water quality parameters and hydraulic conductivity. Tests were performed at MPW-07, located at the LAI facility, MPW-10 located approximately 1,700 feet downgradient of the LAI facility, and at MPW-09, near Port Jefferson Harbor. Using several different analytical methods, hydraulic conductivity values were calculated to range from <0.02 foot/day to 89 feet/day, and transmissivity estimates to range from 12 to 22,219 gallons per day/foot (or 2 to 2,973 feet^2/day). Lithologic logs indicate that the saturated portion of the Upper Glacial and Magothy aquifers at the Site, where the multiport wells were screened, generally consisted of a layer of fine to medium sand overlying a silty sand layer.

During the PD, aquifer testing was performed in the vicinity of the proposed extraction well locations. A step-drawdown test, a 48-hour constant rate test and recovery measurements were collected in order better characterize the bulk hydraulic properties of the aquifer in this area. Using several different analytical methods hydraulic conductivity estimates ranged from 31 to 63 ft/day and transmissivity estimates ranged from 4,377 to 8,780 ft^2/day.

The wide range of hydraulic conductivity values is not unexpected considering the heterogeneity of the glacially deposited material encountered in the borings. The results of the packer testing only represent the hydraulic properties of the aquifer material that immediately surrounds the well screen. While the results of the 48-hour constant rate test at TW-01 represent the mean hydraulic properties of the material between the pumping well and the piezometers used to measure drawdown. Therefore, the estimates derived from the 48-hour constant rate test at TW-01 are likely more representative of the bulk hydraulic properties of the unit in that area.

1.4 SUMMARY OF CONTAMINATION

The TCE plume, based on the May 2008 groundwater sampling results, is shown on the cross-sections presented in Paragraph 1.3 of this section and on the June 2008 Potentiometric surface map (Figure 9). The TCE plume emanates from the vicinity of MPW-02 and MPW-07 and migrates downgradient to the northwest. In the vicinity of multiport well MPW-10, approximately 1,000 feet from the western boundary of the LAI facility, groundwater flow and the TCE plume bend to the north toward Port Jefferson Harbor. There is an upward hydraulic gradient near MPW-09, indicating that contaminated groundwater is moving upward as it moves northward in the vicinity of this well.

The highest onsite groundwater concentrations occur at MPW-07 at a depth of approximately 190 feet to 230 feet bgs with TCE results of approximately 1,100 micrograms per liter (µg/L).

No soil samples within the LAI facility were found to have chlorinated solvent concentrations greater than the New York State (NYS) Technical and Administrative Guidance Memorandum (TAGM) #4046 soil cleanup objectives. However, residual soil contamination might still exist in

low permeability zones serving as sources for groundwater contamination based on the following three considerations:

- High TCE concentrations in groundwater were detected at the Site more than 20 years after releases of the contaminants had stopped.
- Only a limited number of deep borings/monitoring wells have been advanced at the Site, as deep drilling and sampling is difficult and costly.
- Residual soil contamination generally exists in sporadic, thin layers and has only been located at other sites with unique investigative tools and very closely spaced soil borings.

1.5 PROJECT OBJECTIVES

1.5.1 The remedial objective of this contract is to maintain hydraulic plume control of the source area by extracting and treating contaminated groundwater and application of In Situ Chemical Oxidation (ISCO) at the LAI facility, to minimize offsite migration of CVOC-contaminated groundwater. Contaminated groundwater will be extracted from the Upper Glacial Aquifer beneath the LAI facility. Extracted groundwater will be treated at the proposed groundwater treatment facility and discharged to groundwater via injection wells under NYSDEC State Pollution Discharge Elimination System (SPDES) permit equivalent. ISCO will also be applied within the Upper Glacial Aquifer in an area of high TCE concentrations, upgradient of the extraction wells.

The effectiveness of the groundwater treatment system will be measured by evaluating potentiometric data and water quality influent and effluent data to ensure that hydraulic plume control is being maintained and the treatment system is performing in accordance with the design to meet applicable effluent water quality standards. The effectiveness of the ISCO application will be assessed using monitoring well water quality data located within the ISCO treatment area.

