CORRECTIVE ACTION PLAN

METRO-NORTH RAILROAD
HARMON RAILROAD YARD
NYSDEC SITE # 3-60-010
OPERABLE UNITS OU I AND OU II

Prepared For: Metro-North Railroad
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Project No.: 10-3231M (46)

Date: March 2014

INTRODUCTION

This document outlines corrective actions and maintenance of Engineering Controls (ECs) and select monitoring wells currently in place at Operable Units OU I and OU II located at the Metro-North Railroad (MNR) Harmon Railroad Yard in the Town of Croton-on-Hudson, Westchester County, New York (herein after referred to as the "Site"). The Site is a listed New York State Department of Conservation (NYSDEC) Inactive Hazardous Waste Site (NYSDEC Site # 3-60-010) that was remediated in accordance with the provisions of Order on Consent Index #WP-163-85, Site # 3-60-010 (the Order on Consent).

BACKGROUND

The Order on Consent, MNR, to investigate and remediate contaminated media at the Site. OU I is a former location of a wastewater lagoon, and OU II consists of four distinct locations surrounding OU I (i.e., identified as areas L1 though L4) where non-aqueous phase liquid (NAPL) consisting of viscous, severely biodegraded diesel fuel containing varying concentrations of polychlorinated biphenyl (PCBs) was present on the surface of the groundwater. A project locus plan is included as Figure 1 and a Site Plan is presented as Figure 2.

The remediation of OU I included the construction of a containment wall and placement of a cover system coupled with the removal and off-site disposal of impacted materials. As such, treatment systems were not installed within OU I. However, four 4-inch diameter groundwater wells were installed within the former lagoon footprint as a contingency measure should in-situ treatment or pumping be deemed necessary. [Note: to date, treatment has not been required within these structures.] In addition, five pairs (10 wells total) of 2-inch diameter piezometers were also installed around the perimeter of the OU I containment wall for the purpose of monitoring differences in groundwater elevations across the containment wall. The approximate location of each groundwater well and piezometer is depicted on Figure 2.

The OU I cover system (in order from ground surface, downward) consists of the following:

- asphalt cap approximately 6.5 inches in thickness;
- reinforcement geotextile;
- one-foot thick layer of drainage sand;
- one-foot thick layer of clean backfill;
- geocomposite drainage net;
- high density polyethylene (HDPE) geomembrane cap;
- two- to five-foot thick layer of clean backfill;
- ten-inch layer of soil impacted with PCB at concentrations less than 10 parts per million (ppm);
- one-foot layer of clean backfill;
- HDPE geomembrane liner; and
- 3.5-foot thick layer of clean backfill.

Due to settlement over time, a pronounced depression that collected water developed in the northwestern portion of the OU I cover. A drainage modification system was installed in November-December 2005 to correct the effects this depression had on the drainage of the

asphalt cap by continuously draining water away from the depression in the OU I cover system. This system consists of a sump box installed within the depression that is connected to 4-inch diameter PVC piping, installed within the asphalt cap, and above the HDPE liner, that drains via gravity into the existing Harmon Yard storm sewer system. This drainage system was installed as an alternative to re-paving the asphalt cap, which was deemed to be an excessive cost that would not serve to eliminate future settlement or degradation of the OU I cover system. The approximate location of the drainage modification system is depicted on Figure 3, and details for the system are included as Figure 4.

The remediation of OU II included the placement of a cover system that consists of at least two feet of clean soil or an asphalt cover, and implementation of a NAPL recovery program. Currently NAPL recovery operations within OU II includes the physical removal of NAPL from a product recovery well (designated RW-1, located in the L4 area) using a product skimmer device, and the manual removal of NAPL from select wells, within the L1 through L4 areas, utilizing a combination of portable product skimmer devices, bailers and passive NAPL recovery devices (NRDs).

As outlined in the document *Site Management Plan, OU I and OUI II, NYSDEC Site Number : 3-60-010* dated December 2011(revised November 20, 2012), the cover system installed at OU I and the OU II area must is evaluated two times per year to assess the condition of the asphalt cap, areas of erosion, and other relative features. Since the implementation of the SMP in January 2011, the bi-annual inspection has been completed in or around March and September by the MNR Department of Environmental Compliance. Generally this inspection consists of a visual observation of the condition of the asphalt cover; surrounding drainage channels, the air inlet/vapor extraction well clusters installed for contingency purposes, the integrity of the recovered NAPL storage containers, and the condition of the OU II monitoring wells. The inspection completed on March 5, 2013 identified some evidence of settlement and minor cracking over the OU I asphalt pavement. The inspection completed on September 24, 2013 identified the following deficiencies warranting corrective action:

- Evidence of settlement, ponding of surface water, and minor cracking in areas of the OU I asphalt cap;
- a clogged storm water catch basin (i.e., the drainage modification sump box) in the OU I area;
- sediments restricting flow of stormwater off of the OU I cap and into the stormwater drainage system;
- the disrepair of the four containment vaults for the groundwater wells located within OU I; and
- several monitoring wells [including the supplementary wells located within the containment vaults and ten wells installed in tandem in five locations surrounding OU I (i.e., one located on each side of the sheet pile wall surrounding OU I) to monitor the effectiveness of the sheet pile wall and cover system] were observed that historically are not evaluated for the presence of NAPL.

In addition to the above deficiencies, a viscous NAPL has historically been observed in select monitoring wells in the OU II, L1 Area, most notably in monitoring well AI1-4, and to a lesser extent in other L1 area monitoring wells. The viscosity of the NAPL in these L1 area monitoring wells prevents accurate measurements of NAPL thickness, fouls the portable product skimmer and this material cannot be collected using a NRD. Thus, only a total of approximately one gallon of NAPL has been removed from the L1 area (i.e. from monitoring well VE1-1) since NAPL recovery efforts under the SMP commenced in December 2012. The approximate location of each L1 area well that is monitored under the SMP is depicted on Figure 2.

On February 18, 2014 representatives of Metro-North Railroad and DAY held a teleconference with the NYSDEC to discuss the OUII NAPL monitoring data generated in the reporting period from September 2013 through November 2013. The NYSEC expressed concern over the increased quantities of NAPL detected in select OU II L-4 area monitoring wells during the report period, and requested an evaluation of the extent and quantity of NAPL within the OU II area and an assessment of options to collect additional NAPL from this area (if warranted).

PROPOSED CORRECTIVE ACTIONS

The following actions are proposed in order to address/evaluate the deficiencies identified during the March 5, 2013 and September 24, 2013 inspections, assess NAPL conditions, and evaluate wells within OU I and OU II.

Drainage Modification System Maintenance

It is proposed that the sump box, which was installed within the OU I settlement area in November-December 2005, be opened and that accumulated sediments within the sump box be physically removed via high pressure flushing with potable water, a vacuum removal system, or using hand tools. It is also recommended that the 4-inch diameter PVC piping (refer to Figure 4) be inspected for the presence of accumulated sediments and/or other debris that may restrict the flow of stormwater through the pipe. If it is determined that the presence of sediments and/or debris in the pipe are sufficient to restrict the flow of stormwater, then the pipe should be cleaned out via high pressure flushing with potable water, a drain cleaning machine, or equivalent.

In conjunction with the drainage modification system maintenance, sediments that have accumulated on the asphalt cap within the OU I settlement area should be removed via high pressure wash with potable water (i.e., into the drainage modification system), or scraped off using hand tools and deposited in an area of vegetative cover.

Asphalt Cap Survey and Repair

As stated in the *Operable Unit I Operation and Maintenance Plan* prepared by Environmental Resources Management (ERM), dated July 7, 1999 (revised August 1999) regarding the OU I asphalt maintenance, *"The geomebrane cap, which underlies the drainage layer and the asphalt pavement, provides the impermeable cap for the lagoon. Consequently, the asphalt cover was not designed to serve as the impermeable cover for the lagoon. The purpose of the asphalt layer is to control erosion of the backfill materials of the cap. The ability of the asphalt cover to provide the required measure of protection for the underlying soils will be maintained, as needed, though inspection and repairs."*

Pursuant to maintaining the integrity of the asphalt cap to function as designed, the following actions are proposed that:

- the cracks within the cap will be mapped to assess their lateral extent and depth;
- The OU I asphalt cap will be inspected for additional areas of suspected settlement; and
- a licensed surveyor will be retained to measure ground surface elevations on the portions of the asphalt cap that have known or suspected areas of settlement, for the purpose of comparing the survey data obtained in September 1999 (refer to Figure 2) to assess the current condition of the cap and identify areas of settlement requiring remediation.

The results of the survey and mapping will be used to determine whether repairs to the asphalt cap are necessary.

It is proposed that cracks in the asphalt cap which are less than 0.5 inches in width, 0.5 feet in length, and/or do not extend greater than one inch below the surface of the asphalt cap should continue to be monitored. Cracks that are greater than 0.5 inches in width, 0.5 feet in length, and/or extend greater than one inch below the surface of the asphalt cap should be repaired to prevent further deterioration of the asphalt cap.

At the time of the installation the drainage modification system in 2005, the elevation of the top of the sump box (i.e., the point of inlet for the drainage modification system) was located at approximately 17.0 feet above mean sea level. If the elevation survey identifies portions of the asphalt cap that have settled to elevations at or below the top of the sump box, corrective actions may be warranted in order for the drainage modification system to continue to operate effectively. These corrective actions may include addition of fill/pavement materials in the area of settlement, or upgrades to the drainage modification system (e.g., lowering the discharge piping, installation of a pumping system, etc.).

OU I Groundwater Well Containment Vault Repairs

The well heads of the four groundwater pumping wells located within the OU I footprint are surrounded by, and covered with, pre-fabricated concrete vaults. The containment vaults were installed on top of the asphalt cap, and extend approximately three feet above grade. In order to protect the concrete vaults from damage by vehicle traffic and equipment storage, a barrier was constructed around each pre-fabricated concrete vault. These barriers consist of a perimeter wall constructed of railroad ties with gravel between the perimeter wall and the pre-fabricated concrete vault. During the September 24, 2013 SMP inspection, it was noted that the barriers surrounding each of the groundwater pumping well containment vaults were in disrepair. Specifically, the railroad tie perimeter walls were noted to be deteriorating and the gravel fill was beginning to leak out of these perimeter walls. A photograph taken of one of the protective barriers during the September 24, 2013 SMP inspection is included for reference as Attachment A.

It is proposed that the perimeter walls surrounding each of the four containment vaults be demolished and the concrete vaults observed to assess if the vaults are adequate or if the perimeter walls need to be rebuilt.

Monitoring Well Evaluation - OU I/OU II Area

In conjunction with the assessment of the containment vaults, the wells within each vault and each of the piezometers located around the perimeter of OU I (i.e., a total of 14 wells) will be evaluated to determine depth to groundwater and the presence of non-aqueous phase liquid (NAPL). In addition, the top of well casing and ground surface elevation of each OU I well be surveyed to the same datum as the monitoring wells within OU II. The wells containing more than 0.2 feet of NAPL will be sampled and the NAPL sample collected will be submitted to an analytical laboratory to be tested for PCBs using United States Environmental Protection Agency (USEPA) Method 8082.

Following the receipt of the laboratory test results, the NAPL will be removed from the wells using a Spill Buddy ™ or bailer and placed in an appropriate container for subsequent disposal. Wells that do not contain NAPL prior or subsequent to the removal will be decommissioned in accordance to the provisions outlined in the SMP. Wells that consistently contain NAPL will be be added to the media monitoring schedule outlined in Section 3.3.1 of the SMP. The frequency of monitoring and the method of NAPL removal utilized will depend on the physical nature and amount of NAPL present in each well. Specifically, NRDs would be installed in those wells that contain less than 0.25 feet of NAPL, and that a Spill Buster ™ or Spill Buddy ™ be used to remove NAPL from those wells that contain more than 0.25 feet of NAPL. In addition, if the NAPL encountered is determined to be similar to the viscous NAPL present in select L1 area wells (refer to the following section); further assessment may be required in order to determine the best method for NAPL recovery.

Monitoring Well Evaluation – OU II Area L1

It is proposed that each L1 area monitoring well (i.e., AI1-1, AI1-4, AI1-8, AI1-11, AI1-12 AI1-15 AI1-16 VE1-1 VE1-2 VE1-3, and VE1-4) be evaluated for the presence of NAPL, and, if encountered, a sample of NAPL should be collected and submitted to an analytical laboratory to be tested for total petroleum hydrocarbons (TPH) by gas chromatography (GC) methodology. The purpose of the L1 Area NAPL evaluation is to compare the viscous NAPL currently present in monitoring well AI1-4 to the NAPL encountered in adjacent L-1 area monitoring wells.

A standpipe will be installed in each L1 Area monitoring well that contains viscous NAPL similar to that present in monitoring well AI1-4, as determined by the analytical laboratory testing, for the purpose of determining accurate NAPL thicknesses in these wells. The standpipe will consist of a single section or flush coupled solid PVC riser pipe with minimum 0.75-inch inside diameter (ID), and a maximum 1-inch outside diameter (OD), fitted with a water-tight knock-out cap at the base. Each standpipe will be of sufficient length so as to extend from the top of the existing well casing to a depth approximately five to ten feet below the current groundwater level, or two feet from the bottom of the existing well casing (whichever is shallower). Subsequent to installation, the standpipe will be secured to the top of the well casing, and the knock-out cap will be removed to allow for groundwater entry from the bottom. Depth to groundwater surface measurements will be collected from within the standpipe, and depth to the viscous NAPL surface measurements will be measured from between the standpipe and the well casing.

The evaluation of the viscous NAPL will be completed over the four quarterly monitoring events (i.e., one seasonal cycle). Subsequent to a review of the data collected, recommendations will be made regarding the necessity of, and methodology for, recovering the viscous NAPL from the L1 Area.

NAPL Monitoring - OU II Area L4

In order to assess concerns regarding the increase in NAPL thicknesses measured in select OU II L4 area monitoring wells, DAY will review the NAPL data generated for the L4 area monitoring wells during the past seven monitoring periods (i.e., since electronic data management under the SMP commenced around January 2012). NAPL thicknesses for each L4 area monitoring well will be displayed graphically to assess trends in NAPL thicknesses over this period. Select wells for which graphical representations show increasing trends of NAPL thicknesses will be re-evaluated in the field to confirm if increased NAPL is present. In addition, the monitoring frequency of these wells will be increased (e.g., from quarterly to monthly monitoring) for three consecutive quarters (i.e., approximately nine months), to determine if additional NAPL can be removed from the wells using NRD's, the Spill Budy™, or other product removal device.

The commencement of NAPL recovery efforts in the OU I area wells (discussed above) will be conducted in conjunction with this OU II Area L-4 Monitoring well NAPL thickness assessment. It is suspected that the commencement of NAPL recovery efforts in the OU I area wells will result in a decrease of NAPL thickness observed in the OU II L-4 area wells.

SCHEDULE

It is anticipated that the drainage modification system maintenance will be completed during the current quarter (i.e., between March 1, 2014 and May 31, 2014) and that the survey of the OU I asphalt cap would be completed following the drainage modification system maintenance work. Repairs to the asphalt cap and the drainage modification system (as deemed necessary based on the results of the survey) would be completed during the 2014 paving season (i.e., on or before November 1, 2014).

It is anticipated that the repairs to the OU I pumping well containment vaults would be completed during the current quarter (i.e., between March 1, 2014 and May 31, 2014) and that the evaluation of the OU I area monitoring wells would start following the containment vault repairs. Weekly NAPL monitoring of the OU I area wells would be conducted until around September 1, 2014.

It is anticipated that OU II L1 area monitoring well evaluation will commence during the current quarter (i.e., between March 1, 2014 and May 31, 2014), and will continue for one year (i.e., through May 31, 2015). Recommendations regarding the viscous NAPL will be presented within six weeks following the conclusion of the evaluation period.

It is anticipated that the OU II L4 Area monitoring well NAPL thickness evaluation will commence during the current quarter (i.e., between March 1, 2014 and May 31, 2014) and that an increased monitoring schedule in select OU II L-4 Area monitoring wells (if necessary) will continue through December 2014.

DELIVERABLES

The results of the drainage modification maintenance activities, asphalt cap and drainage modification system repairs (if necessary), and OU I groundwater pumping well containment vault repairs will be documented in the bi-annual inspections completed in or around March 2014 and September 2014, and included in the subsequent quarterly site management status report. The results of the OU I asphalt cap survey and the OUI area well evaluation will be included, as data is collected, in the quarterly site management status reports.

The results of the OU II, L1 Area monitoring well evaluation, along with recommendations regarding the viscous NAPL, will be summarized in separate report that will be presented to the NYSDEC on or around July 15, 2015.

Graphical representations of NAPL thickness trends in OU II L4 area monitoring wells will be included in the quarterly site management status report for the quarter between March 1, 2014 and May 31, 2014.

List of Figures

Figure 1: Project Locus Map
Figure 2: OU I and OU II Area Site Plan
Figure 3: 2000 Asphalt Cap Survey and Location of Drainage Modification System
Figure 4: Drainage Modification System Profile, Section, and Details

List of Attachments

Attachment A: Photograph of a protective barrier taken during the September 24, 2013 SMP inspection

FIGURES

Last Date Saved: 25 Oct 2013 Document Path: \\Smelt-win7pc\gis\Aerial Locus Maps\MN\RHarmon Yard - Fire Tower RAP Locus Map.mxd

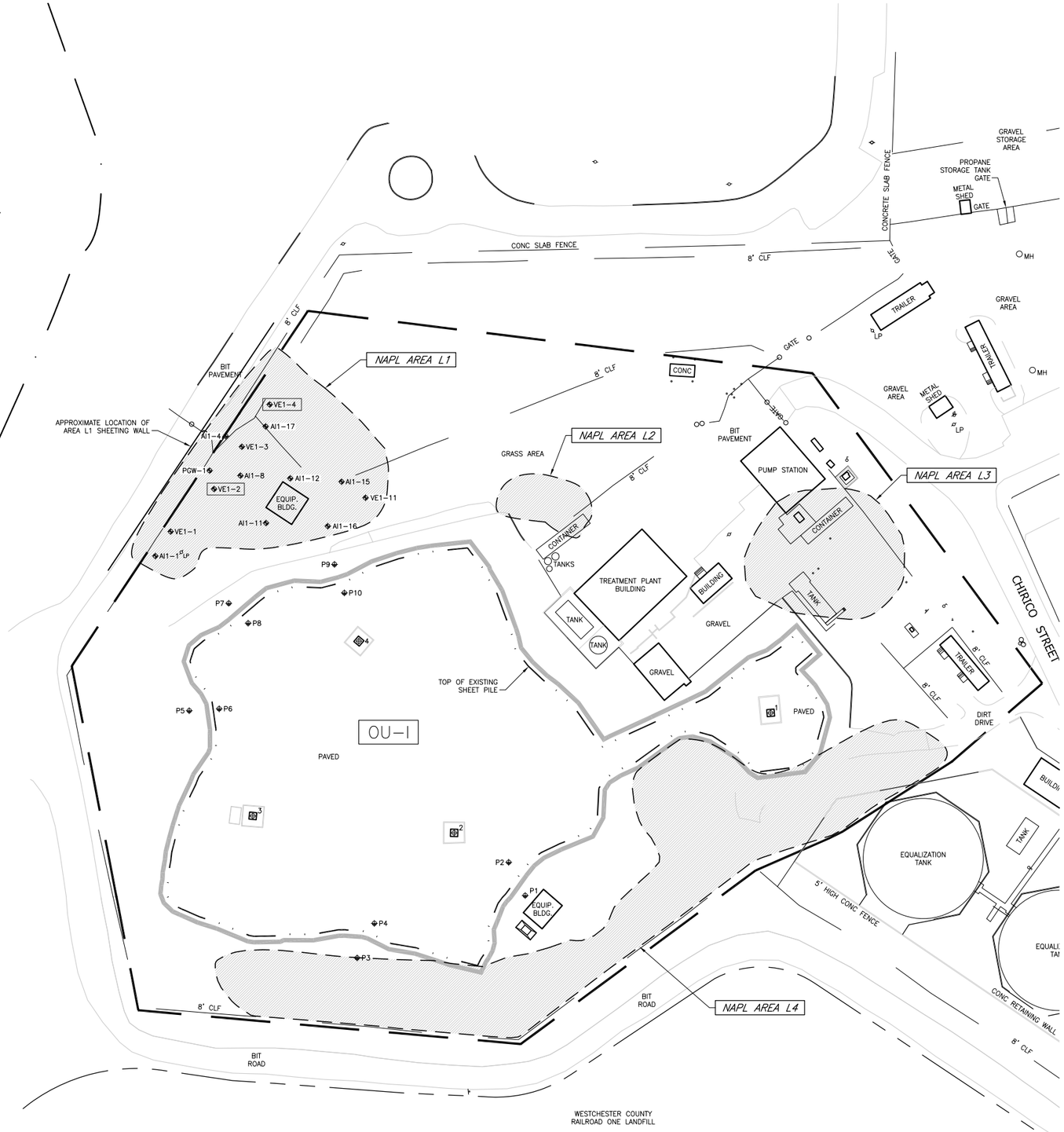
NOTE:

Topo imagery provided by ESRI Online Services and USGS 7.5 Minute Quad of Haverstraw, NY, dated 2010.

Site Coordinates are in Decimal Degrees:

73° 53' 9.72" W 41° 11' 28.64" N

Date: 10-25-2013 Drawn By: CAH Scale: AS NOTED	day **DAY ENVIRONMENTAL, INC.** **Environmental Consultants** **Rochester, New York 14614-1008** **New York, New York 10016-0710**	Project Title: METRO-NORTH RAILROAD HARMON YARD CROTON-ON-HUDSON, NEW YORK Drawing Title: Project Locus Map	Project No.: 10-3231M (176) FIGURE 1



SITE PLAN
1" = 80'

NOTES:

1. This drawing was prepared from a CAD base file provided by others, from a drawing by ERM, entitled "EXISTING SITE PLAN AND SURVEY CONROL" sheet No. C-1 dated 7/31/00 and from a drawing by ERM, "SITE PLAN WITH LOCATIONS OF PROPOSED WELLS AND SHEET PILING", sheet No. C-2, dated 7/31/00.
2. Operable Unit II (OU-II) remedy well locations were determined from coordinate values listed on the ERM drawings identified in note No. 1, or by reference to site features (e.g., DAY-1, RW-1, etc...)

LEGEND:

- VE1-3 — Former Vapor Extraction (VE), Air Inlet (AI), Forced Air Injection (FA), Existing Monitoring Well Or Product Recovery Well (RW) and Designation
- VE1-2 — Long-Term Monitoring Well
- 1 — Approximate Groundwater Pumping Well Containment Vault Location
- P1 — Approximate Piezometer Location
- Approximate Location Of Sheet Pile Wall Around Remediated Former Lagoon Area (OU-I)
- Extent Of OU-I Final Cover System
- OU-II Boundary
- Approximate NAPL Areas (L1, L2, L3 & L4)

0' 80' 160' 240'

PROJECT MANAGER	CAH
DRAWN BY	RJM
SCALE	As Noted
DATE	2-2014
DATE DRAWN	2-3-2014
DATE ISSUED	2-7-2014

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HARMON YARD OPERABLE UNITS OU-I AND OU-II
CROTON-ON-HUDSON, NEW YORK
OU-I AND OU-II CORRECTIVE ACTION PLAN

DRAWING TITLE
OU-I And OU-II Site Plan

PROJECT NO.
10-3231M (46)

FIGURE 2

Xerox432AnsiB-2; 11 x 17
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Ref1:
Ref2:
Ref3:

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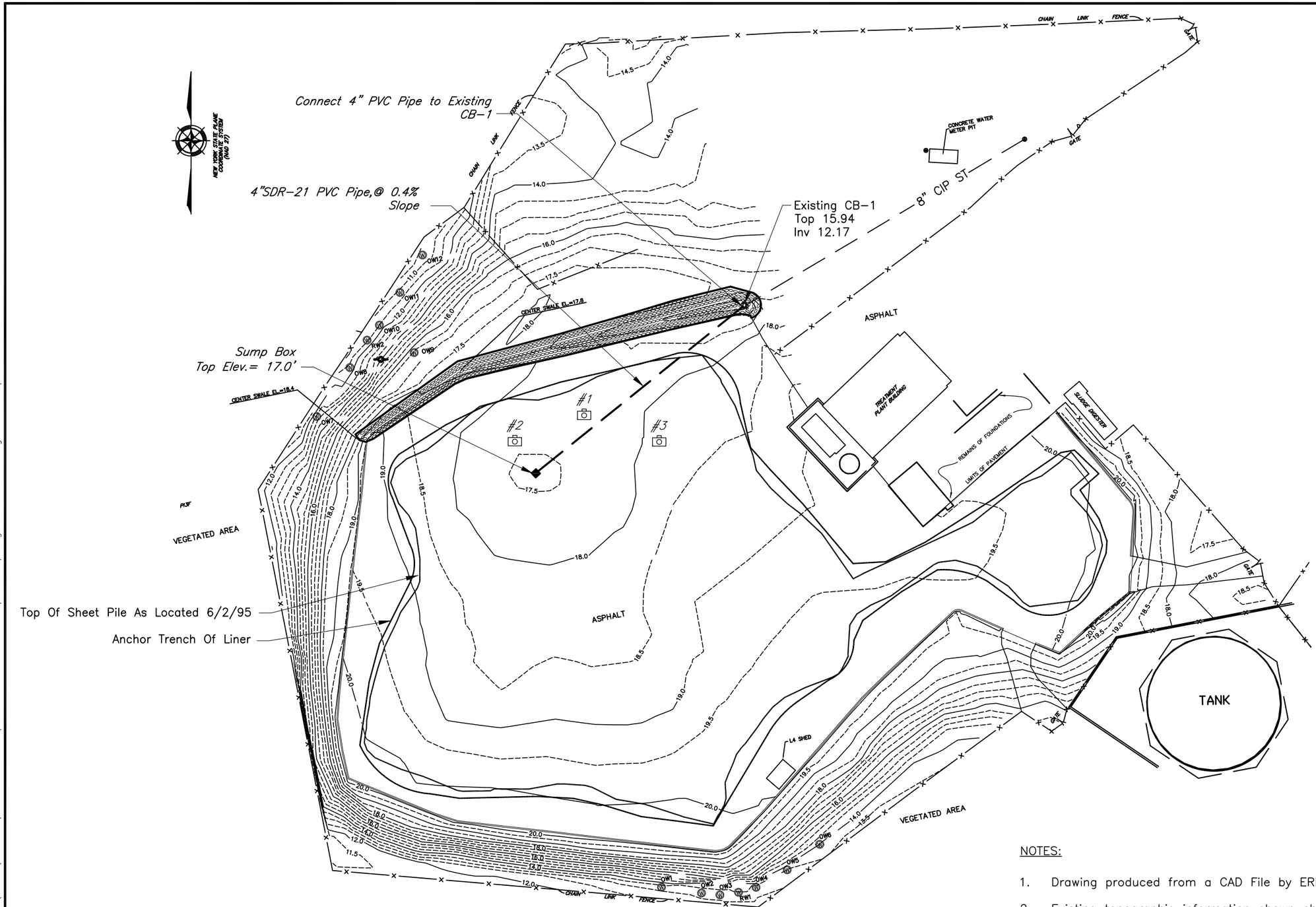

1 FIG-1 SITE PLAN
1" = 60'

NOTES:

1. Drawing produced from a CAD File by ERM.
2. Existing topographic information shown shown on this drawing is based on survey conducted by Chas. H. Sells, Inc.
   500 Bedford Road, Bedford Hills, NY 10507
   Tel. (914) 241-4994
   Dwg. No. CRR-9-99-ERM Dated 9/27/99

PROJECT MANAGER	CAH
DRAWN BY	RJM
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day
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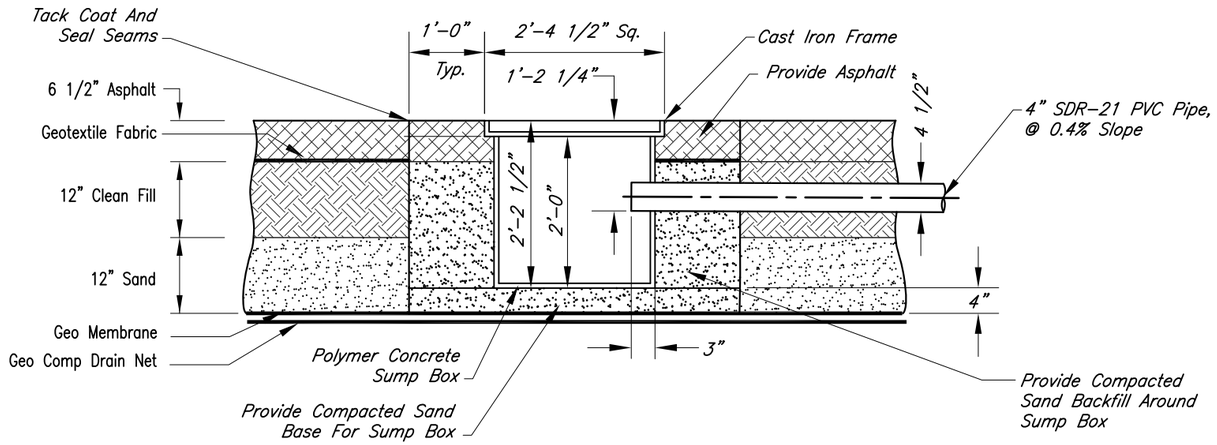
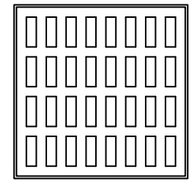
DRAWING TITLE
2000 Asphalt Cap Survey
And Location Of Drainage Modification System

PROJECT NO.
10-3231M (46)

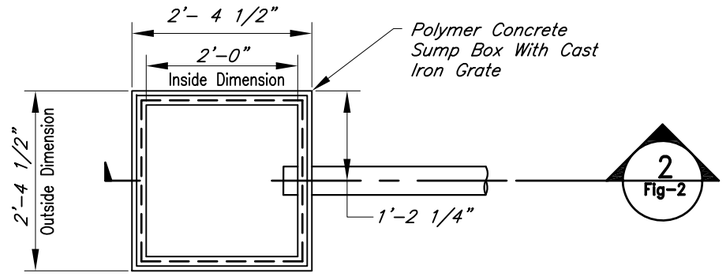
FIGURE 3



2 / FIG-2 SECTION VIEW
1/2" = 1'-0"

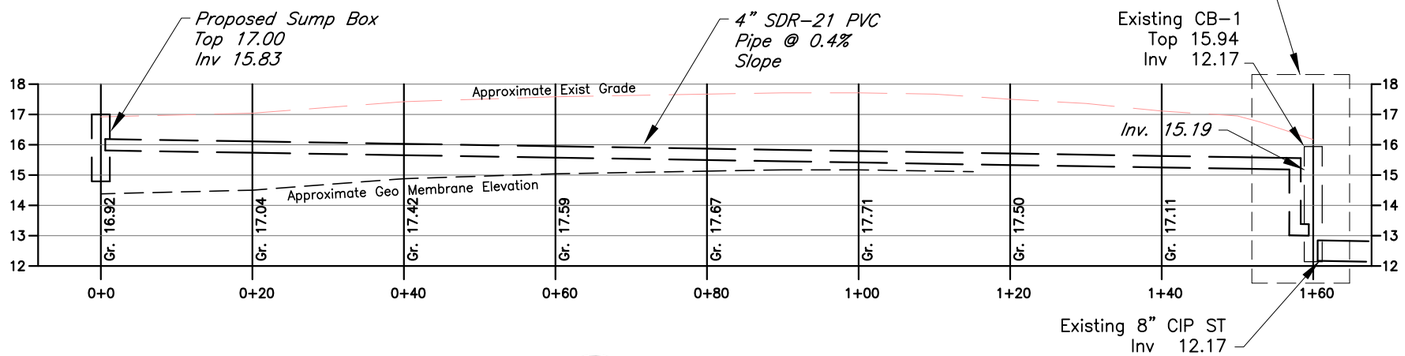


CAST IRON GRATE

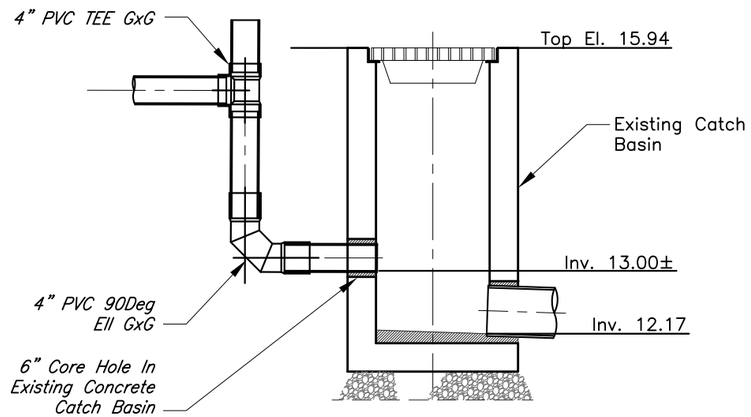


1 / FIG-2 SUMP BOX PLAN VIEW
1/2" = 1'-0"

DETAIL 4 / FIG-2



3 / FIG-2 PROFILE
1" = 20' Horizonal
1" = 5' Vertical



4 / FIG-2 EXISTING CONCRETE CATCH BASIN
1/2" = 1'-0"

NOTES:

1. Polymer Concrete Sump Box: Jay R. Smith Mfg. Co., Smith ACO Trench Drain Series, Model 9846 Sump Box, or approved equal.

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Drainage Modification System Profile, Section And Details

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FIGURE 4

ATTACHMENT A