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SAMPLING AND ANALYSIS PLAN
FOR
SOUTH TERMINAL CDF
AND
ASSOCIATED DREDGE FOOTPRINT

SAP

COMMONWEALTH OF MASSACHUSETTS

New Bedford, Massachusetts
November, 2010

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SDMS DocID 517928

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1.0 Introduction and Purpose

At the request of USEPA, this Sampling and Analysis Plan has been prepared in order to outline sampling activities that will be conducted in order to delineate environmental conditions at the proposed South Terminal CDF in New Bedford Harbor. Several scoping meetings have been held in order to fully understand the scope of USEPA's request. The first such meeting was held at USEPA Region 1 headquarters on October 14, 2010. A subsequent teleconference was held on October 20, 2010. At these meetings, it was clarified that several different USEPA programs are requesting information, and that these programs may require different types of information in order to be able to fully evaluate the proposed project. It is anticipated that the contents of this Sampling and Analysis Plan will meet the needs of the various agencies involved in the decision-making process.

1.1 Project Description

The project site is located within the inner portion of New Bedford Harbor in New Bedford, Massachusetts, as shown on **Figure 1**. A plan showing the proposed footprint of the facility is attached as **Figure 2**.

The proposed South Terminal CDF is a filled structure located adjacent to the shoreline, that will be bounded by sheet piling, and capped by crushed stone. Approximately 1,200 linear feet of berthing space will be available at the facility. The area to the east and south of the CDF will be dredged from its current depth of between -1 and -6 MLLW to between -20 and -30 MLLW to accommodate various sizes of vessels. Portions of the existing South Terminal Basin would be dredged from its existing depth of -20 to -25 MLLW to a depth of -30 MLLW in order to construct a channel connecting the new South Terminal CDF boat basin to the federal turning basin north of South Terminal. The size of the facility as envisioned will be 28.25 acres.

Although the design process for the South Terminal CDF has not yet been completed, it is anticipated that both contaminated sediment and clean sediment are present within the proposed project footprint. As previously described the Commonwealth's September 24, 2010 submittal to USEPA, there are a number of potential scenarios by which the design could be completed. The following is a list of potential construction scenarios, and a description of the ways that that each construction scenario would be linked to the State Enhanced Remedy:

- Use of Clean CAD Cell Material as Fill for the South Terminal CDF;
- Use of Clean CAD Cell Material and Clean Material from Navigational Dredging as Fill for the South Terminal CDF;

- Use of Clean CAD Cell Material and Clean Material from Navigational Dredging and Contaminated Navigational Dredge Material as Fill for the South Terminal CDF;
- Use of Clean Material from the Navigational Dredging Fill for the South Terminal; and
- Use of Clean Material from Navigational Dredging and Contaminated Navigational Dredge Material as Fill for the South Terminal CDF.

As a result of the multiple potential sources of material for fill at the proposed facility, a conservative set of assumptions from the above list was utilized in order that sufficient data be collected to cover the multiple potential construction scenarios.

1.2 Document Purpose

This sampling and analysis plan has been prepared by Apex Companies, LLC (Apex) on behalf of the New Bedford Harbor Development Commission (HDC) and the Commonwealth of Massachusetts for the purpose of investigating the proposed footprint (including upland, intertidal, and sub-tidal locations) of the South Terminal CDF in New Bedford Harbor, New Bedford, Massachusetts.

Due to the potential for re-use of the material within the construction of the South Terminal CDF, additional data will be collected to characterize the dredge spoils that could be utilized for these purposes. The testing is also intended to characterize levels of contaminants within existing resource areas (inter-tidal, sub-tidal, and salt marsh). The testing is also intended to determine whether past use of the upland areas (within which a former textile factory operated prior to 1930) resulted in a release of hazardous materials that may need to be addressed prior to construction of the facility. Finally, the testing is intended to characterize the concentrations of contaminants within potential dredge areas, in order to provide additional information regarding the possible temporary re-suspension of sediment during dredging operations.

This document is intended to provide a work plan, which describes proposed sampling activities, sampling methods, laboratory parameters and field/laboratory quality assurance/quality control (QA/QC) procedures, as well as sampling frequencies, and a sampling schedule. This Sampling Plan was requested by USEPA, and is intended to be used in the field to coordinate sampling activities for characterizing the upland, intertidal, and subtidal areas to be filled during the course of construction, as well as the sediment to be dredged for the project.

1.3 Sampling Strategy

This Sampling and Analysis Plan specifies the data collection activities which will be performed in order to establish baseline conditions at the South Terminal CDF site prior to construction.

The following is a summary of the objectives and scope of this Plan, which were stipulated in order to satisfy the concerns of specific regulatory programs within USEPA:

For the Upland Facility Construction:

- Subtidal and intertidal sediment sample collection at fifteen sampling locations within the facility footprint, focused on characterizing the extent of contamination of resources that will be impacted by construction, as well as other potential contaminants of concern (stipulated to satisfy the 401/404 and TSCA programs);

- Land based geophysical survey within the upland portions of the facility footprint to identify potential subsurface hazards, obstructions and possible sources of hazardous materials (stipulated to satisfy the RCRA program);

- Seven environmental borings and eleven test pits within the upland portion of the facility footprint to investigate possible sources of hazardous materials on the land side portion of the site, including any areas of interest which the geophysical investigation may reveal (stipulated to satisfy the RCRA and TSCA programs);

- The completion of seven borings as groundwater monitoring wells within the upland portion of the facility footprint to establish baseline groundwater quality prior to construction and filling of the South Terminal CDF (to satisfy the RCRA and TSCA programs);

- The installation and sampling of five permanent groundwater monitoring wells within the final facility footprint to provide information regarding the status of impacted sediment transport after construction and filling of the South Terminal CDF (to satisfy the 401/404 and TSCA programs);

- Hydraulic conductivity measurements and tests from sediment collected from within the proposed facility footprint to calibrate a model of sediment transport from within the CDF (to satisfy the 401/404 and TSCA programs); and

- Modeling to determine the potential flux of impacted material from a

completed South Terminal CDF (to satisfy the 401/404 and TSCA programs).

For the proposed dredge footprint:

- Subtidal sediment sample collection from forty-six sampling locations within the dredge footprint focused on delineating the horizontal and vertical extent of PCB and heavy metal contamination, as well as other potential contaminants of concern (to satisfy the 401/404 and TSCA programs); and

For air monitoring during the project:

- A baseline air sampling and analytical program from four sampling stations to establish baseline conditions prior to construction activities (to satisfy the 401/404 and TSCA programs).

The following is a table summarizing the number of sampling locations and analyses outlined within the subsequent sections of this document.

Purpose of Sampling (Sampling Area/USEPA Program)	Sampling Method	Number of Locations	Analyses
Facility Footprint – Subtidal/Intertidal – 401/404 and TSCA	Russian Peat Corer	15	10 PCB Only, 5 PCBs, TPH, SVOCs, and Metals
Facility Footprint – Upland - RCRA	Geophysics	N/A	N/A
Facility Footprint – Upland – RCRA and TSCA	Environmental Boring	7	PCBs, TPH, SVOCs, and Metals (Asbestos if necessary)
Facility Footprint – Upland – RCRA and TSCA	Test Pit	11	PCBs, TPH, SVOCs, and Metals (Asbestos if necessary)
Facility Footprint – Upland – RCRA and TSCA – Facility Investigation	Monitoring Well	7	PCBs, TPH, SVOCs, and Metals (as necessary)
Facility Footprint – Upland – 401/404 and TSCA – Long-Term Monitoring	Monitoring Well	5	PCBs, TPH, SVOCs, and Metals (as necessary)
Facility Footprint – Upland/Intertidal – 401/404 and TSCA	Hydraulic Conductivity	9	Hydraulic Conductivity/Slug Tests (as necessary)
Facility Footprint – Upland – 401/404 and TSCA	Modeling	N/A	N/A
Dredge Area – Subtidal/Intertidal – 401/404 and TSCA	Russian Peat Corer and Vibracore	46	36 PCB Only, 10 PCBs, TPH, SVOCs, and Metals
Facility Footprint – Air Monitoring – 401/404 and TSCA	Air Monitoring	4	PCBs

Sampling is proposed within the dredge footprint on a grid spacing of approximately 120 feet and within the inter-tidal and sub-tidal portions of the proposed CDF filling area on a grid spacing of approximately 150 feet (see **Figure 3** for sub-tidal and inter-tidal sample locations). The result is approximately sixty-one (61) sample locations within the sub-tidal and inter-tidal areas.

Assuming that the contaminated thickness of material is an average of two (2) feet in thickness within the area to be dredged (which, for 15.39 acres, equates to approximately 49,700 cubic yards) and is an average of one (1) foot within the area to be filled (which, for 6.39 acres, equates to approximately 10,300 cubic yards), the average sample location frequency on a volumetric basis is approximately one sampling location per 1000 cubic yards of contaminated material (61 sampling locations/60,000 cubic yards), which is consistent with recommended sampling frequencies for 401 Water Quality Certifications for projects involving reuse of dredged sediment within the Commonwealth of Massachusetts. Please note that this only represents a ratio of sampling frequency to contaminated material. More than one sample will be collected at each sample location, and more than one sample will be analyzed at multiple locations (as outlined below).

Quality control measures will be utilized to ensure data quality during the sampling, documentation, and analysis portions of this program. Quality control procedures are discussed in the sample collection section of this document.

2.0 Project Organization And Responsibilities

Apex Companies LLC will follow a well defined project management organization so that project goals are met during both the field sampling and the laboratory testing portions of the Sampling Plan. Project staff will be integrated into a cohesive project team, with individual members contributing their area of expertise to the overall sampling plan under the supervision of a single project manager.

2.1 Project Organization and Key Personnel

The personnel identified below are considered to be key members of the site characterization project team. The team will maintain an open communication line between the Client, Apex and the regulatory bodies which are engaged in the review process.

Mr. Jay Borkland is the Program Manager for the South Terminal CDF project at Apex Companies LLC. The program manager will be responsible for interacting with the regulatory bodies, and the client in resolving any issues which arise prior to and during the sample collection and analysis phase. He will also ensure that the sampling plan is executed in conformance with this plan through the Project Manager.

Mr. Chet Myers, P.E. is the Project Manager for the South Terminal CDF project and will oversee the overall project design including the site investigation. Mr. Myers will implement the geotechnical, geophysical, and environmental investigations of the project site. As Project Manager, he will also manage the analytical laboratories for the geotechnical, water, groundwater, sediment, and air samples collected as described in this document. The field staff will report directly to Mr. Myers.

3.0 Existing Information

3.1 Existing Sediment Data

Existing sediment sampling and analysis within New Bedford Harbor, both within the footprint of the proposed facility (and associated dredge area) as well as within other locations between the Route 6 bridge and the New Bedford Hurricane Barrier, has been collected and reviewed in order to provide an indication of sediment characteristics in the proposed South Terminal CDF area. The New Bedford Harbor Development Commission collected multiple sediment samples during the New Bedford Harbor Phase III Navigational Dredging, completed in 2009. Sampling and chemical analyses were also conducted from multiple areas during the New Bedford Harbor Dredge – Phase II, completed in 2005. Additional data was collected and analyzed by USEPA during its New Bedford Superfund Site Remedial Investigation. The existing sediment characterization data indicates that the surficial sediment may contain elevated amounts of TPH, metals, PAHs and PCBs. Tables containing historic data, as well as relevant figures indicating the collection location of this data are attached as **Appendix A**.

The existing sediment characterization data is inadequate for the purposes of meeting the goals outlined above. Therefore, new data must be collected from within the proposed dredge area, and area to be filled, in order to adequately characterize the sediment to be dredged and disposed as well as the upland portions of the facility that will be filled and covered. The following sections discuss the sample collection and analysis protocols that will be performed in order to obtain the additional data required.

3.2 Existing Upland Information

The upland properties to be included in the South Terminal CDF, were historically part of the Potomska Mill complex from the 1880's to the 1930's. The mill buildings were demolished and from 1946 through 1966, the property and surrounding lots existed as urban, filled, undeveloped open space. The New Bedford Redevelopment Authority came to be in possession of the former mill complex in 1998, and subsequently subdivided it and sold portions of it for redevelopment. Four parcels of the former mill complex are included in the proposed South Terminal CDF:

1. An undeveloped 9.2 acre parcel currently owned by the City of New Bedford.
2. Two adjacent undeveloped parcels totaling 3.4 acres owned by the Commonwealth of Massachusetts (referred to as a single site for the purposes of this document)
3. A 2.9 acre developed site currently owned by the Shuster Corporation.

4. A 6.4 acre undeveloped site currently owned by RIST LLC (a Limited Liability Corporation owned by Richard and Steven Shuster), often referred to as “the Shuster vacant lot”.

Apex reviewed recently prepared environmental assessment reports for the Commonwealth of Massachusetts site and the Shuster vacant lot.

Information reviewed by Apex indicates the Commonwealth of Massachusetts site has undergone assessment and closure activities under the Massachusetts Contingency Plan (MCP). A MCP Response Action Outcome (RAO) statement was prepared in March 2009 that included an Activity and Use Limitation (AUL) for a portion of the property. The AUL was implemented due to elevated residual levels of lead and polycyclic aromatic hydrocarbons (PAHs) in the shallow soils on the site. Conditions in the AUL include maintenance of a parking lot on the property to limit exposure potential to these soils.

The Schuster vacant lot has undergone assessment only and has not reached regulatory closure under the MCP. The following is a summary of relevant findings from the investigations conducted to date at the Commonwealth of Massachusetts site and the Shuster vacant lot:

- In general, contaminants of concern (COCs) for both the Commonwealth of Massachusetts site and the Schuster vacant lot include lead and PAHs, which are typical COCs for urban sites that have been filled;
- Polychlorinated biphenyls (PCBs) were detected in one groundwater sample collected at Commonwealth of Massachusetts site; however, subsequent retesting of the groundwater did not confirm the original testing results;
- Asbestos containing material (ACM) was confirmed in one soil sample from the Schuster vacant lot;
- The contamination detected on both properties has been attributed to the urban fill that was historically placed on these lots; and
- Groundwater has been encountered at depths ranging from approximately 3 to 5.5 feet below ground surface.

A review of the more recent analytical testing results indicates that groundwater does not appear to have been significantly impacted on the two properties.

4.0 Sampling and Analytical Program

4.1 Dredge Areas

4.1.1 Sample Collection

The proposed sample locations within the sub-tidal areas within the dredge footprint have been selected based on existing data in order to provide sufficient characterization information prior to construction. The following sub-tidal areas are anticipated to be effected by dredging:

- Areas of Dredging (Existing Depth Between -1 and -6 MLLW):
  - 9.0 acres of near-shore, subtidal area will be dredged to between -20 and -30 MLLW (6.65 acres to -20 MLLW and 2.35 acres to -30 MLLW).
- Areas of Dredging (Existing Depth between -20 and -25 MLLW):
  - 6.39 acres of subtidal area will be dredged to -30 MLLW.

4.1.2 Vertical Delineation

"Parent" material consists of a number of different combinations of silt, sand, gravel or rock. "Parent" geological material was formed and placed during the advancement and recession of the glaciers, approximately 13,000 years before industrial activity of man. Therefore, "parent" material would not normally be expected to contain anthropogenic contaminants. Contaminated material would typically have formed as a layer of fine-grained material that has deposited within New Bedford Harbor over the last several hundred years. Contamination within New Bedford Harbor, particularly the areas located to the south of the Coggeshall Street Bridge, has been shown to typically be present within the top one to two feet of dredge material.

When making a "Suitability Determination" for offshore disposal of "parent" material, U.S. Army Corps of Engineers (USACE) determines the delineation between "parent" and non-"parent" materials utilizing the following indicator constituents: PCBs, Copper, Chromium and Zinc. The concentrations of these indicator constituents indicate the depth at which the transition from "parent" to non-"parent" material occurs. Attached as **Appendix B**, are tables previously utilized to delineate between "parent" and non-"parent' material during the "Suitability Determination" process for CAD Cell #2.

In order to determine vertical delineation between "parent" and non-"parent" material within the proposed dredge footprint, five (5) vibracores will be advanced. The vibracores will be advanced to refusal, and the recovered material will be sampled at one-

foot intervals for PCBs, Copper, Chromium, and Zinc. Sediment will be logged in the field in accordance with ASTM 2488-93 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)." The locations of the vibracores is indicated on **Figure 3**.

4.1.3 Horizontal Delineation

Other than the five (5) vibracore locations, discussed within Section 4.1.2, samples will be collected using a Russian Peat Corer. A Russian Peat Corer is a hand-operated, mechanical sampling device that utilizes a side-filling mechanism to collect uncompressed samples from wetlands and estuaries. The chambered-type corer collects samples which are not compressed or shortened during recovery, unlike samples taken with end-filling core samplers. The corer is deployed (in the closed position) to the desired depth. The corer is rotated clockwise 180° so that the sharpened edge of the chamber cuts a sediment core which is contained by the cover plate. During retrieval, the cover plate's counterclockwise rotation extrudes the undisturbed sample. This mechanism will be utilized to collect samples at one-foot intervals until refusal at locations indicated on **Figure 3**, except where a vibrocore sample is scheduled. Approximately 41 locations will be sampled utilizing a Russian Peat Corer.

4.1.4 Sample Collection Method

Samples will be collected at each sampling station until refusal. The sampling will be lead in the field by an experienced sediment sampler. This Field Operations Lead (FOL) will have discretion (within the parameters of this sampling plan) to make decisions in the field concerning the sampling program. Sampling will be conducted from a research vessel equipped with an "A-frame" and appropriate sampling and positioning equipment. As-built sample locations will be documented using a Global Positioning System (GPS).

Once the sampling vessel is in position, the as-built coordinates and water depth will be logged. The vibracore unit or the Russian Peat Corer will be deployed where noted on **Figure 3**. Samples will be collected at one-foot intervals.

4.1.5 Water Column Testing

In order to determine what risk to the environment may be posed by sediments suspended in the water column during construction activities, up to four sediment samples and water samples from the site will be collected for elutriate testing in accordance with the "Tier II Evaluations" found in the 2004, U.S. EPA and Army Corps of Engineers "Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters" (RIM). The locations of these samples are indicated on **Figure 3**. It should be noted that impacted sediments contaminated with PCB's and heavy metals

from the New Bedford Harbor Superfund Site exist throughout the entire harbor bottom, and are continuously re-suspended in the water column by vessel traffic, wave action, and biological activity. The purpose of constructing the proposed facility is to create a storage structure for the long-term containment of such sediments so that the contaminants within the sediments will no longer be available for biological uptake. However, during dredging, pile-driving, and filling activities it is expected that there will be a localized increase in the volume of suspended sediment in the water column. Elutriate testing is performed to determine what quantity of the contaminants, present in the sediments, are expected to affect the water quality at the site. Samples will be analyzed for PCBs (22 NOAA Congeners by EPA Method 8280A), 13 Priority Pollutant Metals, SVOCs, and Total Petroleum Hydrocarbons.

Sediment Sampling

Sediment for elutriate analysis will be collected from the proposed dredge area. Sediment will be collected from within 0-2 feet of the mudline, in sufficient quantity to meet the reporting limits required in the RIM. Generally this volume varies depending on the laboratory conduction the elutriate testing, but one liter will be collected at a minimum. The sediments will be collected from a stationary sampling vessel, and the collection point will be recorded and noted using a portable GPS device. The sediment will be placed in clean laboratory supplied sample containers and placed in a cooler and handled, and transported in accordance with Section 4.3.2 of this document.

Water Sampling

Water samples will be collected from the proposed dredge area from throughout the water column to provide a representative sample of conditions at the site. A discrete interval water sampling device such as a Kemmerer sampler or a peristaltic pump will be used to collect the water sample. Efforts will be made to ensure that there is not contamination from surface sheens or other sources while the sample is being collected or the device is being lowered into the water. Samplers will be acid rinsed prior to being used for collection of water for metals analysis, and solvent rinsed prior to being used for collection of water for organic analysis. Tubing for peristaltic pumps will be flushed with 10 times the volume of the sample tube using water from the depth interval being sampled. A volume of water equal to or exceeding 4 times the volume of sediment sample, will be collected at the proposed dredge site, from a stationary sampling vessel, and the collection point will be recorded and noted using a portable GPS device. The water will be placed directly from the sampling device or pump tubing into clean laboratory supplied glassware, sealed and placed in a cooler and transported to the laboratory in accordance with Section 4.3.2 of this document.

4.2 Filled Facility – Sub-Tidal and Inter-Tidal Areas

4.2.1 Sample Collection

The proposed sample locations within the sub-tidal and inter-tidal areas have been selected based on existing data in order to provide sufficient characterization information prior to construction. The following sub-tidal and inter-tidal areas are anticipated to be effected by either filling or dredging:

- Areas of Proposed Filling:
  - 1.43 acres of intertidal area,
  - 4.73 acres of shallow, near-shore sub-tidal area; and
  - 0.18 acres of salt marsh will be filled during the construction of the facility.

4.2.2 Horizontal Delineation

Samples will be collected using a Russian Peat Corer. See Section 4.1.3 for a description of this device. This mechanism will be utilized to collect samples at one-foot intervals until refusal at locations indicated on **Figure 3**. Approximately 15 locations will be sampled utilizing a Russian Peat Corer.

4.2.3 Sample Collection Method

Samples will be collected at each sampling station until refusal. The sampling will be lead in the field by an experienced sediment sampler. This Field Operations Lead (FOL) will have discretion (within the parameters of this sampling plan) to make decisions in the field concerning the sampling program. Sampling will be conducted from a research vessel equipped with an "A-frame" and appropriate sampling and positioning equipment. As-built sample locations will be documented using a Global Positioning System (GPS).

Once the sampling vessel is in position, the as-built coordinates and water depth will be logged. The vibracore unit or the Russian Peat Corer will be deployed where noted on **Figure 3**. Samples will be collected at one-foot intervals.

4.3 Dredge and Fill Area Sampling Logistics

4.3.1 Sampling Schedule

The proposed sampling fieldwork is anticipated to be conducted over a three-week period. Chemical analysis will begin within the first week of sampling, and is expected to take approximately three weeks per sample. A sampling results will be submitted approximately two weeks after all analytical results have been reported.

4.3.2 Sample Handling

Sampling equipment will be cleaned following standard decontamination procedures prior to individual sample collection. Sediment samples will be logged and visually characterized prior to being transferred to laboratory-supplied pre-cleaned and pre-preserved jars. Samples will be stored at 4 degrees Celsius in sample coolers on the vessel prior to shipment to the laboratory.

Samples for chemical analysis will be stored on ice from the time of sample collection until they are delivered to the laboratory. Samples will be collected and placed in the appropriate container for each analytical method and sealed with the lid. The sealed container will then be labeled with indelible ink, with the sample location, depth interval and time of collection. Sample containers will then be wrapped in protective shipping material (such as bubble wrap) and be placed in a cooler with ice. Ice will be placed in and around the samples to ensure uniform and quick chilling. Chemical ice shall not be used.

At the completion of daily sample collection events, all of the samples will be added to the Chain of Custody form with appropriate analytical testing methods noted. The Chain of Custody will be placed in a sealable watertight plastic bag, and affixed to the lid of the cooler. The cooler lid will be closed tightly, and taped shut with clear packing tape. Sample coolers will be shipped via courier or by overnight express service to an EPA certified laboratory for analysis. Standard quality control and quality assurance (QA/QC) samples (including field and matrix spike duplicates) will be collected as part of the sampling protocol.

4.3.3 Sampling Quality Control

QA/QC duplicate samples will be collected at the rate of up to one duplicate for every ten samples per sample matrix (with the possible exception of elutriate testing, depending upon field and laboratory requirements). Samples will be collected and labeled in such a manner as to make them easily associated with the primary samples.

Sediment samples which are to have duplicate samples generated from them, will be homogenized prior to being split into the primary and duplicate sample. Primary and duplicate samples will be transported and stored in the same manner. All duplicate samples will be run by the laboratory as “blind” samples.

Up to one half of the duplicate samples will be analyzed utilizing either different analytical methods and/or by a different analytical laboratory to provide analytical quality assurance for the project.

4.3.4 Sample Analysis

The analytical testing program will address chemical characterization of the sediment within the dredge footprint as well as within the inter-tidal and sub-tidal areas to be filled. Samples will be sent to an EPA approved offsite chemical analysis laboratory. Samples will be hand-delivered or couriered to the laboratory in sample coolers in order to maintain appropriate sample conditions. Samples requiring physical characterization will be sent to a qualified geotechnical laboratory.
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4.3.4.1 Chemical Analysis

Sampling of five (5) vibracores and of the elutriate tests will be conducted as previously stipulated. Samples from within the dredge areas or the filled facility footprint, fifty-six (56) other locations, will be collected on one foot intervals from the surface to refusal for PCBs (22 NOAA Congeners by EPA Method 8280A) at each sample location. Surface samples (samples collected from 0 to 1 foot) from fifteen (15) of the fifty-six (56) locations (five locations within the area to be filled and ten locations from within the dredge footprint) will also be analyzed for 13 Priority Pollutant Metals, SVOCs, and Total Petroleum Hydrocarbons; four (4) of the ten (10) locations from within the dredge footprint will also be locations for water column elutriate testing. The location at which each suite of analyses from within the dredge areas or within the inter-tidal or sub-tidal areas of the filled areas will be conducted is indicated on **Figure 3**.

Analytical parameters for the samples were selected based on guidelines established during discussions with USEPA. The following is a list of proposed analytical testing parameters and their associated USEPA Analytical Method:

Parameter	Analytical Method EPA Method
Antimony	6020
Arsenic	6020
Beryllium	6020
Cadmium	6020
Chromium	6020
Copper	6020
Lead	6020
Mercury	7471
Nickel	6020
Selenium	6020
Silver	6020
Thallium	6020
Zinc	6020
SVOCs	8270C

PCBs 22 NOAA Congeners	8082A
Total Petroleum Hydrocarbons	8015B

Of the fifty-six (56) sampling locations, the surface samples (samples collected from 0 to 1 foot) will be analyzed immediately. Samples collected at deeper intervals will be put on ice at the laboratory. Once the delineation line between "parent" and non-"parent" material has been determined, the following procedures will be initiated:

1. The delineation between "parent" and non-"parent" material will be established utilizing the data from the five (5) vibracores within the dredge areas.
2. Of the 41 other sampling locations within the dredge footprint, approximately 6 locations (which represents 10% of the total number of sampling locations) that contain the highest concentration of PCBs will be identified.
3. In those 6 locations, samples collected from below the "parent"/non-"parent" horizon will also be run for PCBs, in order to confirm that PCBs have not infiltrated into "parent" material.

Standard turnaround time for all analytical parameters is 14 business days. Samples collected will be analyzed by a laboratory for a standard analytical turnaround time. Additionally, all sediment samples may be frozen to increase the holding time for up to one year.

4.3.4.2 Laboratory Methods

Samples will be sent to a USEPA approved laboratory. Chemical analytical methods will be performed in accordance with USEPA protocol. Laboratory methods for the proposed analyses are shown above.

4.4 Filled Facility - Upland Areas

4.4.1 Geophysical Investigation

Geophysical investigations will be performed on the upland areas of the South Terminal CDF. The purpose of the investigation is to provide information on the character and conditions of the subsurface within the boundaries of the proposed project. The information will allow:

- Hazard screening of the soils underlying the project site and targeting of borings and test pits in areas where geophysical signatures suggest hazardous materials (if any are found) may exist; and
- Utility and other obstruction identification of the uplands prior to placement of fill material.

The investigation will aid in determining whether any infrastructure which may have serviced the mill remains in place below the surface. Geophysical methods may reveal the presence of underground storage tanks, metallic pipelines, and extent of buried debris, foundations, and voids. It is anticipated that buried debris would be the likeliest location for the presence of any additional ACM onsite. The geophysical survey information will be utilized with complementary geotechnical data in characterizing the subsurface site conditions,

A geophysical survey will be conducted of the entire property using Time Domain Electromagnetics (TDEM) followed by Ground Penetrating Radar (GPR). GPR will be used in conjunction with TDEM data to better characterize electromagnetic anomalies.

During the geophysical investigation and subsequent test pit program, observations will be made as to the presence of asbestos containing material (ACM) in the soil. If significant quantities are observed (greater than one pound) then the Massachusetts Department of Environmental Protection will be notified.

4.4.2 Sample Collection

4.4.2.1 Test Pits

Approximately 11 test pits will be excavated to assess potential target areas identified during the geophysical survey, and to observe and collect soil samples from the test pits. Test pits will be excavated using a backhoe capable of excavating to depths approximating the water table. Soil samples will be collected for field screening using DEP's jar headspace screening method. The material removed from the test pits, side-walls of the test pits, and the bottom of test pits will be observed for visual and olfactory evidence of contamination, as well as for the presence of material that appears to be ACM. The soil samples will be screened for total volatile organic compounds (VOCs) using a photo-ionization detector (PID). Samples exhibiting PID readings and/or visual and/or olfactory evidence of contamination will be collected for laboratory analysis. Upon completion, each test pit will be backfilled with the excavated soils in the general sequence the soils were removed. Test pit logs will be prepared detailing the subsurface conditions encountered. Each test pit will be recorded at the time of excavation with coordinates in NAD 83 State Plane, Massachusetts Mainland Zone, and shown on **Figure 4**.

4.4.2.2 Test Borings/Monitoring Wells

A drilling program consisting of the installation of seven test borings will be performed on the site to assess current subsurface conditions. The borings will be completed as monitoring wells for groundwater sampling and analysis to develop a baseline for future long term monitoring of the site's groundwater. Test borings will be advanced using

conventional hollowstem auger drilling methods. Soil samples will be collected continuously using a two foot long split spoon sampler. Each sample will be logged by Apex personnel and placed in a clean glass jar. Each sample will be screened in the field using DEP's jar headspace method.

Monitoring wells will be installed at each location that encounters groundwater. Well screens will be at least five feet long and will be set to span the water table observed during drilling. Well screen placement will consider tidal fluctuations. Wells will be constructed with 2-inch diameter PVC material. Newly installed monitoring wells will be surveyed to a MLLW datum. Previously installed monitoring wells that are located by Apex will be also be tied into MLLW datum by the survey.

Test borings/monitoring wells will be located on the site in both upgradient and downgradient positions. If gross contamination is encountered in a test pit, a monitoring well may be placed adjacent to the test pit to gage the water quality. All borings and monitoring well locations will have their locations logged in NAD83 State Plane Coordinates Massachusetts Mainland Zone, at the time of installation with a portable GPS. The locations of the proposed borings are shown on **Figure 4**.

4.4.2.3 Groundwater Monitoring

One initial sampling event will take place for samples collected from the seven groundwater monitoring wells to establish base-line conditions. It is currently anticipated that the base-line monitoring wells will be destroyed during construction; therefore, long term groundwater monitoring wells will need to be installed post-construction at the South Terminal CDF. Two wells will be installed along the installed bulkhead and three other wells will be installed along the northern, western, and southern lines of the facility, and within areas that are anticipated to be relatively protected from heavy crane travel. Wherever possible, long-term groundwater monitoring wells will be installed in locations where base-line monitoring wells previously existed. The wells will be installed using the hollow-stem auger drilling method. The wells will be designed to span the water table with at least 5 to 10 feet fully saturated with groundwater taking into account potential tidal fluctuations.

Depending on the contaminants of concern that are indentified during this investigation and the character of the fill material used within the CDF, the long term monitoring wells will be sampled and analyzed for PCBs (22 NOAA Congeners by EPA) Method 8280A, 13 Priority Pollutant Metals, SVOCs, and Total Petroleum Hydrocarbons. The wells will be sampled quarterly for the first two years then semi-annually thereafter. The exact list of parameters for analysis may be modified depending on the initial sampling results.

4.4.3 Sample Handling

Sampling equipment will be cleaned following standard decontamination procedures prior to individual sample collection. Sediment samples will be logged and visually characterized prior to collection in laboratory-supplied pre-cleaned and pre-preserved jars. Samples will be stored at 4 degrees Celsius in sample coolers on the vessel prior to shipment to the laboratory.

Samples for chemical analysis will be stored on ice from the time of sample collection until they are delivered to the laboratory. Samples will be collected and placed in the appropriate container for each analytical method and sealed with the lid. The sealed container will then be labeled with indelible ink, with the sample location, depth interval and time of collection. The sample container will then be wrapped in protective shipping material (such as bubble wrap) and be placed in a cooler with ice. Ice will be placed in and around the samples to ensure uniform and quick chilling. Chemical ice shall not be used.

At the completion of daily sample collection events, all of the samples will be added to the Chain of Custody form with appropriate analytical testing methods noted. The Chain of Custody will be placed in a sealable watertight plastic bag, and affixed to the lid of the cooler. The cooler lid will be closed tightly, and taped shut with clear packing tape. Sample coolers will be shipped via courier or by overnight express service to an EPA certified laboratory for analysis. Standard quality control and quality assurance (QA/QC) samples (including field and matrix spike duplicates) will be collected as part of the sampling protocol.

4.4.4 Sampling Quality Control

QA/QC duplicate samples will be collected at the rate of up to one duplicate for every ten samples per sample matrix. Samples will be collected and labled in such a manner as to make them easily associated with the primary samples.

Sediment samples which are to have duplicate samples generated from them, will be homogenized prior to being split into the primary and duplicate sample. Primary and duplicate samples will be transported and stored in the same manner. All duplicate samples will be run by the laboratory as “blind” samples.

Up to one half of the duplicate samples will be analyzed utilizing either different analytical methods and/or by a different analytical laboratory to provide analytical quality assurance for the project.

4.4.5 Sample Analysis

Samples will be sent to an EPA approved offsite chemical analysis laboratory. Samples will be hand-delivered or couriered to the laboratory in sample coolers in order to maintain appropriate sample conditions. Samples requiring physical characterization will be sent to a qualified geotechnical laboratory.

4.4.5.1 Chemical Analysis

4.4.5.1.1 Soil

At a minimum one, soil sample(s) will be selected from each boring and each test pit for laboratory analyses. The selected soil samples will be submitted for the 13 Priority Pollutant Metals, PCBs (22 NOAA Congeners by EPA Method 8280A), and semi-volatile organic compounds (SVOCs by Method 8270C). If elevated headspace readings are detected then the soil sample will be submitted for volatile petroleum hydrocarbons (VPH) and volatile organic compounds (VOCs by Method 8260). A minimum of three soil samples will be submitted for extractable petroleum hydrocarbons (EPH) including the target compounds. PCBs analyses will be performed using a soxhlet extraction method.

4.4.5.1.2 Groundwater

Each monitoring well will be developed and allowed to reach equilibrium with the surrounding aquifer before sampling. Low-flow sampling will be used to minimize turbidity in each sample. Each groundwater sample will be analyzed for the 13 Priority Pollutant Metals (field filtered prior to preservation), PCBs, SVOCs and VOCs. If elevated levels of petroleum contamination are detected in soil samples, then groundwater samples will be collected and submitted for EPH and VPH analyses.

Analytical parameters for the samples were selected based on guidelines established during discussions with USEPA. The following is a list of proposed analytical testing parameters and their associated USEPA Analytical Method:

Parameter	Analytical Method EPA Method
Antimony	6020
Arsenic	6020
Beryllium	6020
Cadmium	6020
Chromium	6020
Copper	6020

Lead	6020
Mercury	7471
Nickel	6020
Selenium	6020
Silver	6020
Thallium	6020
Zinc	6020
SVOCs	8270C
PCBs 22 NOAA Congeners	8082A
Total Petroleum Hydrocarbons	8015B
VOCs	8260

Standard turnaround time for all analytical parameters is 14 business days. Samples collected will be analyzed by a laboratory for a standard analytical turnaround time. Additionally, all sediment samples may be frozen to increase the holding time for up to one year (with the exception of VOC parameters).

4.4.5.2 Laboratory Methods

Samples will be sent to a USEPA approved laboratory. Chemical analytical methods will be performed in accordance with USEPA protocol. Laboratory methods for the proposed analyses are shown above.

4.5 Ambient Air Monitoring

To ensure protection of public health, ambient air monitoring will be conducted prior to, during, and after the completion of construction of the South Terminal CDF. The purpose of the program is to quantify the amount and concentrations, if any, of PCB's which may volatize from sediments during the dredging, or filling operations associated with the South Terminal CDF. This data will be provided to the EPA for their use in tracking the cumulative exposure budgets of receptors within the harbor, and be used to initiate proper responses to mitigate or reduce potential PCB exposure risks. To achieve this goal monitoring locations will be established in the vicinity of the proposed CDF.

4.5.1 Monitoring Stations

Air monitoring stations will be erected in four locations surrounding the South Terminal CDF site (one on the north, south, and west sides of the facility, and one to be located on Palmer's Island) in a configuration which will account for anticipated seasonal prevailing wind directions. Previous studies and plans for the New Bedford Harbor Superfund site have identified the seasonal prevailing wind directions, which would affect the transportation of any volatized PCB's they are listed below:

- Summer – prevailing winds are from the South and Southwest, and would carry contaminants North or Northeast;
- Fall – Prevailing winds are from the Northwest, and South/Southwest;
- Winter – Prevailing winds are from the Northwest, with secondary peak winds from the Northeast and Southeast; and
- Spring – Prevailing winds are transitional, but trend from the Northwest and East.

The preliminary locations of the fixed air monitoring locations are shown on **Figure 4** (other than the Palmer's Island location, which will be determined at a later date)**.** Prior to installation, the installation site will be inspected, to ensure that no obstructions or impediments (i.e. buildings, trees etc) exist at that location which may adversely affect the validity of the data collected at that location by interrupting the wind flow direction.

4.5.2 Monitoring Station Sampling Frequency

The four fixed air monitoring locations will be sampled initially at a rate once per week beginning one month before the start of site development, for the first two months until baseline conditions have been established for the site. Previous reports from the Superfund site show that the major source of airborne PCB's in the New Bedford area to be the source points in the upper harbor. Consequently, the relatively low concentrations revealed in the sediments in previous investigations of the area of The South Terminal CDF suggest that volatilization releases from the sediments during construction of the CDF and dredging would not be significantly different from background levels. If air sampling confirms there is no or little change in ambient air PCB concentrations, subsequent sampling frequency will be reduced to either once every two weeks or once a month. The same reduction in sampling frequency will be implemented in the event that the concentrations which are found in the initial sampling period are low in comparison to the cumulative exposure budget established for the Superfund Site.

5.0 Hydraulic Conductivity

In order to determine hydraulic conductivity at the facility for future modeling purposes, several analyses will be conducted. Slug tests (either rising-head or falling-head) will be conducted on each monitoring well to determine hydraulic conductivity at the facility. In addition, up to two samples of sediment that will be utilized as fill within the facility will be collected during sampling activities. These samples will be submitted to a laboratory for either constant head of falling head measures of hydraulic conductivity of the material. Additionally, up to two samples will be collected and treated with additives anticipated to be utilized during construction to stabilize the sediment prior to placement within the CDF. These additives potentially include: granular material, lime, and cement. After mixture and curing (if necessary) is complete, a falling head and/or constant head hydraulic conductivity test will be conducted on the stabilized sediment.

6.0 Groundwater Modeling

In order to simulate the potential for contaminant flux out of the South Terminal CDF, a model of the proposed CDF will be created using Modflow. The basis of the model will be similar models used by USEPA when determining potential contaminant flux out of similar CDFs either conceived or constructed by USEPA for the New Bedford Harbor Superfund remedy. The Modflow model will utilize existing knowledge of soils beneath the facility, hydraulic conductivity within the existing substrate, hydraulic conductivity of sediments to be placed within the CDF, as well as the levels of contaminants within existing soils at the site and within sediments planned to be placed within the CDF. This information will be synthesized. The goal of operation of the model will be the estimate of contaminant flux from impacted sediment placed within the CDF into New Bedford Harbor. The results of the model will be summarized and presented. Where applicable, assumptions made as part of the model will be outlined and explained.

FIGURE 1

Figure 1: Site Location Map

South Terminal CDF Proposed Location

City of New Bedford, New Bedford, Massachusetts

FIGURE 2

Apex Companies, LLC

1 MAUSHUTTA STREET
SUITE 6
NEW BEDFORD, MA 02740
(508) 996-[illegible]

184 HIGH STREET
SUITE 502
BOSTON MA 02110
(617) 728-9779

REVISIONS

NO.	DATE	DESCRIPTION

PREPARED FOR:

THE NEW BEDFORD
HARBOR DEVELOPMENT
COMMISSION
NEW BEDFORD,
MASSACHUSETTS

DRAWING TITLE:

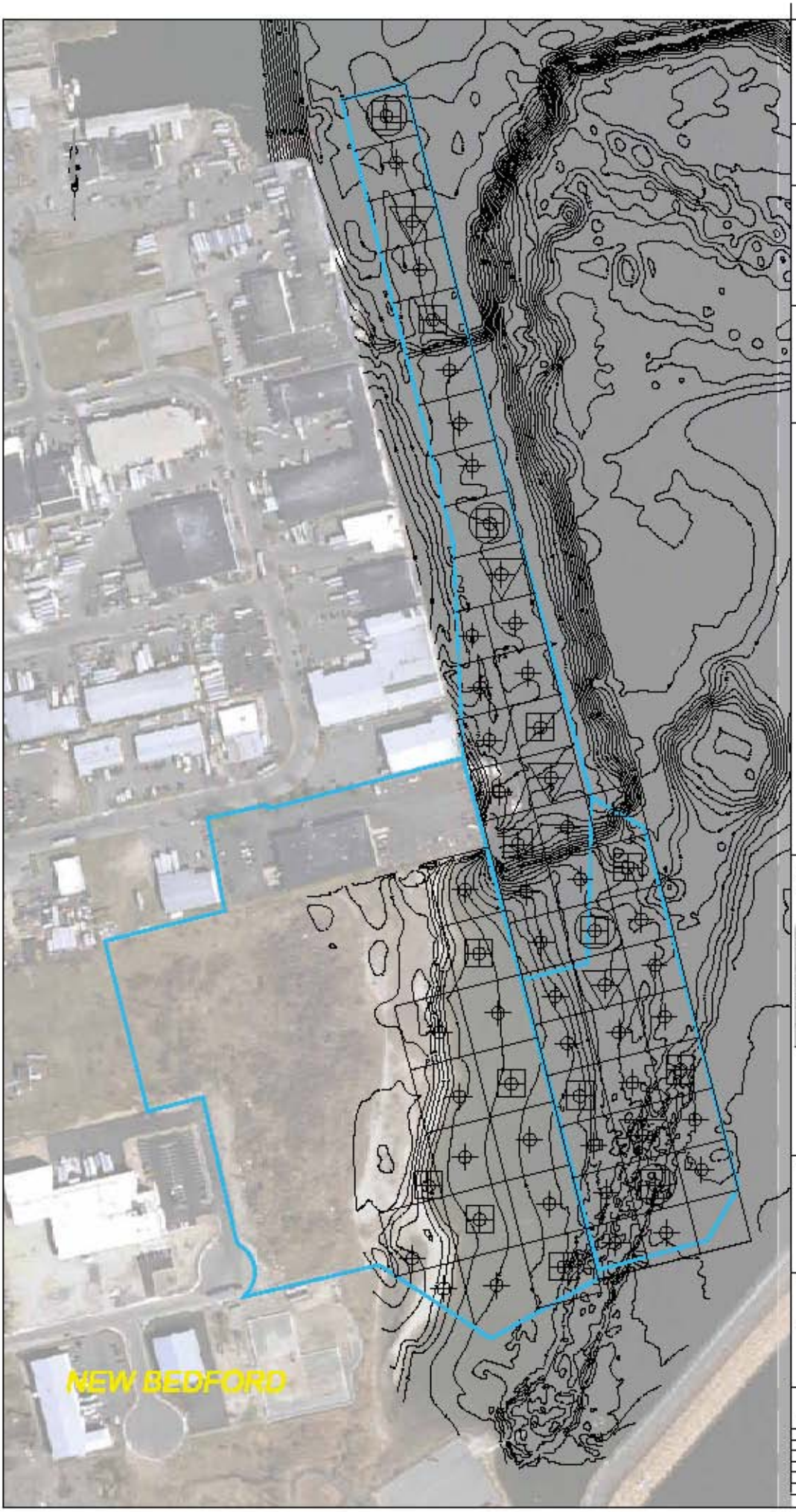
SOUTH TERMINAL
MARINE
INFRASTRUCTURE PARK
PROPOSED BULKHEAD

Scale: 1"=150'

0 75 150 300 450 FEET

Date: 3/24/10	Drawing No.
Proj. Mgr. JKB	
Design: DAM	
Check: DAM	P–4
Drawn: DCD	
Job. No. 8600	
Last Rev. 8/23/10	

FIGURE 3



Apex

184 HIGH STREET
SUITE 202
BOSTON MA 02110
(617) 728-9070

REVISIONS

#	DATE	DESCRIPTION
1	9/27/10	MOVING FIELD & MAP.

NOTES

1. THE PROPOSED MARINE LOCATIONS SHOWN HEREIN ARE APPROXIMATE. ACTUAL LOCATIONS OF SAMPLES WILL VARY DURING THE SITE INVESTIGATION.

PREPARED FOR

THE NEW BEDFORD HARBOR DEVELOPMENT COMMISSION
NEW BEDFORD, MASSACHUSETTS

DRAWING TITLE

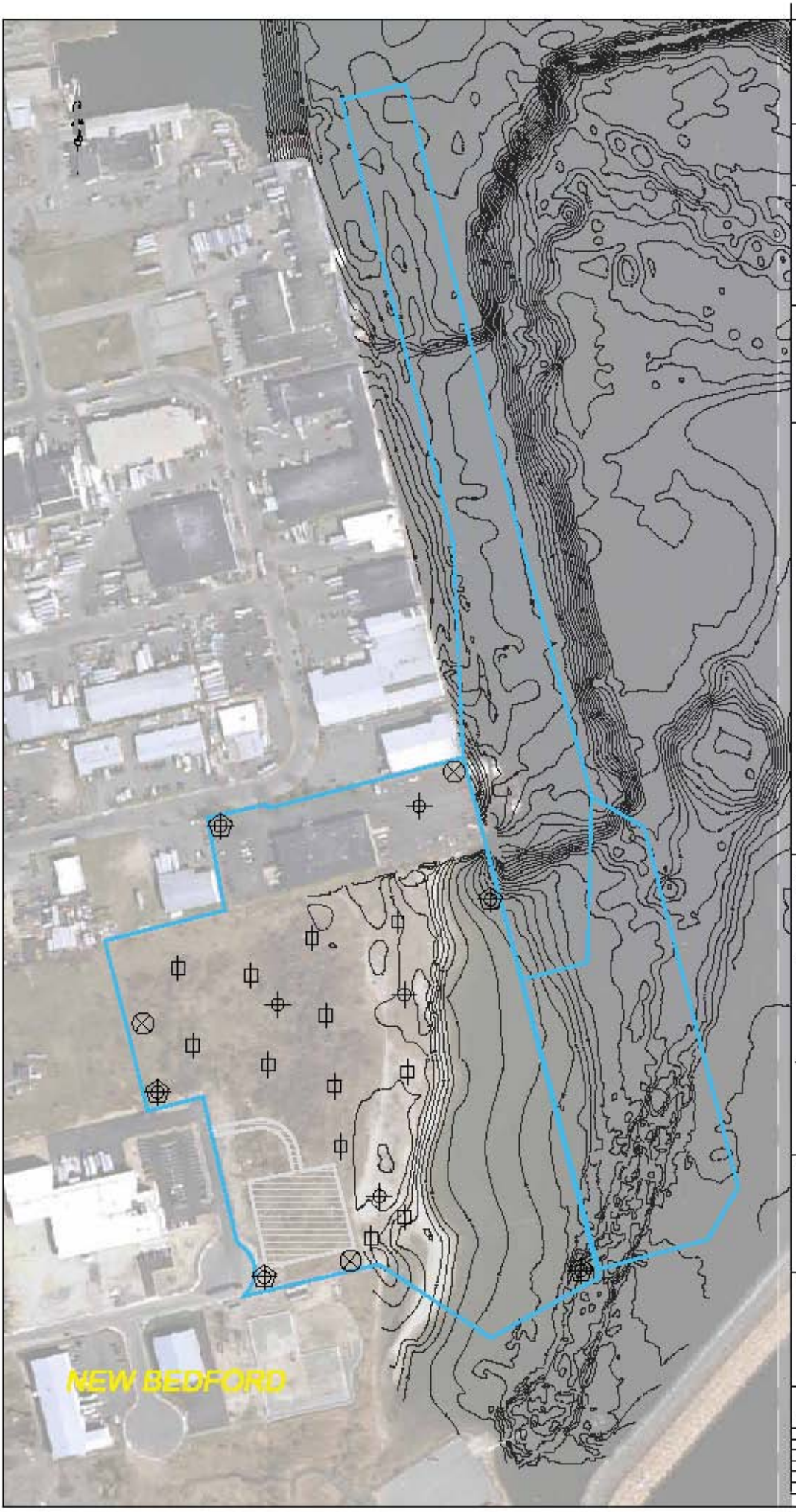
SOUTH TERMINAL MARINE INFRASTRUCTURE PARK INTER-TIDAL AND SUB-TIDAL SAMPLING PLAN

Scale: 1"=100'

0 50 100 200 300 FEET

Date 2/11/10	Drawing No.
Proj. Mgr.	
Designer GSN	
Chkd. JKB	P-1
Drawn KCD	
Job No. 8815	
Last Rev. 9/27/10	

FIGURE 4



Apex

184 HIGH STREET
SUITE 202
BOSTON MA 02110
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REVISIONS

#	DATE	DESCRIPTION
1	9/27/10	MOVED PROG. & MAX.

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NOTES

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PREPARED FOR

THE NEW BEDFORD
HARBOR DEVELOPMENT
COMMISSION
NEW BEDFORD,
MASSACHUSETTS

DRAWING TITLE

SOUTH TERMINAL
MARINE
INFRASTRUCTURE PARK
UPLAND SAMPLING
PLAN

Scale: 1"=100'

0 50 100 200 300 FEET

Date 2/11/10	Drawing No.
Proj. Mgr.	
Designer GSN	
Check JKB	P-1
Drawn KCC	
Job No. 8615	
Last Rev. 9/27/10	

APPENDIX A

Table 1:
Analytical Data: Linberg Marine
Phase III Harbor Maintenance Dredge Program
New Bedford, Massachusetts

		Extractable Petroleum Hydrocarbons (μg/kg)																				
Sample Name	Collection Date	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	Unadjusted C11-C22 Aroma	Naphthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene
307A 0-1	10/23/2006	300000	1300000	310000	320000	830	830	830	830	830	830	830	1000	2000	990	890	1300	830	920	1700	1700	830
308 0-1	10/23/2006	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

		Metals (mg/kg)							
Sample Name	Collection Date	Arsenic	Barium	Cadmium	Chromium	Lead	Selenium	Silver	Mercury
307A 0-1	10/23/2006	5.9	32	4.4	260	190	1.4	1.8	0.94
308 0-1	10/23/2006	NS	NS	NS	NS	NS	NS	NS	NS

		PCB Congeners (μg/kg)																							
Sample Name	Collection Date	Cl2-BZ#5/#8	Cl3-BZ#18	Cl3-BZ#28/#31	Cl4-BZ#44	Cl4-BZ#52	Cl4-BZ#43/#49	Cl4-BZ#66	Cl5-BZ#101/#84	Cl5-BZ#87	Cl7-BZ#184	Cl5-BZ#105	Cl5-BZ#118	Cl7-BZ#183	Cl6-BZ#167/#128	Cl6-BZ#138/#163	Cl6-BZ#153	Cl7-BZ#170/#190	Cl7-BZ#180	Cl7-BZ#182/#187	Cl8-BZ#195	Cl9-BZ#206	Cl10-BZ#209	Summation of Congeners (mg/kg) [NOAA 18]	Reactive Sulfide (mg/kg)
307A 0-1	10/23/2006	87	300	1500	370	570	620	740	920	270	0.31	290	760	29	130	540	460	54	100	66	9.2	19	3.8	18.0	150
308 0-1	10/23/2006	14	33	190	39	84	94	84	120	32	0.24	36	110	4.1	20	80	80	8.3	12	9.6	1.1	1.6	1.1	2.4	NS

Notes:
U = Concentration is below the laboratory's method detection limit.
NS = Not sampled.

Table 2:
Analytical Data: Olde North Wharf Fisheries
Phase III Harbor Maintenance Dredge Program
New Bedford, Massachusetts

		Extractable Petroleum Hydrocarbons (μg/kg)																				
Sample Name	Collection Date	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	Unadjusted C11-C22 Aroma	Naphthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene
309 0-1	10/24/2006	48000	300000	100000	110000	650	650	650	650	650	650	650	860	1800	650	650	650	650	650	1300	1300	650
310 0-1	10/24/2006	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
311 0-1	10/24/2006	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

		Metals (mg/kg)							
Sample Name	Collection Date	Arsenic	Barium	Cadmium	Chromium	Lead	Selenium	Silver	Mercury
309 0-1	10/24/2006	6	160	1	56	360	1	1	0
310 0-1	10/24/2006	NS	NS	NS	NS	NS	NS	NS	NS
311 0-1	10/24/2006	NS	NS	NS	NS	NS	NS	NS	NS

		PCB Congeners (μg/kg)																								
Sample Name	Collection Date	Cl2-BZ#5/#8	Cl3-BZ#18	Cl3-BZ#28/#31	Cl4-BZ#44	Cl4-BZ#52	Cl4-BZ#43/#49	Cl4-BZ#66	Cl5-BZ#101/#84	Cl5-BZ#87	Cl7-BZ#184	Cl5-BZ#105	Cl5-BZ#118	Cl7-BZ#183	Cl6-BZ#167/#128	Cl6-BZ#138/#163	Cl6-BZ#153	Cl7-BZ#170/#190	Cl7-BZ#180	Cl7-BZ#182/#187	Cl8-BZ#195	Cl9-BZ#206	Cl10-BZ#209	Summation of Congeners (mg/kg) [NOAA 18]	Reactive Sulfide (mg/kg)
309 0-1	10/24/2006	26	57	330	73	160	180	140	240	61	0	65	200	7	36	150	140	15	24	16	2	3	2	4.4	190
310 0-1	10/24/2006	85	260	1100	280	420	420	460	700	220	0	210	530	19	98	420	350	42	65	46	6	5	3	13.2	NS
311 0-1	10/24/2006	29	65	390	95	170	200	190	300	78	0	81	240	9	43	180	160	20	32	21	3	3	1	5.3	NS

Notes:
U = Concentration is below the laboratory's method detection limit.
NS = Not sampled.

Table 3:
Analytical Data: Union Wharf
Phase III Harbor Maintenance Dredge Program
New Bedford, Massachusetts

		Extractable Petroleum Hydrocarbons (µg/kg)																				
Sample Name	Collection Date	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	Unadjusted C11-C22 Aroma	Naphthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene
321 0-1	10/25/2006	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
325 0-1	10/25/2006	880000	2200000	1000000	1100000	1000	1000	1000	1000	1000	2400	1200	8500	10000	5700	5200	5600	2400	4100	3700	3700	2800

		Metals (mg/kg)							
Sample Name	Collection Date	Arsenic	Barium	Cadmium	Chromium	Lead	Selenium	Silver	Mercury
321 0-1	10/25/2006	NS	NS	NS	NS	NS	NS	NS	NS
325 0-1	10/25/2006	20	330	5.1	200	3000	3.0	1.2	7.3

		PCB Congeners (µg/kg)																							
Sample Name	Collection Date	Cl2-BZ#5/#8	Cl3-BZ#18	Cl3-BZ#28/#31	Cl4-BZ#44	Cl4-BZ#52	Cl4-BZ#43/#49	Cl4-BZ#66	Cl5-BZ#101/#84	Cl5-BZ#87	Cl7-BZ#184	Cl5-BZ#105	Cl5-BZ#118	Cl7-BZ#183	Cl6-BZ#167/#128	Cl6-BZ#138/#163	Cl6-BZ#153	Cl7-BZ#170/#190	Cl7-BZ#180	Cl7-BZ#182/#187	Cl8-BZ#195	Cl9-BZ#206	Cl10-BZ#209	Summation of Congeners (mg/kg) [NOAA 18]	Reactive Sulfide (mg/kg)
321 0-1	10/25/2006	24	68	270	82	120	110	140	170	45	0.28	46	97	43	22	180	180	77	170	96	18	8.8	0.36	4.6	NS
325 0-1	10/25/2006	73	150	720	220	370	320	350	940	280	0.37	250	620	120	150	810	870	210	440	300	42	33	9.4	17.0	79

Notes:
U = Concentration is below the laboratory's method detection limit.
NS = Not sampled.

Table 4:
Analytical Data: Steamship Authority Pre-Dredge Locations
Phase III Harbor Maintenance Dredge Program
New Bedford, Massachusetts

		PCB Congeners (μg/kg)																					
Sample Name	Collection Date	Cl2-BZ#5/#8	Cl3-BZ#18	Cl3-BZ#28/#31	Cl4-BZ#44	Cl4-BZ#52	Cl4-BZ#43/#49	Cl4-BZ#66	Cl5-BZ#101/#84	Cl5-BZ#87	Cl7-BZ#184	Cl5-BZ#105	Cl5-BZ#118	Cl7-BZ#183	Cl6-BZ#167/#128	Cl6-BZ#138/#163	Cl6-BZ#153	Cl7-BZ#170/#190	Cl7-BZ#180	Cl7-BZ#182/#187	Cl8-BZ#195	Cl9-BZ#206	Cl10-BZ#209
329 0-1	10/23/2006	48	87	540	120	260	290	220	370	90	0.7 U	97	310	18	57	240	260	37	69	46	7.3	7.3	1.7
330 0-1	10/23/2006	140	260	1300	340	600	620	600	930	260	2.4 U	250	680	56	140	580	570	110	210	140	26.0	22.0	6.3
331 0-1	10/25/2006	2	3	14	4	8	9	6	12	2	0.33 U	3	9	2	3	8	10	2	4	3	0.33 U	0.33 U	0.33 U
332A 0-1	10/23/2006	2	3	14	4	7	8	5	11	3	0.19 U	3	8	1	2	7	8	1	3	2	0.7	0.19 U	0.3

Summation of Congeners (mg/kg) [NOAA 18]
7.2
18.0
0.234
0.210

Notes:
U = Concentration is below the laboratory's method detection limit.
NS = Not sampled.

Table 5:

Additional Analytical Data: Additional Pre-Dredge Locations
Phase III Harbor Maintenance Dredge Program, USEPA Data, Intertidal Sampling Results
New Bedford, Massachusetts

		Extractable Petroleum Hydrocarbons (µg/kg)																				
Sample Name	Collection Date	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	Unadjusted C11-C22 Aromatics	Naphthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene
VC-07C-08	11/17/2008	25000	213000	152000	185000	803 U	803 U	803 U	803 U	803 U	3790	803	6330	5250	2920	3180	2740	2470	2520	2040	803	1880

		Metals (mg/kg)							
Sample Name	Collection Date	Arsenic	Barium	Cadmium	Chromium	Lead	Selenium	Silver	Mercury
VC-05-08	11/13/2008	4.58	20	1.59	82.7	64.4	0.729	0.793	0.283
VC-07C-08	11/17/2008	6.6	87.2	8.01	86.5	547	0.744	11.9	0.803
VC-16-08	11/21/2008	8.22	44.4	0.948	57.7	107	1.2	0.524	0.641

		PCB Congeners (µg/kg)																					
Sample Name	Collection Date	Cl2-BZ#5/#8	Cl3-BZ#18	Cl3-BZ#28/#31	Cl4-BZ#44	Cl4-BZ#52	Cl4-BZ#43/#49	Cl4-BZ#66	Cl5-BZ#101/#84	Cl5-BZ#87	Cl7-BZ#184	Cl5-BZ#105	Cl5-BZ#118	Cl7-BZ#183	Cl6-BZ#167/#128	Cl6-BZ#138/#163	Cl6-BZ#153	Cl7-BZ#170/#190	Cl7-BZ#180	Cl7-BZ#182/#187	Cl8-BZ#195	Cl9-BZ#206	Cl10-BZ#209
VC-05-08	11/13/2008	39.7	166	529	156	296	209	184	359	127	1.13 U	127	386	10.8	72.5	320	224	29.9	38.3	23.8	2.47	3.49	1.35
VC-07C-08	11/17/2008	576	1490	2150	656	1240	620	285	504	174	1.03 U	143	390	23.2	97.3	400	309	57	90.9	66.9	9.52	16.5	2.77
VC-16-08 (0-1.5')	11/21/2008	17.2	95.9	153	145	340	132	96.9	207	207	1.22 U	163	478	13.8	108	464	300	41.8	50.1	27.2	1.22 U	6.62	3.85
H1	8/6/2010	1.80	7.41	20.4	9.54	16.6	11.4	4.13	16.1	2.08	0.958 U	4.38	13.6	0.958 U	3.14	12.2	10.4	1.19	1.16	0.958 U	0.958 U	0.958 U	0.958 U
D2	8/6/2010	0.870 U	1.09	3.01	1.45	4.10	2.73	0.870 U	3.49	0.870 U	0.870 U	0.870 U	2.83	0.870 U	0.870 U	3.20	2.57	0.870 U	0.870 U	0.870 U	0.870 U	0.870 U	0.870 U
F1	8/10/2010	0.912 U	2.38	7.14	2.89	7.57	5.12	1.40	7.25	0.912 U	0.912 U	2.00	6.59	0.912 U	1.31	5.34	4.72	1.25	0.912 U	0.912 U	0.912 U	0.912 U	0.912 U
B1	8/10/2010	0.856 U	2.64	7.63	2.44	8.52	5.5	1.87	7.77	0.856 U	0.856 U	1.8	6.7	0.856 U	1.2	6.07	6.37	0.933	0.968	0.856 U	0.856 U	0.856 U	0.856 U

Summation of Congeners (mg/kg) [NOAA 18]
7.7
22.1
7.0
0.32
0.07
0.14
0.15

Sample Name	Collection Date	Total PCBs [Method Unknown] (mg/kg)
S-203316	Pre-ROD	16
S-ae538	Pre-ROD	1
S-ae539	Pre-ROD	5
S-ae540	Pre-ROD	4
S-ae542	Pre-ROD	3
S-403	10/6/1999	2
S-405	10/6/1999	0.2
S-406	10/7/1999	9.2
S-af541	Pre-ROD	1
S-ae531	Pre-ROD	10
S-ae532	Pre-ROD	6
S-ae517	Pre-ROD	4
S-ae525	Pre-ROD	2
S-ae532	Pre-ROD	6

Notes:
U = Concentration is below the laboratory's method detection limit.
NS = Not sampled.

NOTES

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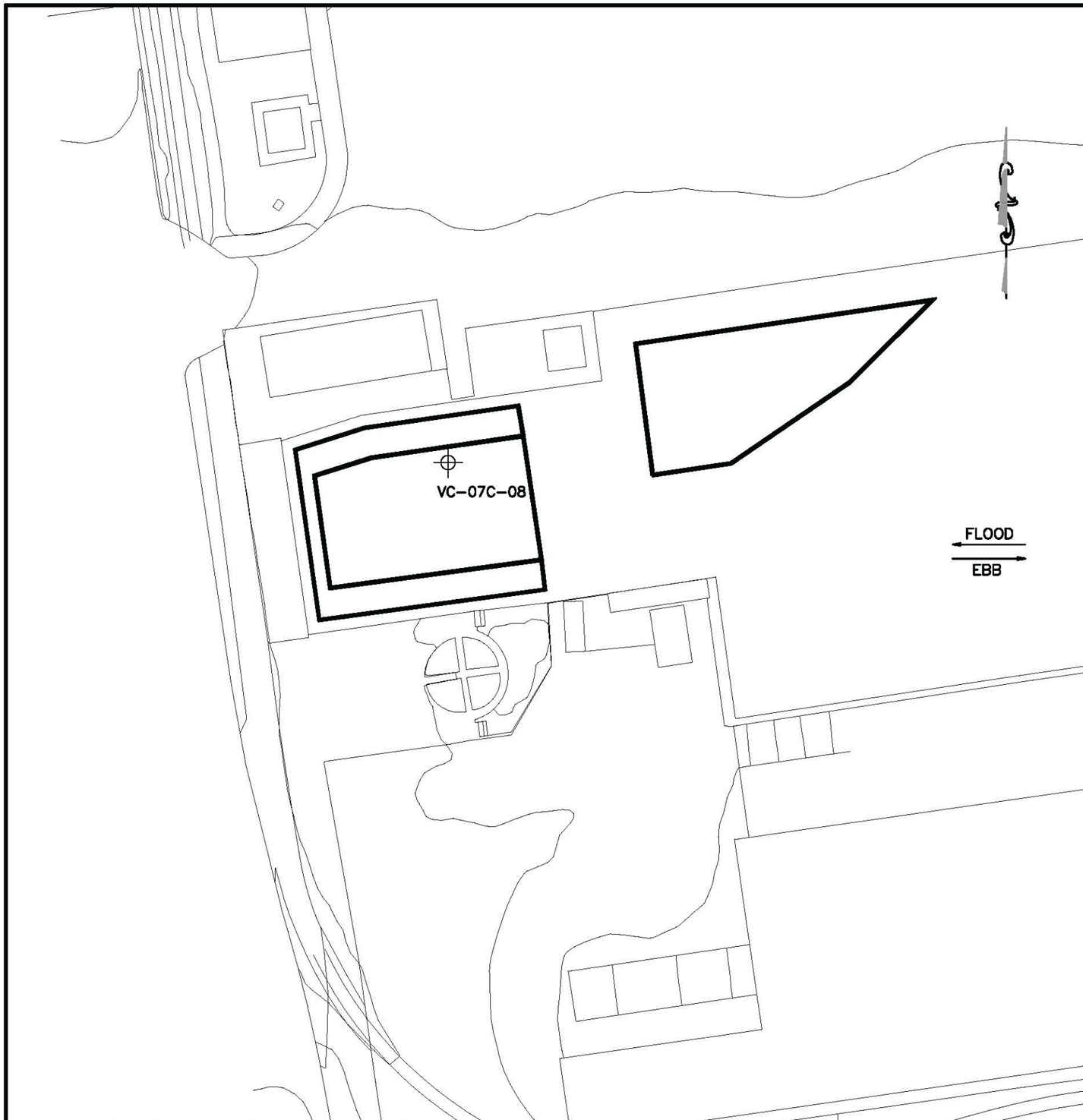
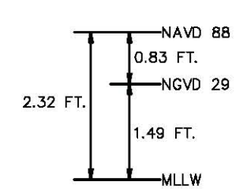
2. BASE PLAN FOR THIS FIGURE OBTAINED FROM U.S. ARMY CORPS OF ENGINEERS. EXISTING CONDITIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR.

3. HORIZONTAL AND VERTICAL CONTROL HAVE BEEN PROVIDED BY THE OWNER AND HAVE NOT BEEN INDEPENDENTLY VERIFIED. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF CONTROL DATA.



GRAPHIC DEPICTION OF DATUM SEPARATIONS FOR NEW BEDFORD HARBOR



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REVISIONS

NO.	DATE	DESCRIPTION
1.	[illegible]	PRELIM. DREDGE LAYOUT
2.	[illegible]	90 DFT
3.	[illegible]	RE-SID
4.	[illegible]	POST-DREDGE SAMPLES

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PROJECT TITLE:

NEW BEDFORD HARBOR NAVIGATIONAL DREDGE - PHASE III, PART A & B

PREPARED FOR:

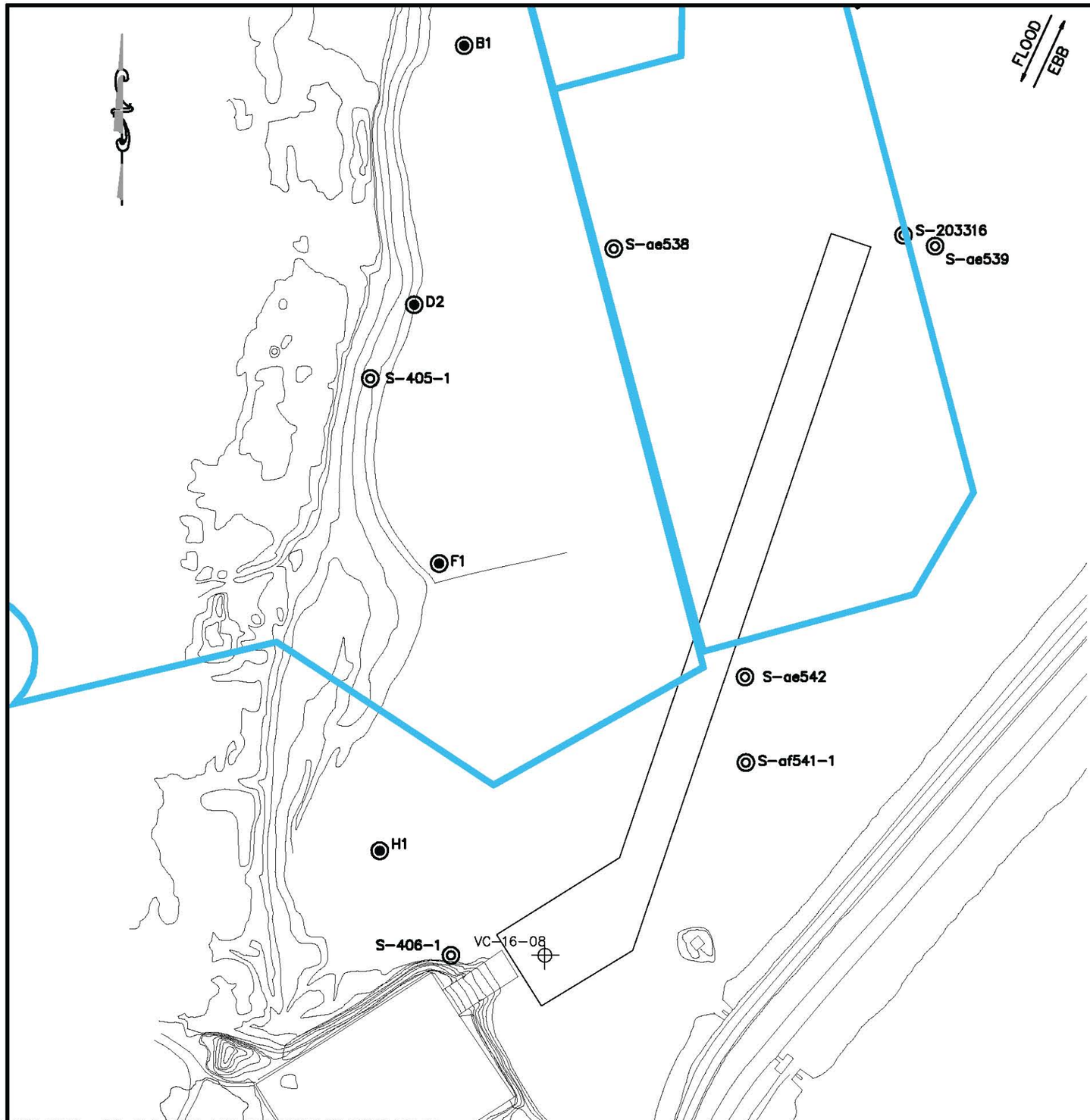
THE NEW BEDFORD HARBOR DEVELOPMENT COMMISSION AND THE TOWN OF FAIRHAVEN, MASSACHUSETTS

DRAWING TITLE:

TOMMESSON PARK DREDGE AREAS- PRE AND POST DREDGE SAMPLING LOCATIONS NOT FOR CONSTRUCTION

Scale: 0 10 20 40 60 FEET

Date 9/5/08	Drawing No.
Proj. Mgr. JAB	
Design GCD	
Check CM	V-1
Drawn GCD	
Job. No. 6615	
Last Rev. 1/22/10	



NOTES

1. COORDINATES SHOWN ARE IN THE STATE PLANE COORDINATE SYSTEM, MASSACHUSETTS MAINLAND ZONE 2001, REFERENCED TO THE 1983 NORTH AMERICAN DATUM.

2. BASE PLAN FOR THIS FIGURE OBTAINED FROM U.S. ARMY CORPS OF ENGINEERS. EXISTING CONDITIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR.

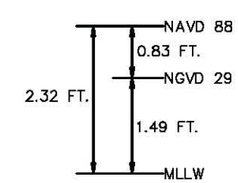
3. HORIZONTAL AND VERTICAL CONTROL HAVE BEEN PROVIDED BY THE OWNER AND HAVE NOT BEEN INDEPENDENTLY VERIFIED. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF CONTROL DATA.

VC-07-08 — PRE DREDGE SAMPLE LOCATION

B1 — APEX SAMPLES 8-6-2010, 8-10-2010

S-ae-538 — USACE SAMPLES

GRAPHIC DEPICTION OF DATUM SEPARATIONS FOR NEW BEDFORD HARBOR



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NO.	DATE	DESCRIPTION
1.	[illegible]	PRELIM. DREDGE LAYOUT
2.	11/14/08	BID SET
3.	1/16/09	RE-BID
4.	1/22/10	POST-DREDGE SAMPLES

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PROJECT TITLE:

NEW BEDFORD HARBOR NAVIGATIONAL DREDGE - PHASE III, PART A & B

PREPARED FOR:

THE NEW BEDFORD HARBOR DEVELOPMENT COMMISSION AND THE TOWN OF FAIRHAVEN, MASSACHUSETTS

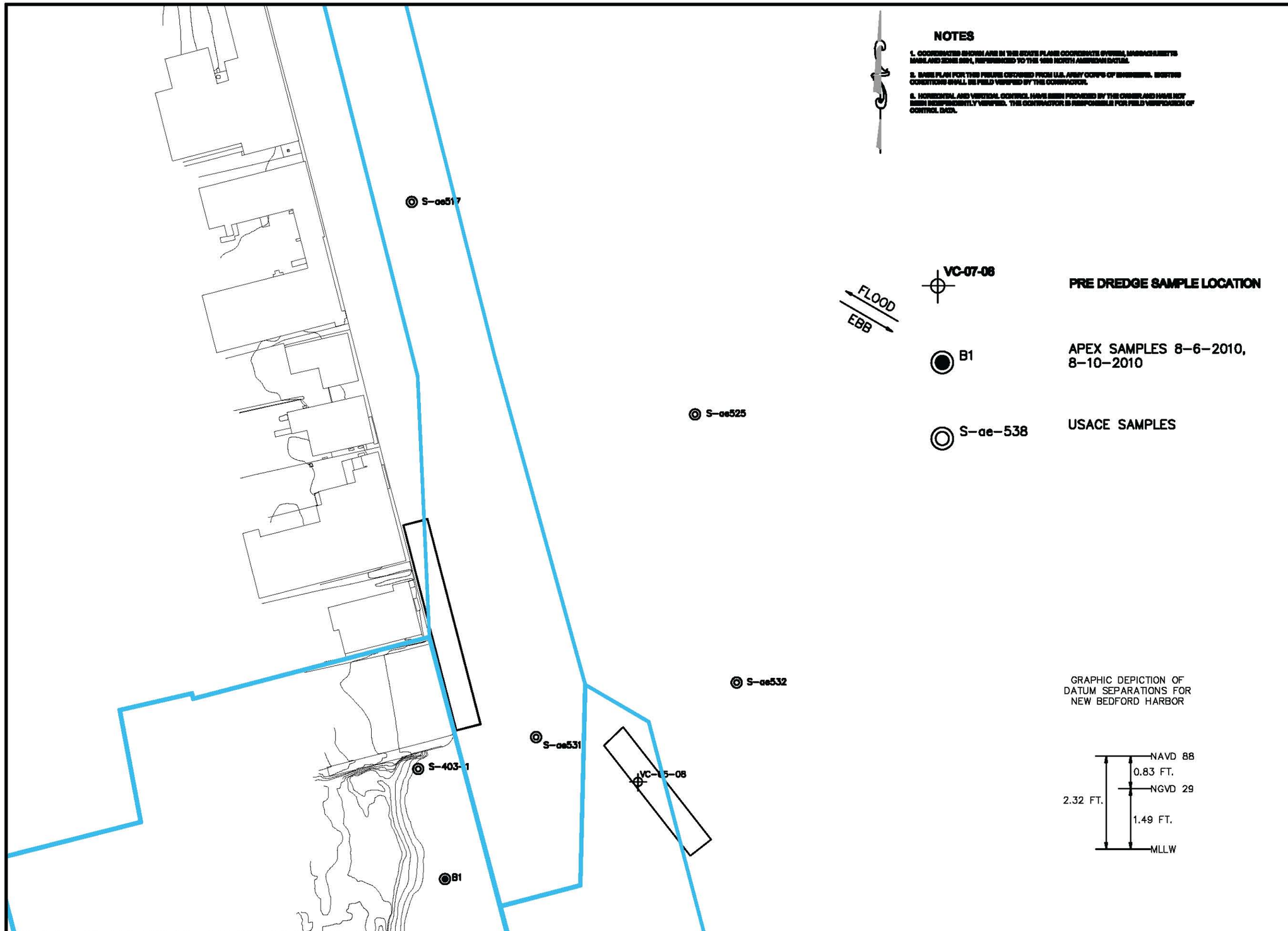
DRAWING TITLE:

GIFFORD STREET BOAT RAMP DREDGE AREA- PRE AND POST DREDGE SAMPLING LOCATIONS

NOT FOR CONSTRUCTION

Scale: 0 30 60 120 150 FEET

Date 9/5/08	Drawing No.
Proj. Mgr. JAB	V-2
Design GCD	
Check CM	
Drawn GCD	
Job. No. 6615	
Last Rev. 1/22/10	



NOTES

1. COORDINATES SHOWN ARE IN THE STATE PLANE COORDINATE SYSTEM, MASSACHUSETTS MAINLAND ZONE 2001, REFERENCED TO THE 1983 NORTH AMERICAN DATUM.

2. BASE PLAN FOR THIS FIGURE OBTAINED FROM U.S. ARMY CORPS OF ENGINEERS. EXISTING CONDITIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR.

3. HORIZONTAL AND VERTICAL CONTROL HAVE BEEN PROVIDED BY THE OWNER AND HAVE NOT BEEN INDEPENDENTLY VERIFIED. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF CONTROL DATA.

VC-07-08 — PRE DREDGE SAMPLE LOCATION

B1 — APEX SAMPLES 8-6-2010, 8-10-2010

S-ae-538 — USACE SAMPLES

GRAPHIC DEPICTION OF DATUM SEPARATIONS FOR NEW BEDFORD HARBOR

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NO.	DATE	DESCRIPTION
1.	[illegible]	PRELIM. DREDGE LAYOUT
2.	11/14/09	BID SET
3.	1/15/10	RE-BID
4.	1/22/10	POST-DREDGE SAMPLES

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PROJECT TITLE:

NEW BEDFORD HARBOR NAVIGATIONAL DREDGE - PHASE III, PART A & B

PREPARED FOR:

THE NEW BEDFORD HARBOR DEVELOPMENT COMMISSION AND THE TOWN OF FAIRHAVEN, MASSACHUSETTS

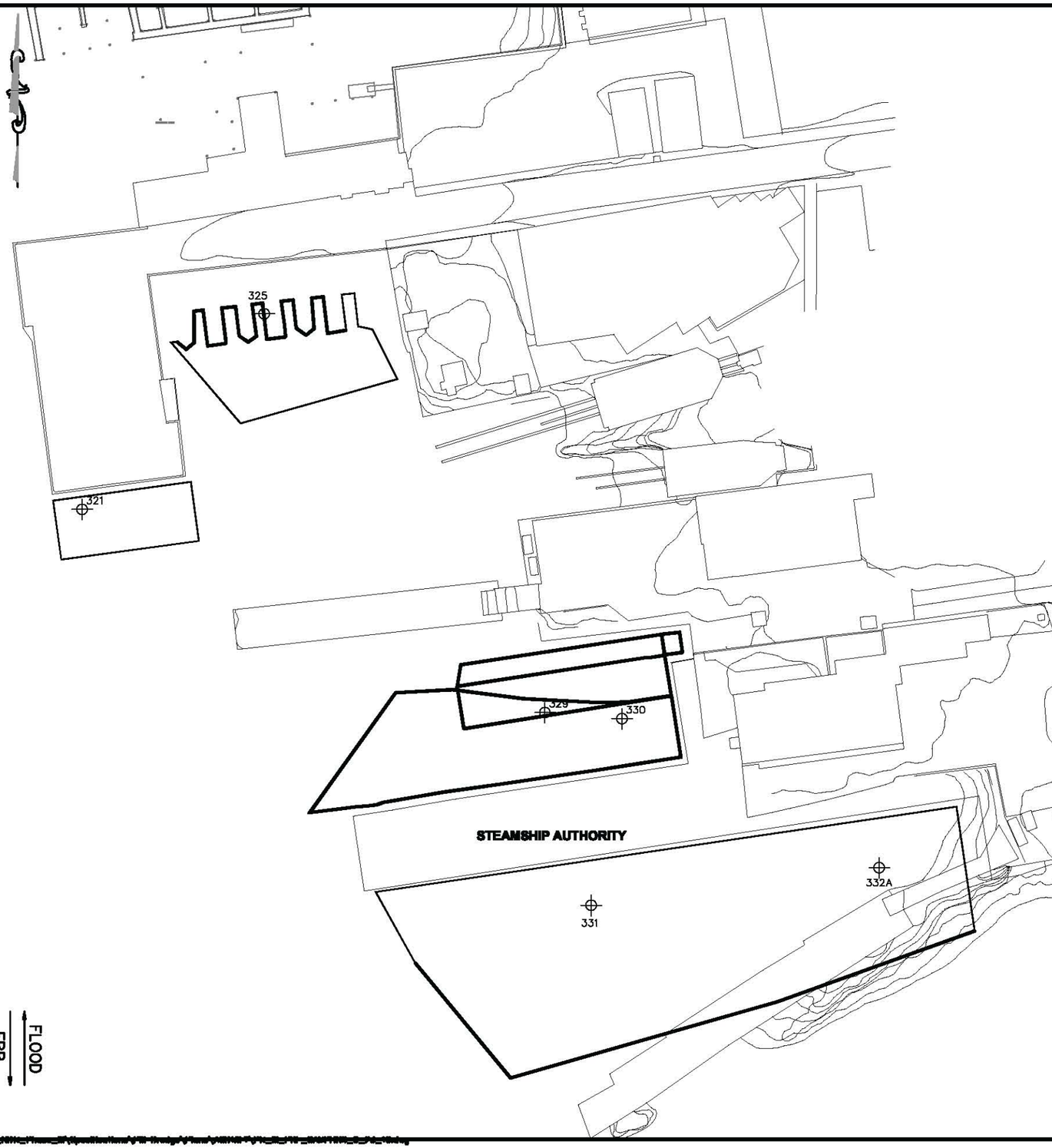
DRAWING TITLE:

SOUTH TERMINAL DREDGE AREAS- PRE AND POST DREDGE SAMPLING LOCATIONS

NOT FOR CONSTRUCTION

Scale: 0 40 80 160 200 FEET

Date 9/5/08	Drawing No.
Proj. Mgr. JAB	
Design GCD	
Check CM	V-3
Drawn GCD	
Job. No. 6615	
Last Rev. 1/22/10	



NOTES

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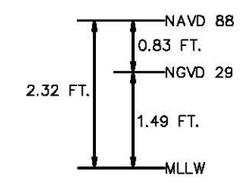
VC-07-08 PRE DREDGE SAMPLE LOCATION

GRAPHIC DEPICTION OF DATUM SEPARATIONS FOR NEW BEDFORD HARBOR



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NO.	DATE	DESCRIPTION
1.	[illegible]	PRELIM. DREDGE LAYOUT
2.	11/14/08	SED SMT
3.	1/7/09	RE-SED
4.	1/22/10	POST-DREDGE SAMPLES

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PROJECT TITLE:

NEW BEDFORD HARBOR NAVIGATIONAL DREDGE - PHASE III, PART A & B

PREPARED FOR:

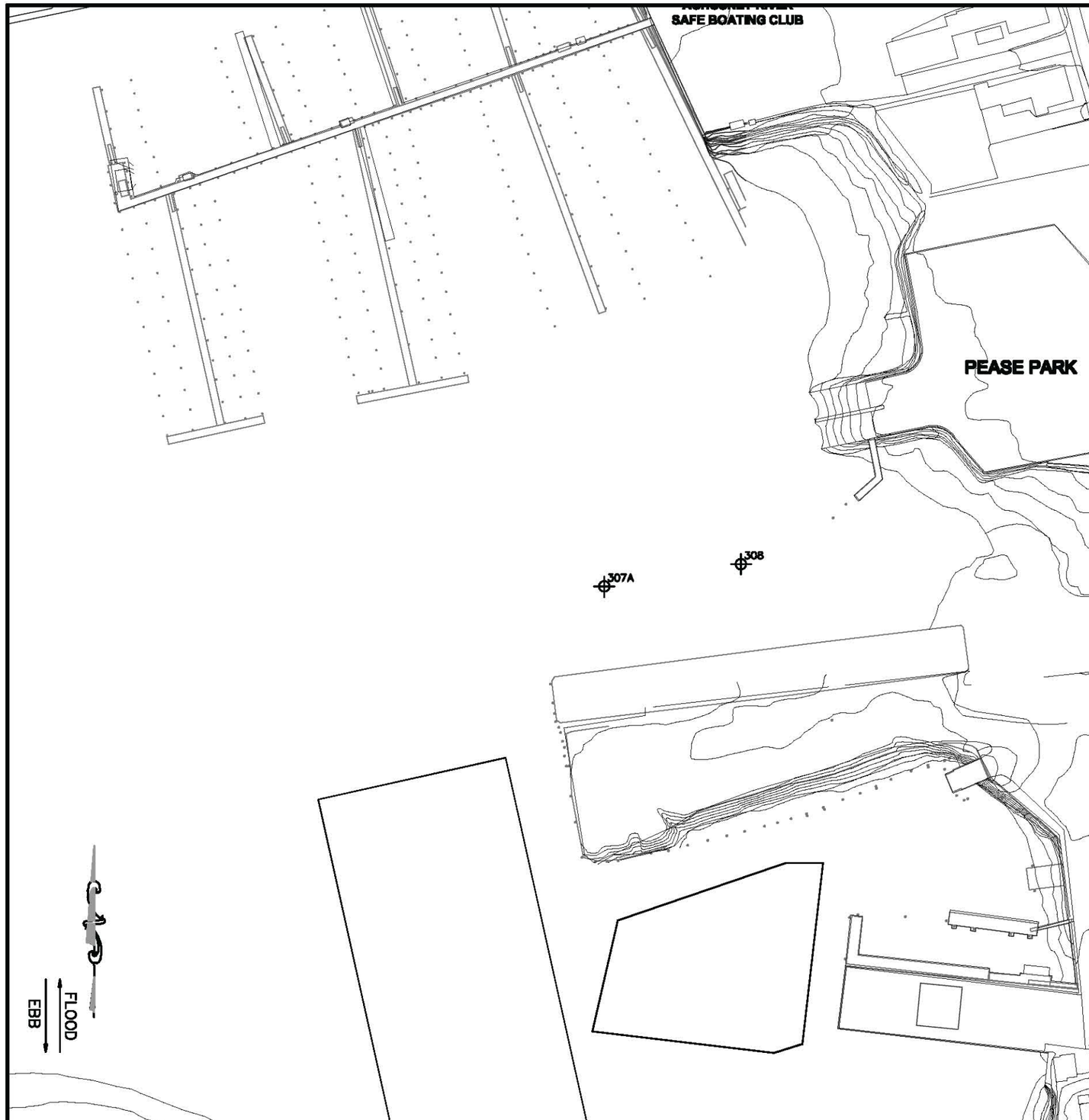
THE NEW BEDFORD HARBOR DEVELOPMENT COMMISSION AND THE TOWN OF FAIRHAVEN, MASSACHUSETTS

DRAWING TITLE:

WAMPIN ALEXANDER SOUTH AND UNION WHARF DREDGE AREAS- VIBRACORE AND BORING LOCATION SHEET NOT FOR CONSTRUCTION

Scale: 0 20 40 80 100 FEET

Date 9/5/08	Drawing No.
Proj. Mgr. JAB	
Design GCD	
Check CM	V-4
Drawn GCD	
Job. No. 6615	
Last Rev. 1/22/10	



NOTES

1. COORDINATES SHOWN ARE IN THE STATE PLANE COORDINATE SYSTEM, MASSACHUSETTS MAINLAND ZONE 2001, REFERENCED TO THE 1983 NORTH AMERICAN DATUM.

2. HYDROGRAPHIC SURVEY IS A COMPILATION OF SURVEYS PREFORMED BETWEEN 9-11-08 AND 11-8-08.

3. HYDROGRAPHIC SURVEY DATUM IS REFERENCED TO MEAN LOWER LOW WATER (MLLW) ON THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL OCEAN SERVICE TIDAL BENCHMARK BM7684 J 1677 - SURVEY DISK SET FLUSH IN THE SURFACE OF A CONCRETE SIDEWALK ON THE SOUTH SIDE OF U.S.HIGHWAY 6 ON THE NORTH SIDE OF THE MOBIL SERVICE STATION, 4 FEET (1 M) WEST OF A FIRE HYDRANT AND 1 FOOT (0.3 M) SOUTH OF U.S. HIGHWAY 6. DATUM SEPARATIONS WERE COMPUTED BY COLER AND COLANTONIO, INC. FEBRUARY 2002 AS MLLW - 1.82 FT = NGVD29 0.0 FT. TO OBTAIN VALUES IN NGVD29, SUBTRACT 1.82 FEET FROM THE INDICATED VALUE AT ANY POINT. HORIZONTAL CONTROL CAN BE OBTAINED FROM THE ENGINEER.

4. BASE PLAN FOR THIS FIGURE OBTAINED FROM U.S. ARMY CORPS OF ENGINEERS. EXISTING CONDITIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR.

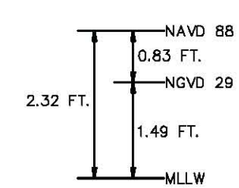
5. HORIZONTAL AND VERTICAL CONTROL HAVE BEEN PROVIDED BY THE OWNER AND HAVE NOT BEEN INDEPENDENTLY VERIFIED. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF CONTROL DATA.

6. THE INFORMATION DEPICTED ON THIS DRAWING REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES INDICATED ABOVE AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS AT THE TIME OF THE SURVEYS AND AT THE SOUNDING POINTS NOTED ON THE DRAWING.

VIBRACORE LOCATION

BORING LOCATION

GRAPHIC DEPICTION OF DATUM SEPARATIONS FOR NEW BEDFORD HARBOR



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NO.	DATE	DESCRIPTION
1.	[illegible]	[illegible]
2.	[illegible]	[illegible]
3.	[illegible]	[illegible]

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PROJECT TITLE:

NEW BEDFORD HARBOR NAVIGATIONAL DREDGE - PHASE III, PART A & B

PREPARED FOR:

THE NEW BEDFORD HARBOR DEVELOPMENT COMMISSION AND THE TOWN OF FAIRHAVEN, MASSACHUSETTS

DRAWING TITLE:

LEGEND DREDGE AREAS- VIBRACORE AND BORING LOCATION SHEET

NOT FOR CONSTRUCTION

Scale: 0 20 40 80 100 FEET

Date 9/5/08	Drawing No.
Proj. Mgr. JAB	
Design GCD	
Check CM	V-5
Drawn GCD	
Job. No. 6615	
Last Rev. 10/30/08	

NOTES

1. COORDINATES SHOWN ARE IN THE STATE PLANE COORDINATE SYSTEM, MASSACHUSETTS MAINLAND ZONE 2001, REFERENCED TO THE 1983 NORTH AMERICAN DATUM.

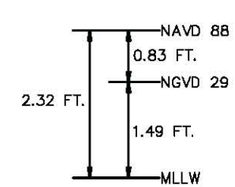
2. BASE PLAN FOR THIS FIGURE OBTAINED FROM U.S. ARMY CORPS OF ENGINEERS. EXISTING CONDITIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR.

3. HORIZONTAL AND VERTICAL CONTROL HAVE BEEN PROVIDED BY THE OWNER AND HAVE NOT BEEN INDEPENDENTLY VERIFIED. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF CONTROL DATA.

VC-07-08

PRE DREDGE SAMPLE LOCATION

GRAPHIC DEPICTION OF DATUM SEPARATIONS FOR NEW BEDFORD HARBOR



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NO.	DATE	DESCRIPTION
1.	[illegible]	PRELIM. DREDGE LAYOUT
2.	11/14/08	BID SET
3.	1/[illegible]	RE-BID
4.	1/[illegible]/10	POST-DREDGE SAMPLES

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PROJECT TITLE:

NEW BEDFORD HARBOR NAVIGATIONAL DREDGE - PHASE III, PART A & B

PREPARED FOR:

THE NEW BEDFORD HARBOR DEVELOPMENT COMMISSION AND THE TOWN OF FAIRHAVEN, MASSACHUSETTS

DRAWING TITLE:

OLDE NORTH WHARF FISHERIES DREDGE AREAS PRE AND POST DREDGE SAMPLING LOCATIONS

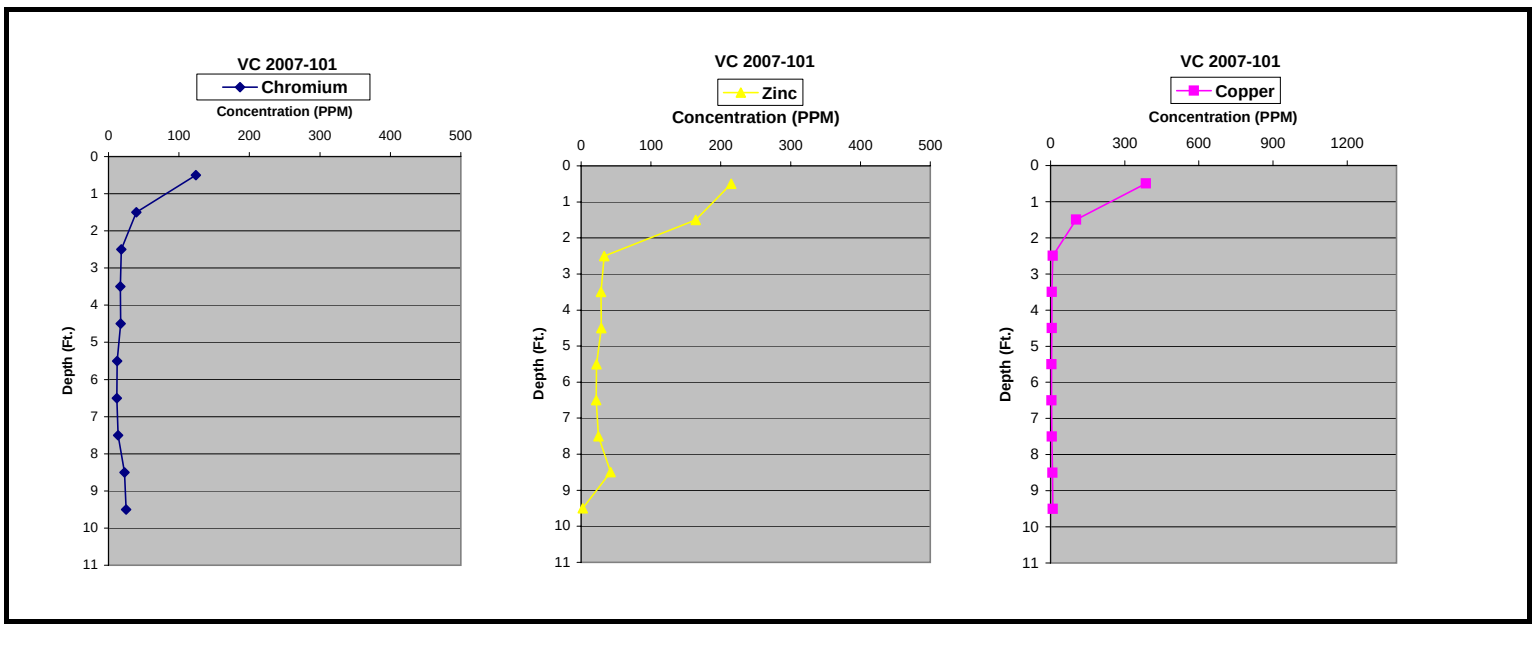
NOT FOR CONSTRUCTION

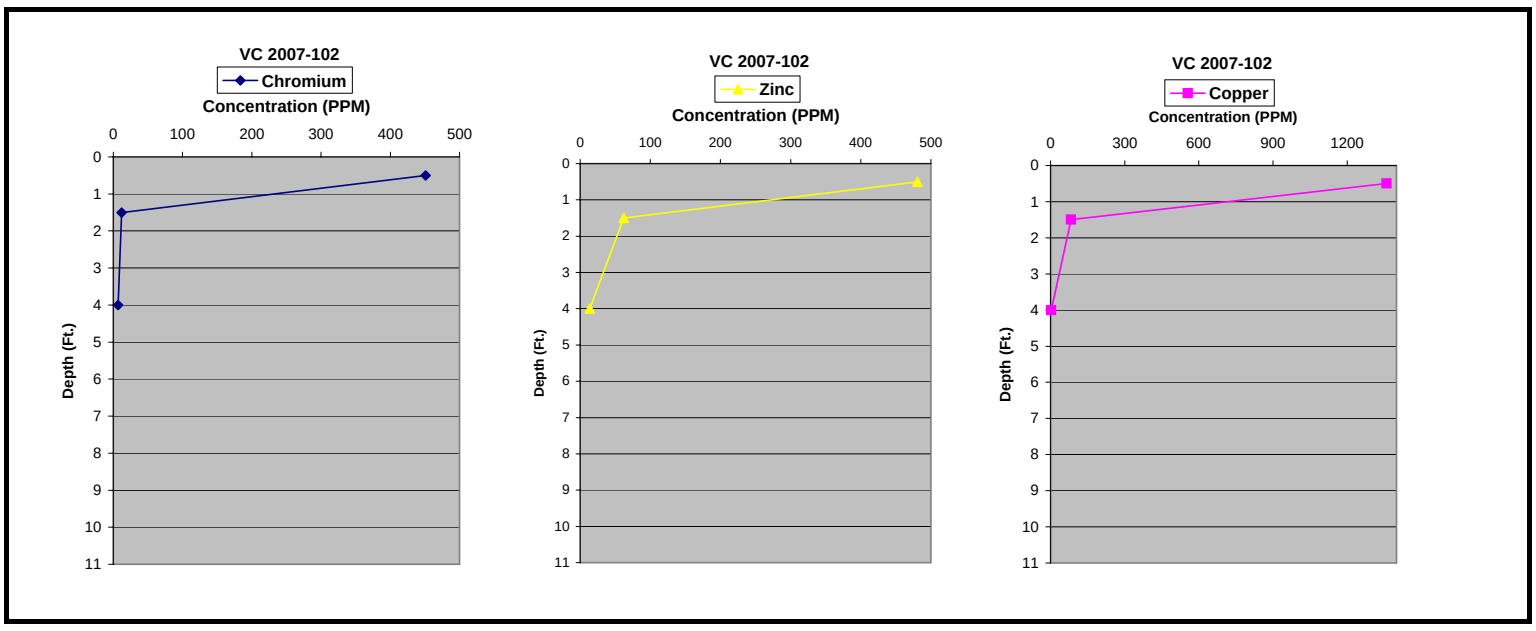
Scale: 0 10 20 40 60 FEET

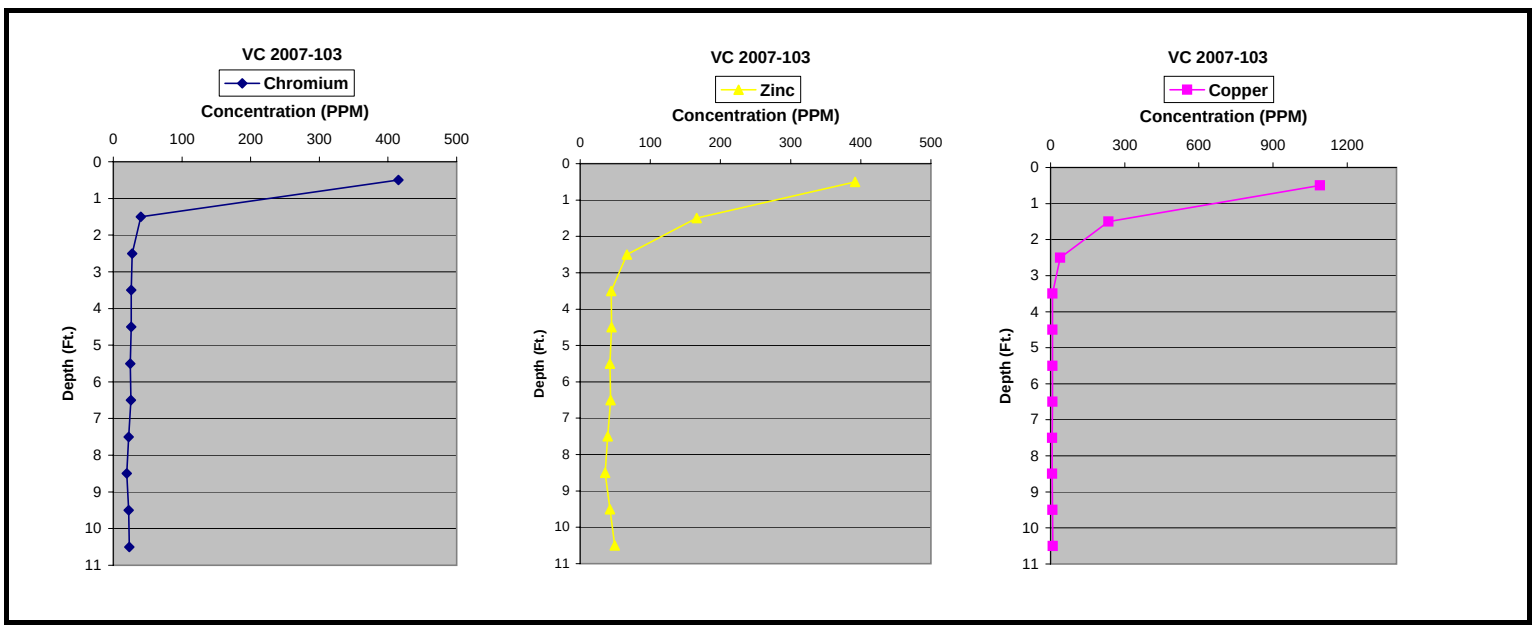
Date 9/5/08	Drawing No.
Proj. Mgr. JAB	
Design GCD	
Check CM	V-7
Drawn GCD	
Job. No. 6615	
Last Rev. 1/22/10	

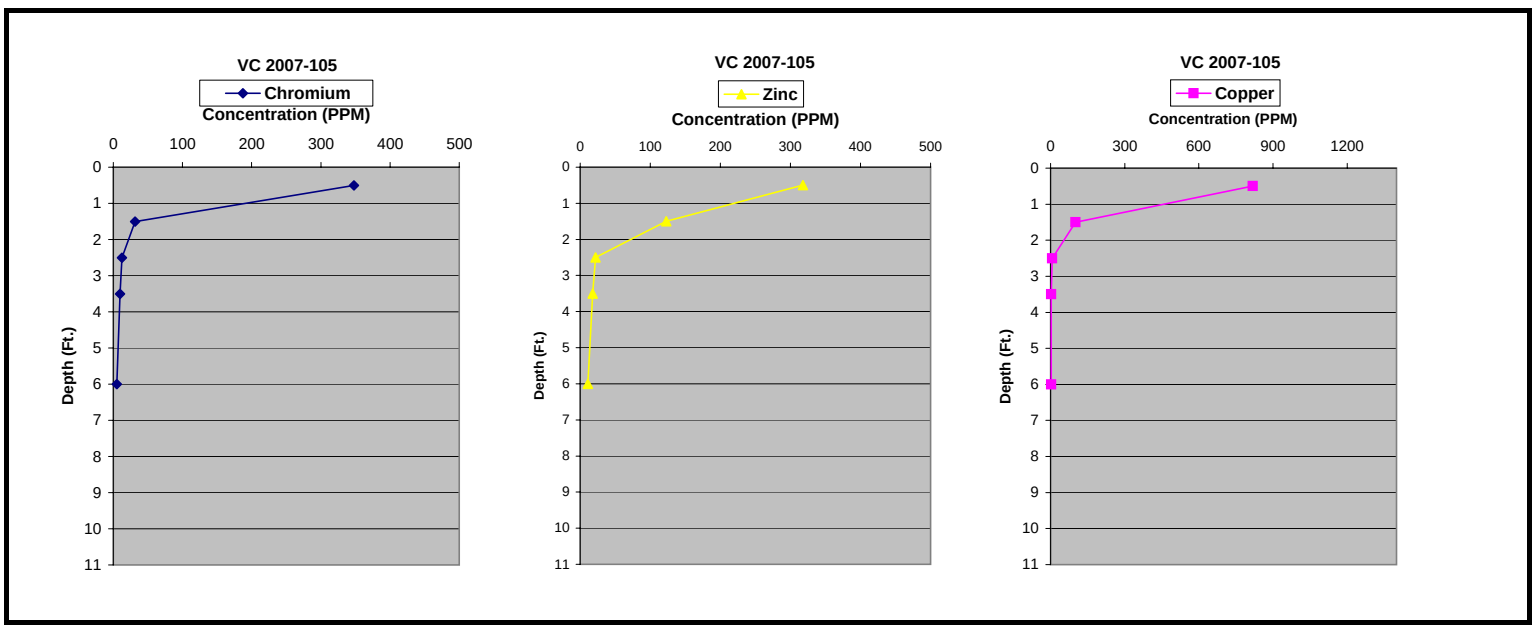
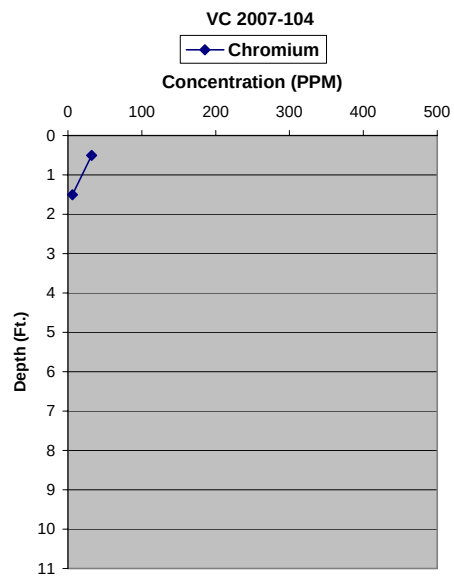
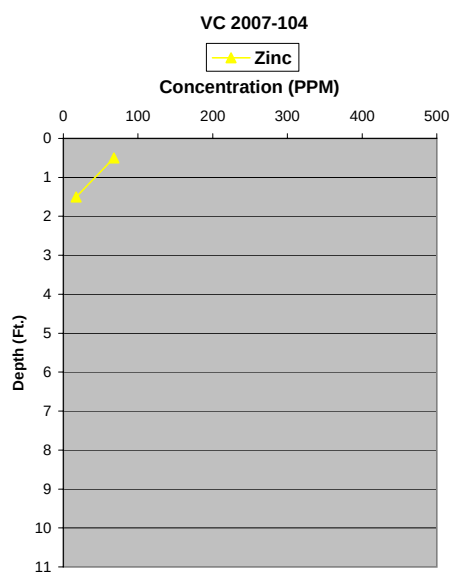
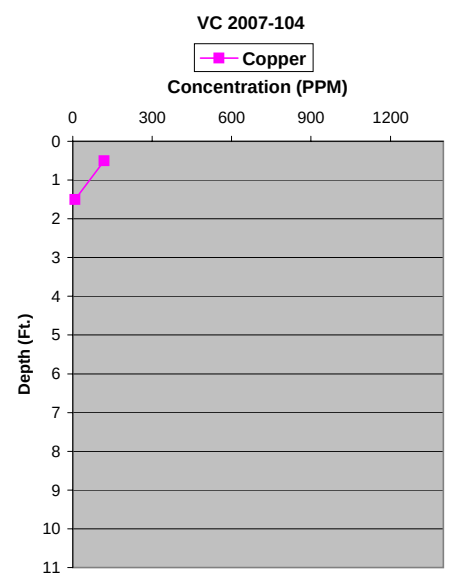
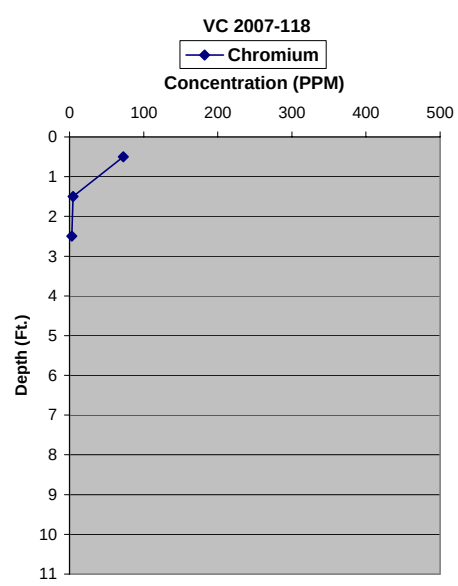
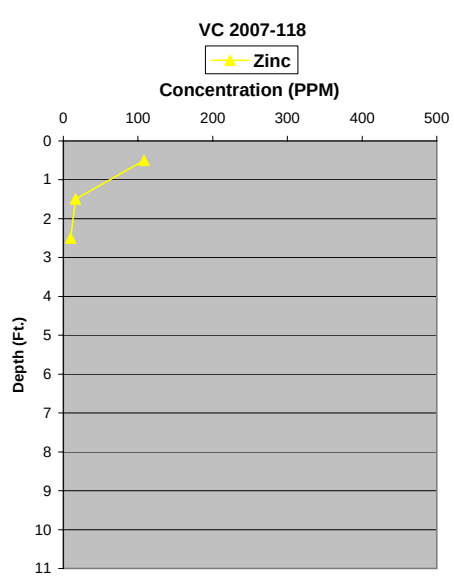
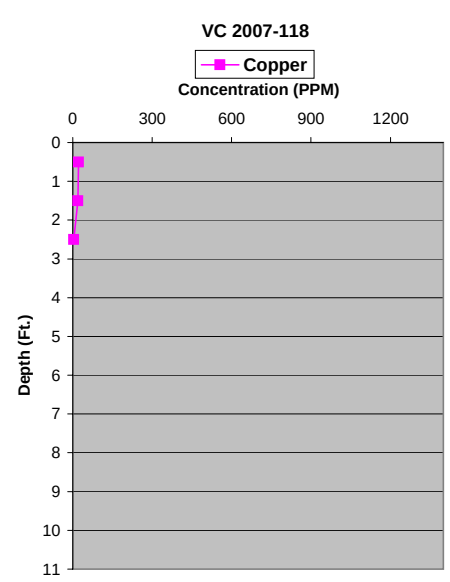
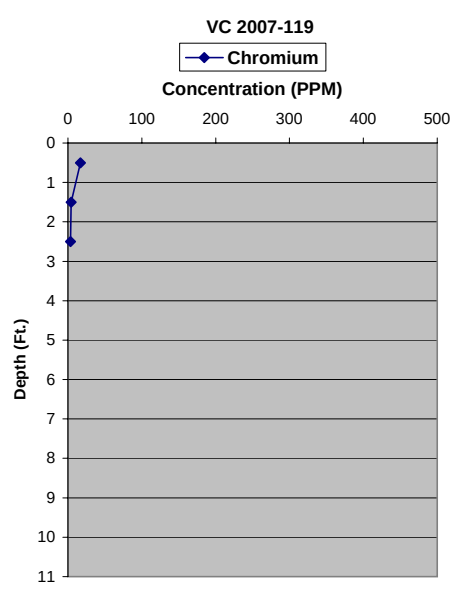
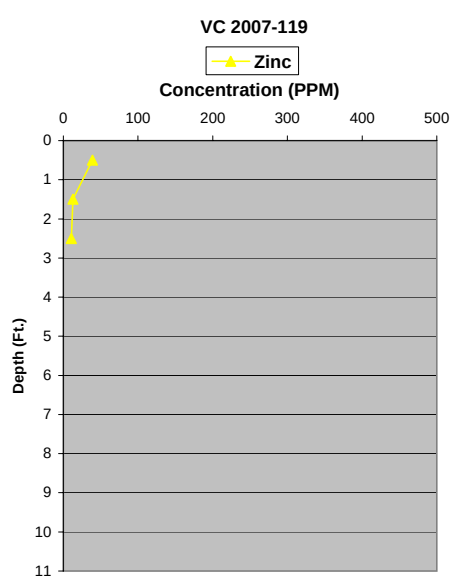
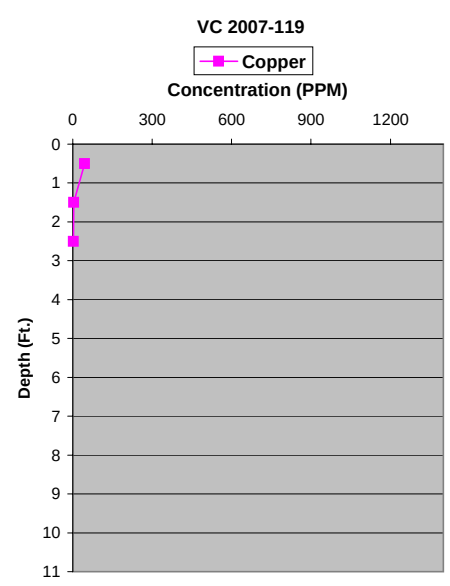
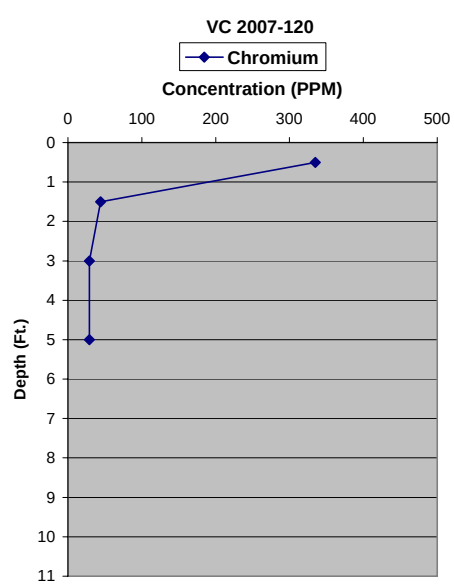
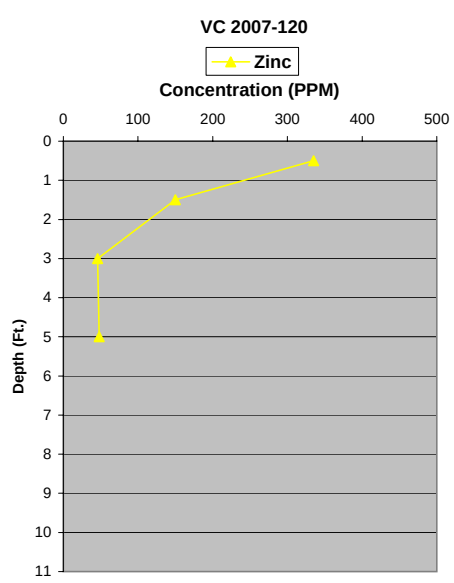
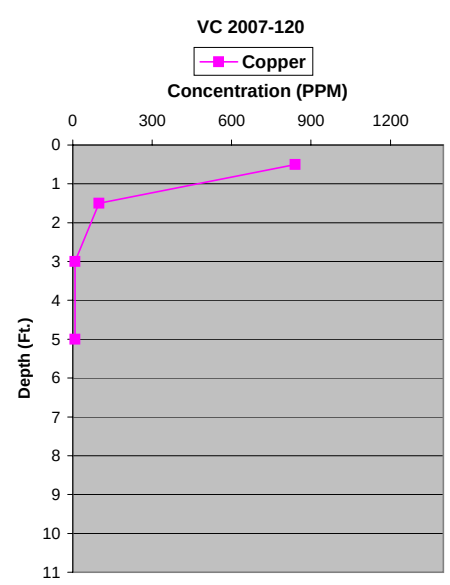
APPENDIX B

CAD Cell #2 Suitability Determination Sampling Results









CAD Cell #2 Suitability Determination Sampling Results