1.5.2 This design consists of performance-based specifications, which include design criteria and performance objectives. The Contractor is required to complete designs for groundwater extraction wells, injection wells, treatment system, and ISCO treatment, including all process, controls, building, mechanical, electrical, instrumentation, and HVAC, in which the Contractor is required to provide a system to meet the design criteria specified herein. The Contractor shall be required to submit a detailed design to meet all design criteria and requirements for the Contracting Officer's review and approval. After the approval of the design by the Contracting Officer, the Contractor shall then submit shop drawings for review. A summary of the major performance objectives and prescriptive design criteria are included in Table 01110-1. Additional criteria are included in the respective specification sections.

1.5.3 Design criteria and requirements were developed for the groundwater extraction and treatment system, and ISCO treatment. The criteria and requirements were developed based on industry standards and technical considerations that are specific to the Site groundwater treatment system construction, start-up, and operation and maintenance (O&M), and application of the ISCO treatment.

1.5.4 Criteria for the groundwater treatment system may include:

- Extraction well performance requirements
- Injection well performance requirements
- Pumping rates
- Groundwater effluent criteria
- Minimum treatment train requirements
- Minimum unit process design and sizing requirements
- Minimum process instrumentation and control requirements
- Minimum construction and/or operation standards for equipment and materials
- Minimum building/enclosure construction requirements
- Minimum percent uptime
- Initial start-up testing requirements
- Minimum sampling, monitoring and reporting requirements for facility operation and maintenance

1.5.5 Criteria for the ISCO treatment may include:

- Minimum ISCO TCE groundwater contaminant reduction requirements
- Minimum sampling, monitoring and reporting requirements

1.6 WORK INCLUDED IN DESIGN PACKAGE

The listing of major work items presented herein, may not include all specific items. The Contractor shall complete all work covered by the Contract Documents. The work includes, but is not limited to, the following:

1.6.1 The Contractor shall design an extraction and treatment systems that will meet the performance requirements of this specification. Submit the design to the Contracting Officer to obtain approval of the design.

1.6.2 Obtaining the necessary permits and approvals from applicable federal, state, and local regulatory agencies to execute the construction phases of the project. See Paragraph 1.9 – Work Not Included for government provided permits.

1.6.3 Construction of the approved design which may include the following activities:

1.6.3.1 Providing all utilities, materials, equipment, labor and facilities required to perform the work in accordance with the Contract Drawings and applicable federal, state, and local regulations. Utilities service shall be maintained to the building during construction.

1.6.3.2 Mobilization, including all labor, materials and equipment required to provide the following:

1.6.3.2.1 Compliance with health and safety requirements as specified in SECTION 01351 – SAFETY, HEALTH, AND EMERGENCY RESPONSE.

1.6.3.2.2 Equipment and material staging area as directed by the Contracting Officer.

1.6.3.2.3 Mobilization of temporary facilities, installation of temporary fencing, and security.

1.6.3.2.4 Utility site survey and geophysical survey prior to construction activities. The Contractor shall be responsible for field verifying all existing utilities and potential underground structures prior to installation of piezometers, extraction, injection and monitoring wells, and excavation/trenching.

1.6.3.2.5 Installation of soil erosion and sediment control measures as specified.

1.6.3.3 Installation of GWTF extraction wells, injection wells, and piezometers.

1.6.3.4 Completion of step-testing of the extraction and injection wells and construction of well vaults and piping.

1.6.3.5 Installation of a pre-engineered building to house the groundwater treatment system and all associated support systems.

1.6.3.6 Installation of the groundwater treatment system including all associated site piping, electrical, and instrument components.

1.6.3.7 Installation of yard piping.

1.6.3.8 Construction of access roads.

1.6.3.9 Construction of fencing.

1.6.3.10 Installation of ISCO injection wells or temporary injection points (determined by the selected treatment method), installation of ISCO monitoring wells, performance of ISCO treatment, and groundwater sampling in order to asses the effectiveness of the treatment process

1.6.3.11 Connection of the water service line and electric utility line to the GWTF.

1.6.3.12 Characterize and dispose of generated waste.

1.6.3.13 Site restoration.

1.6.3.14 Demobilizing and securing the Site.

1.6.3.15 Completion of site-wide groundwater monitoring program (baseline).

1.6.4 Completion of an Initial Testing Program (ITP), which includes a 14-day operational test and a 48-hours performance test, to demonstrate that the extraction wells, injection wells, and treatment system operate in accordance with the specifications.

1.6.5 Operation and maintenance of the treatment system for one year to demonstrate that the extraction and treatment systems function as designed and are in compliance with the

permit requirements.

1.6.5.1 Sampling and analysis of influent and effluent to determine compliance of the Site NYSDEC SPDES permit equivalent requirements, Federal Drinking Water Standards and New York Department of Health Drinking Water Standards, and NYSDEC Air Pollution Control Permit Equivalent requirements.

1.6.5.2 Performance monitoring and site-wide groundwater monitoring for a period of one year.

1.6.5.3 The Contractor shall monitor the effects of the ISCO treatment process via collection and analysis of groundwater samples until the acceptance criteria is met as specified in 13600 – IN SITU CHEMICAL OXIDATION. These will include groundwater sampling results acquired during the Baseline, Pre-Final, and Final rounds of performance monitoring; process monitoring and interim sampling.

1.7 WORK SEQUENCE

The work specified herein and presented on the Contract Drawings shall be performed in a timely and efficient manner to minimize disturbances and inconveniences to property owners. The Construction sequence presented is provided as a planning mechanism to the Contractor. The Contractor shall implement the construction tasks presented; however, the tasks need not necessarily be completed in the order shown. The Contractor shall determine the sequence of construction activities for the ISCO injections and the Groundwater Treatment Facility. Unless noted, the Contractor shall perform all items as part of the work of this contract.

1.8 SITE RESTORATION

The Contractor shall restore all disturbed areas to their original condition in accordance with SECTION 02900 – SITE RESTORATION or as approved by the Contracting Officer. Characterize and dispose of generated wastes.

1.9 WORK NOT INCLUDED

The following permit equivalent will be obtained by the government: NYSDEC SPDES Permit and Air Pollution Control Permit Equivalencies. The Contractor shall provide all necessary applications and information to the Contracting Officer for the Air Pollution Control Permit Equivalent. The NYSDEC SPDES permit equivalent will be obtained by the government prior to construction. The Contractor shall be responsible for obtaining all other required permits.

The Contractor will only be responsible for maintaining the newly constructed access road and features pertinent to this remedy (building, injection wells, extraction wells etc.) and will not be responsible for the general upkeep or maintenance of the entire Site.

1.10 CONTRACTOR'S USE OF PREMISES

The Contractor shall limit onsite operations to the work areas as shown on the Contract Drawings, unless authorized by the Contracting Officer. Work in areas outside of these work

areas shall be coordinated with the Contracting Officer.

1.11 SITE ACCESS

Property access for the Site, the NYSDOT right-of-way, and areas of public water supply installation shall be coordinated by the Contracting Officer. It should be noted that the LAI site access is through an entrance on Sheep Pasture Road and is controlled by a manned gatehouse. Hours of operation need to be established at the beginning of the project so that the Contracting Officer can negotiate access. Deviations from the established schedule shall require notice at least 7 days in advance to the Contracting Officer to notify the owner and receive approval.

1.12 PCB SOIL CONTAMINATION

Surface soil in specific areas near the proposed treatment building and injection well locations is known to be contaminated with PCBs. It is assumed that cleanup efforts will be completed by others prior to commencement of earthwork under this contract. Post excavation soil samples will be collected by others to verify sufficient soil cleanup. The Government will provide the Contractor as-built details indicating the lateral and vertical extent of the cleanup activities. Excavated materials during construction shall be characterized prior to using the material as backfill on the Site.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION