Appendix F
Hazardous Materials

Appendix F.4a
Sediment Sampling and Analysis Plan
(March 2024)

DRAFT

Sediment Sampling and Analysis Plan

North/West Battery Park City Resiliency Project

March 29, 2024

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Acronyms and Abbreviations

bgs	below ground surface
BODR	Basis of Design Report
BPC	Battery Park City
BPCA	Battery Park City Authority
bss	below sediment surface
BUD	beneficial use determination
COC	Chain of Custody
COCs	constituents of concern
CY	cubic yards
EDR	Environmental Data Resources
FBS	Flood Barrier System
HASP	Health and Safety Plan
ID	identification
IDW	investigation-derived waste
NWBPCR	North/West Battery Park City Resiliency Project
NYSDEC	New York State Department of Environmental Conservation
PAH	polycyclic aromatic hydrocarbons
PANYNJ	Port Authority of New York and New Jersey
PCB	polychlorinated biphenyls
PPE	personal protective equipment
RR	Restricted Residential
UU	Unrestricted Use
SCO	Soil Cleanup Objective
SOP	Standard Operating Procedures
SSAP	Sediment Sampling and Analysis Plan
SVOC	semi volatile organic compounds
TOGS	Technical & Operational Guidance Series
USEPA	United States Environmental Protection Agency
VOC	volatile organic compounds

1 Introduction

The North/West Battery Park City Resiliency Project (NWBPCR) will create a continuous Flood Barrier System (FBS), connecting from the South Battery Park City Resiliency Project to a tie-in point at high ground to the north of Battery Park City (BPC) (in Tribeca east of the West Side Highway Route 9A) New York, NY. The FBS will reduce flood risk for real estate assets in BPC, including portions of the public realm. In addition to the primary benefit of flood risk reduction, this project will enhance specific aspects of BPC's public spaces and infrastructure, including, but not limited to, pedestrian access and circulation, bicycle infrastructure, and sustainable infrastructure and landscaping. The project Owner is the Battery Park City Authority (BPCA).

The NWBPCR includes a FBS to be constructed along the Hudson River; where design elements of the FBS was divided into seven (7) Reaches. Reaches 2, 4, 5, 6, and 7 include in-water work. Reach 5 is a unique segment of the FBS, as this area transverses the Port Authority of New York and New Jersey (PANYNJ) PATH Tunnel and includes a channel of water beneath an existing platform from Route 9A to the North Cove in North Cove Marina. Reach 5 will include construction of a two bridging structures over the PATH Tunnel to avoid impact of the tunnel. Construction of the bridging structures will require installation of large drill shafts to support the span of the bridging structure over the PATH Tunnel. There will be displacement and excavation of sediment in this channel to allow for construction of the drill shafts, deck, and pile caps (south bridging structure – N: 198754.07, E: 979697.38; north bridging structure – N: 199139.67 , E: 979843.11). Sediment that has accumulated in the channel beneath the existing platform is proposed to be removed to allow for installation of the deck and pile caps. Sediment and existing riprap would be removed and generally reused for grading purposes.

Installation of the FBS along the shoreline of the Hudson River will require excavation/dredging and/or displacement of as much as 5,000 cubic yards (CY) of sediment within two (2) dredge areas in Reach 5. The two areas will require an average dredge depth of approximately 9.5 to 10.5 feet (8.5 to 9.5 feet plus 1-foot overdredge allowance). Sloping outside of the target dredge area will be performed at a 3:1 slope (H:V) to prevent sloughing into dredge area during removal activities. Elevations and depth of dredging varies for the north and south FBS structure installation, as shown in Table 1 below and Figures 1 through 3 (attached).

Table 1. Dredge Depths, Elevations and Volumes

Reach 5 FBS Structure	Dredge Depth Range (feet)	Target Dredge Elevation (feet, NAVD88)	Total Dredge Area[1] (square yards)	Total Dredge Volume[2] (cubic yards)	Figure Reference
North	8.0 to 9.5	-17	1,844	2,862	Figure 2 Figure 3 – Section 2
South	8.3 to 10.5	-17	1,429	2,132	Figure 1 Figure 3 – Section 1

Note:

[1] Total dredge area includes the target dredge area and the limits of sloping

[2] Total dredge volume includes estimated amount of material to be removed from the target dredge area and the limits of sloping.

Since the project is in navigational waters of the United States, the New York State Department of Environmental Conservation (NYSDEC) requires sampling and analysis of proposed excavated sediment, as part of its 6

NYCRR Part 608: Protection of Waters permitting program. Characterization of the sediment would allow the NYSDEC to determine management, upland disposal and/or reuse options that could be employed, along with controls that might be required to minimize potential impacts to the environment during excavation/dredging.

This Sediment Sampling and Analysis Plan (SSAP) describes the sequencing of the field tasks and physical and chemical analyses required for the evaluation of sediment characteristics within or adjacent to the proposed dredging areas. The collected data will provide information regarding concentrations of chemical constituents within the sediments, existing water quality and potential water quality impacts from dredging. It is anticipated that dredge material will either be placed in an upland disposal facility or possibly beneficially re-used or in the case of rip-rap, placed in-water. The collected data will also be used for estimating potential disposal costs and/or support determination for potential beneficial use determination (BUD) and /or in-water placement. This SSAP has been designed to meet NYSDEC requirements, using the following guidance document:

- NYSDEC's *"Technical & Operational Guidance Series (TOGS) 5.1.9 In-Water Riparian Management of Sediment and Dredge Material"* (TOGS 5.1.9; November 2004); https://www.dec.ny.gov/permits/94755.html

Table 2 below outlines the components of this SSAP that satisfy the items prescribed in NYSDEC's guidance checklist for Designing a Dredging Sediment Sampling and Analysis Plan.

Table 2. NYSDEC Checklist - Designing a Dredging Sediment Sampling and Analysis Plan

NYSDEC Checklist Item		SSAP Section	Description
1.	Prepare a plan view of the proposed dredge area, including project depth	Figures 1 through 3	Plan views, sample locations, dredge area and dredge depth provided on Figures 1 through 3
1a.	Use a recent (e.g., less than 6 months old) bathymetry survey of the project site	Figures 1 through 3	See figure notes
			Additional data on bathymetry will be collected during underwater inspections
1b.	Determine total area to be dredged and the total volume of sediment to be removed	Section 3.2 – Sediment Core Samples	Approximately 5,000 CY of sediment may be removed or disturbed from two (2) dredge areas (1,844 square yards (sy) and 1,429 sy in the north and south respectively)
1c.	Identify locations of outfalls or other known sources of pollution, including historical spill areas	Section 1 – Introduction Figure 4	Outfall locations near Reach 5 were mapped on referenced Figures. Reference Outfalls Locations: Citywide Outfalls | NYC Open Data (cityofnewyork.us)
			There are no known sources of pollution, including historical spill areas. Reference Report: Environmental Findings Report, Corridor Environmental Site Assessment (Matrix 2022)
2.	Determine the number of core samples to be collected based on the total area to be dredged using Balduck's Method	Section 3.2– Sediment Core Samples, Table 3	Seven (7) cores per area are required based on the following: Balduck's Method = 7

NYSDEC Checklist Item		SSAP Section	Description
3.	Identify locations for core sampling using the guidance for identifying core sampling locations	Section 3.3 – Sediment Sample Locations and Figures 1 and 2	Proposed sample locations are proposed within the total dredge area[1].
4.	Plan to drive cores 1 foot below project depth	Section 3.3– Sediment Sample Locations	Due to access limitation of the dredge area during sampling activities (i.e., existing shoreline infrastructure, including the PATH train tunnels, existing underground utilities and the North Cove Marina) two (2) sediment samples will be collected from each dredge area in coordination with the Geotechnical Boring Program, as discussed in the North West Battery Park City Resiliency Project Geotechnical Investigation – North PATH and South PATH Borehole Plan (AECOM 2023) and the remaining five (5) sediment samples per dredge area would be collected using vibracore techniques or similar from the total dredge area[1] following removal of the existing platforms prior to construction. Proposed borings and core locations for this SSAP are presented on Figures 1 and 2. Sediment sample depths will be representative of the dredge depth per sample location. Note, after dredging is complete, a concrete slab, as part of the FBS installation, will be placed on the post dredge surface in each of the target dredge areas. Therefore, driving sample cores 1 foot below the project depth within the target dredge area will not be performed because the post dredge surface will not be exposed.
4a.	Cores will be separated into two segments, a segment homogenized over the project depth and a segment representing the next six inches to be exposed after dredging. The remainder of the core can be excluded from further analysis	Section 3.3 – Sediment Sample Locations and Appendix B	Cores will be composited across each dredge area into upper and lower intervals, as applicable, in a manner consistent with DEC checklist criteria
4b.	Individual cores should not be homogenized if color, odor, grain size, total organic carbon (TOC),	Appendix B, Section 3.3	Composite samples should be made by homogenizing the cores from the same sample area into two samples, one upper and one lower. Individual cores

	NYSDEC Checklist Item	SSAP Section	Description
	or likelihood of contamination differs among horizons		should not be homogenized if color, odor, grain size, total organic carbon, or likelihood of contamination differs among horizons.
5.	Composite samples should represent sediments with similar characteristics (e.g., grain size, TOC, color) taken from approximately the same depth and geographic area. Composite samples should be comprised of no more than three samples	Appendix B, Section 3.3	Core material above the project depth will be composited separately from core material below project depth (next 6 inches of sediment to be exposed), as applicable.
			Cores from areas of known or suspected contamination (e.g., proximity to outfall or historical spill areas) are not to be composited with cores form other areas.

Note:

[1] Total dredge area includes the target dredge area and the limits of sloping

In accordance with the NYSDEC's TOGS 5.1.9, outfall locations within the work area are presented on Figure 4. As shown on Figure 4, the nearest outfall locations are located north of the work area between Reach 4 and Reach 5 and South of the work area between Reach 5 and Reach 6. In addition, results of previous sampling activities within the Reach 5 work area, as presented in the Environmental Findings Report, Corridor Environmental Site Assessment (Matrix 2022), indicate no evidence of a petroleum spill or other releases.

This SSAP focuses on the general components of the environmental investigations, including sampling and field procedures for sediment collection, baseline water quality monitoring and sampling, laboratory analytical methods, and sample handling and documentation procedures.

Included in this SSAP is information on sample designation, sampling equipment and procedures, sample handling and custody, field quality control checks, split sampling procedures, parameters for field measurements, and planned preventive maintenance procedures for various field sampling equipment. In support of the text described above, the appendices to this SSAP contain standard operating procedures (SOPs) for sampling at the Site, including sample collection, handling and shipment, and equipment decontamination procedures.

Note that the procedures described in this SSAP, particularly as they relate to field investigation protocols, are intended to be general guidelines and may be subject to certain modifications if deemed appropriate or necessary based on field considerations, provided that such modifications do not compromise the integrity of the data. All sampling and field procedures will be conducted in accordance with the requirements of the Health and Safety Plan (HASP) for the Site.

2 Site Reconnaissance and Underwater Inspections

Site reconnaissance and underwater inspections were performed by Marine Solutions, Inc. in Reach 5 from January 2024 through February 2024 to assess the elevation of the existing sediment surface, water depths and feasibility to collect diver assisted push cores within the footprint of the FBS structures. Results of the site reconnaissance and underwater inspections show that the existing sediment surface within the footprint of the North and South FBS structures ranges from -6.672 to -8.851 feet (NAVD88) and -8.078 to -9.224 feet (NAVD88) respectively. As the target dredge elevation is -17 feet (NAVD88), diver-assisted push cores are not feasible as the maximum core length that can be collected by divers is 4 feet.

Due to the presence of existing shoreline infrastructure, including the PATH tunnels and the North Cove Marina, there is limited access to the areas of disturbance where sample collection would typically need to occur. Additional site constraints, including the presence of utilities beneath the platform, and the need to maintain the structural integrity of the platforms in completing the geotechnical borings were factors that limited the locations where borings could be completed at this time. Therefore, sample collection is limited to the geotechnical boring locations (i.e., SPN-1, SPN-2, SPS-1 and SPS-2), as presented on Figures 1 and 2 (attached) and the North West Battery Park City Resiliency Project Geotechnical Investigation – North PATH and South PATH Borehole Plan (AECOM 2023) [Note: the precise location of geotechnical borings is subject to review by the PANYNJ]. Sediment samples will be collected from the geotechnical borings and will target the dredge depths presented in Table 1, in accordance with NYSDEC TOGS requirements. Expanded access to the dredge areas is anticipated during construction after the existing structures/platforms are removed. Additional sediment cores denoted with the R5 designation, as presented in Table 4, will be collected at this time to satisfy the number of sample cores required by NYSDEC TOGS 5.1.9.

3 Field Sampling Protocols

This section presents a summary of the sample collection procedures, sample container requirements, and sample and document custody procedures, as well as a discussion of equipment decontamination and the management of investigation-derived waste (IDW).

3.1 Sampling Procedures

The specific types of samples to be collected at the site include sediment from the Hudson River within Reach 5 of the project work limits. Samples will be collected for physical and chemical analyses as described below.

3.2 Sediment Core Samples

Approximately 5,000 cubic yards of sediment may be dredged from both dredge areas to install the FBS bridging structures in Reach 5 for the NWBPCR, as shown on Figures 1 and 2. In accordance with NYSDEC TOGS 5.1.9, Balduck's Method using a dredge factor of 2 was used to estimate the minimum number of sediment cores to be collected within these dredge areas. As shown in Table 3 below, the total number of cores were estimated using Balduck's Method per dredge area.

Table 3. Number of Sediment Core Locations

FBS Structure	Dredge Area (square yards)	Method	Number of Core Locations Per Area
North	**1,844**	**Balduck's Method** (Dredge factor of 2)	7.1
South	**1,429**	**Balduck's Method** (Dredge factor of 2)	6.5

Based on site constraints, as discussed in Section 2, BPCA is proposing to collect two (2) sediment cores per dredge area in advance of construction activities and five (5) sediment cores per dredge area after the existing platforms are removed during construction.

Sediments samples will be collected for analysis from the seven (7) locations presented in Table 4 and Figures 1 and 2. The cores will be composited in accordance with NYSDEC requirements. Additional details on sample location, depth and composite samples are provided in Sections 3.3 and Appendix B.

Field investigations, data collection, monitoring, and/or sampling procedures may be performed involving one or more of the SOPs listed below.

- Appendix A Chain of Custody, Handling, Packing, and Shipping Standard Operating Procedures
- Appendix B Sediment Sampling Standard Operating Procedures

- Appendix C Field Documentation Standard Operating Procedures
- Appendix D Field Equipment Decontamination Standard Operating Procedures

The field sampling SOPs have been developed with the goal of standardizing methodology, to the extent practical, to ensure that data are collected utilizing consistent and "best practices" methodology. Any planned deviations from these SOPs, based on site-specific conditions, will be proposed in the task-specific work plans.

3.3 Sediment Sample Locations

Existing survey data was used within the dredge area to locate sample stations. Sample stations were selected based on existing site constraints as discussed in Section 2 and are representative of the depth of the sediment to be dredged/disturbed.

Sample locations, as presented on Figures 1 and 2, have the prefix "SPS" and "R5S" to reference southern Reach 5 dredge area or "SPN" and "R5N" to reference the northern Reach 5 dredge area. Samples will be composited into upper and lower intervals, as applicable, to represent sediment to be dredged and sediment to be exposed after dredging, respectively. Sample stations, core length, and water depth are presented in Table 4 below.

Table 4. Sample Locations and Depth

Sample Station	Northing	Easting	Approximate Water Depth Range (feet)	Collection Method	Core Length (feet)[1]	Sample Intervals (feet bss)	
						Upper	Lower
SPN-1	199124.63	979782.34	9.8 to 11.2	Core Drill	45	0 to 9.5	9.5 to 10.5
SPN-2	199175.01	979791.29	9.8 to 11.2	Core Drill	45	0 to 9.5	9.5 to 10.5
R5N-1	199167.34	979828.03	9.8 to 11.2	Vibracore	9.5	0 to 9.5	Not Applicable (see Note 2)
R5N-2	199154.47	979872.65	9.8 to 11.2	Vibracore	9.5	0 to 9.5	Not Applicable (see Note 2)
R5N-3	199099.99	979845.43	9.8 to 11.2	Vibracore	8.5	0 to 7.5	7.5 to 8.5
R5N-4	199112.99	979864.42	9.8 to 11.2	Vibracore	9.5	0 to 9.5	Not Applicable (see Note 2)

Sample Station	Northing	Easting	Approximate Water Depth Range (feet)	Collection Method	Core Length (feet)[1]	Sample Intervals (feet bss)	
						Upper	Lower
R5N-5	199118.95	979817.47	9.8 to 11.2	Vibracore	9.5	0 to 9.5	Not Applicable (see Note 2)
SPS-1	198732.97	979671.50	9 to 15	Core Drill	45	0 to 9.5	Not Applicable (see Note 2)
SPS-2	198783.02	979682.20	9 to 15	Core Drill	45	0 to 9.5	Not Applicable (see Note 2)
R5S-1	198790.87	979708.29	9 to 15	Vibracore	8.5	0 to 7.5	7.5 to 8.5
R5S-2	198772.90	979723.51	9 to 15	Vibracore	10.5	0 to 10.5	Not Applicable (see Note 2)
R5S-3	198711.53	979729.76	9 to 15	Vibracore	6.5	0 to 5.5	5.5 to 6.5
R5S-4	198730.26	979713.56	9 to 15	Vibracore	10.5	0 to 10.5	Not Applicable (see Note 2)
R5S-5	198718.50	979683.39	9 to 15	Vibracore	7.5	0 to 6.5	6.5 to 7.5

Abbreviations:
bss = below sediment surface
Note:
[1] Location and depth of cores may change based on site conditions at the time of collection. Alternate locations are shown on Figures 1 and 2.
[2] The NYSDEC requirement to drive cores 1 foot below project depth is not applicable at these locations because a concrete slab, as part of the FBS installation, will be placed on the post dredge surface in each of the target dredge areas. Therefore, driving sample cores 1 foot below the project depth within the target dredge area will not be performed because the post dredge surface will not be exposed.

Samples will be collected in accordance with Appendix B (Sediment Sampling Standard Operating Procedures). Samples will be handled and analyzed in accordance with Table 4 and SSAP Appendix A (Chain of Custody, Handling, Packing and Shipping Standard Operating Procedures; Arcadis 2023).

3.4 Water Quality Monitoring and Sampling

Baseline water quality monitoring will include monitoring and sampling activities to assess the following:

- Naturally occurring background concentrations of turbidity within the Hudson River
- Representative measurement of potential constituents of concern (COCs) within the water column during conditions preceding intrusive in-water work.

Field investigations, data collection, monitoring, and/or sampling procedures may be performed involving one or more of the SOPs listed below.

- Appendix A Chain of Custody, Handling, Packing, and Shipping Standard Operating Procedures
- Appendix C Field Documentation Standard Operating Procedures
- Appendix D Field Equipment Decontamination Standard Operating Procedures
- Appendix E Water Quality Sampling Standard Operating Procedure

3.4.1 Water Quality Monitoring

Water quality monitoring will be performed using real-time measurements to collect quantitative readings. A water quality meter with cellular modem telemetry will be used to measure turbidity. Water quality meters for baseline monitoring will be installed and anchored at two (2) locations, one inside the marina and one outside of the marina area, away from the proposed in-water work area. Meter installation and baseline data collection will also be performed at least one week prior to intrusive in-water activities. Water quality meters will be installed and maintained based on manufacturers specifications. The meters will be equipped with the ability to notify field personnel if/when water quality action levels are exceeded during active work periods.

3.4.2 Water Column Sampling

Water column sampling will be performed during two sampling events in the month leading up to intrusive work activities to obtain representative baseline measurements of potential COCs water column. The sample locations will be collocated at the upstream and downstream water quality monitoring stations discussed in Section 3.4.1.

Samples will be collected in accordance with Appendix E (Water Quality Sampling Standard Operating Procedure). Samples will be handled and analyzed in accordance with Table 4 and SSAP Appendix A (Chain of Custody, Handling, Packing and Shipping Standard Operating Procedures; Arcadis 2023).

3.5 Sample Containers

The samples for each analytical parameter will be collected and preserved in appropriate lab provided sample containers. The sample containers provided by the analytical laboratories will be new, pre-cleaned, and certified by the manufacturer. Sample container certifications will be maintained by the analytical laboratories in a manner that will allow each sample container (e.g., glassware, bottles) order to be traced to its respective certification. At a minimum, the sample containers supplied by the laboratory will meet EPA's Specifications and Guidance for Contaminant Free Sample Containers (EPA 540/R-931051, December 1992).

3.6 Sample Designation

A unique identification (ID) number will be assigned to each sample prior to collection. Field duplicate samples, which will receive an entirely separate sample ID number, will be noted under sample description in the field book (described below).

3.7 Sample Handling and Documentation

The information presented below is intended to provide specific information regarding sample and document custody procedures. The objective of field custody is to assure the samples are not tampered with from the time of collection through time of transport to the analytical laboratory. Field custody documentation consists of both field books and field Chain of Custody (COC) forms as discussed below, while Appendix A provides additional information relevant to this topic.

3.7.1 Field Books

Field books provide the means of recording sample collection activities. As such, entries will be described in as much detail as possible so that individuals returning to the site or reviewing the analytical data can reconstruct a particular situation. Details on the information to be included in the field book are provided in Appendix C.

Field books will be stored in a secure location when not in use. Entries into the books will be made in indelible and waterproof ink and will contain a variety of information including, the equipment used to collect samples will be noted, time of sampling, sample ID (discussed above), sample description, sample location and coordinates (X, Y, and Z), depth at which the sample was collected, and volume and number of containers.

3.7.2 Chain of Custody and Sample Labels

The SOP for the COC establishment for all samples collected in the field is set forth in Appendix A. (The SOP for COC for samples in the laboratory will be established by the laboratory handling the sample.) As described in Appendix A, complete COC forms will be required for samples to be analyzed. COC forms will be initiated by the sampling crew in the field and will be completed in indelible ink. The COC forms will contain the sample's unique ID number, sample date and time, sample description, sample type, preservation (if any), and analyses required. The original COC form will accompany the samples to the laboratory. Copies of the COC will be made prior to shipment (or multiple copy forms used) for field documentation. The COC forms will always remain with the samples. The samples and signed COC forms will remain in the possession of the sampling crew until the samples are delivered to the express carrier (e.g., Federal Express), hand delivered to the laboratory or their courier, or placed in secure storage.

Sample labels will be completed for each sample using indelible ink. The labels will include sample information such as sample ID and location, type of sample, date and time of sampling, sampler's name (or initials), preservation method, and analyses to be performed. The completed sample labels will be affixed to each sample container and covered with clear tape.

Whenever samples are split with another party (e.g., United States Environmental Protection Agency (USEPA), a separate Sample Receipt will be prepared for those samples and marked to indicate with whom the samples are being split. The person relinquishing the samples to the other party should request the representative's signature

acknowledging sample receipt. If the representative is unavailable or refuses to sign, this should be noted in the "Received By" space.

3.8 Equipment Decontamination

Non-disposable equipment will be cleaned after completing each sampling event, between sampling events, and prior to leaving the site. Equipment decontamination procedures are described in Appendix D and include the cleaning well as the cleaning of subsurface sampling equipment.

3.9 Management of Investigation-Derived Waste

IDW that will be generated during sediment, soil and water quality sampling may include excess sample material, decontamination fluids, used personal protective equipment (PPE), and disposable equipment. The management of these materials is discussed below.

Any excess sample material will be containerized and placed in 55-gallon drums and temporarily stored on site in a secured location. All drums will include a record of the materials contained within including, sample locations and the dates on which the material was generated. These materials will be characterized as necessary for profile approval, and then transported off-site for disposal at a permitted facility.

Any decontamination fluids containing non-indigenous materials (e.g., hexane, alconox solution) generated during performance of the sediment sampling will be containerized in 55-gallon drums. These drum(s) will be temporarily stored on site in a secured location. These materials will be characterized as necessary for profile approval, and then transported off-site for disposal at a permitted facility.

Used PPE, disposable equipment, and other debris (e.g., plastic, tubes, etc.) will be containerized in 55-gallon drums. These drum(s) will be temporarily stored on site in a secured location. These materials will be characterized as necessary for profile approval, and then transported off-site for disposal at a permitted facility.

4 Analytical Laboratory Testing

The specific analytical protocols to be followed for the various groups of analytes are summarized in Table 5 below. In general, analytical services will employ EPA-approved protocols.

Table 5. Laboratory Analytical Methods

Parameter	Analytical Method
Sediment Samples	
Metals	
Arsenic	USEPA SW-846 Method 6010B
Cadmium	USEPA SW-846 Method 6010B
Copper	USEPA SW-846 Method 6010B
Lead	USEPA SW-846 Method 6010B
Mercury	USEPA SW-846 Method 6010B, 7470
Polycyclic aromatic Hydrocarbons (PAH) and Petroleum-Related Compounds	
Benzene	USEPA SW-846 Method 8021, 8260B
Total BTX	USEPA SW-846 Method 8021, 8260B
Total PAH	USEPA SW-846 Method 8270
Pesticides	
Sum of DDT+DDE+DDD	USEPA SW-846 Method 8081A
Mirex	USEPA SW-846 Method 8081A
Chlordane	USEPA SW-846 Method 8081A
Dieldrin	USEPA SW-846 Method 8081A
Chlorinated Hydrocarbons	
PCBs (Aroclor-specific)	USEPA SW-846 Method 8082
Dioxin (Toxic Equivalency Total)	USEPA SW-846 Method 1613B
Physical Properties	
Grain Size Analysis	ASTM Method D41/D42
Total Organic Carbon	USEPA SW-846 Method 9060A
Percent Moisture	ASTM D2216-19
Baseline Water Quality Samples	
Total suspended solids	USEPA SW-846 Method 160.2
Metals	
Copper (dissolved)	USEPA SW-846 Method 6010B
Lead (dissolved)	USEPA SW-846 Method 6010B
Mercury (total)	USEPA SW-846 Method 7470
Nickel (dissolved)	USEPA SW-846 Method 6010B
Zinc (dissolved)	USEPA SW-846 Method 6010B
PAHs and Petroleum-Related Compounds	
Benzo(a)pyrene (unfiltered)	USEPA SW-846 Method 610
Naphthalene (unfiltered)	USEPA SW-846 Method 610
PCB Aroclors (unfiltered)	
Aroclor 1242	USEPA SW-846 Method 8082

Parameter Sediment Samples	Analytical Method
Aroclor 1248	USEPA SW-846 Method 8082
Aroclor 1254	USEPA SW-846 Method 8082
Aroclor 1260	USEPA SW-846 Method 8082

Notes:
1. Analysis of additional parameter may be required to demonstrate compliance with the NJDEP Soil Remediation Standards and Screening Levels and to meet NJDEP disposal requirements for the dredge material.

The sample results will be compared to the NYSDEC TOGS 5.1.9 Sediment Quality Threshold Values for Dredging, Riparian or In-water Placement to determine sediment chemistry class as presented in Table 6 below. In addition, the sample results will be reviewed against NYSDEC Soil Cleanup Objectives presented in 6 NYCRR Part 375 and New Jersey Department of Environmental Protection (NJDEP) Soil Remediation Standards and Screening Levels to determine the appropriate upland disposal of dredged material. In addition, physical properties of the sediment (i.e., grain size, total organic carbon, and moisture content) will be reviewed in coordination with the NYSDEC to determine if additional analyses will be required.

Table 6. Sediment Quality Threshold Values for Dredging, Riparian or In-water Placement

Compound	Class A	Class B	Class C	Derivation Code
Metals (mg/kg)				
Arsenic	< 14 (8.2)	(8.2) 14 – 53	> 53	1
Cadmium	< 1.2	1.2-9.5	> 9.5	1
Copper*	< 33	33-207 (270)	> 207 (270)	1
Lead	< 33 (47)	33 (47) – 166 (218)	> 166 (218)	1
Mercury*	< 0.17	0.17 – 1.6 (1.0)	> 1.6 (1.0)	1
PAHs and Petroleum-Related Compounds (mg/kg)				
Benzene	< 0.59	0.59 – 2.16	> 2.16	2
Total BTEX*	< 0.96	0.96 – 5.9	> 5.9	2
Total PAH[1]	< 4	4 – 35 (45)	>35 (45)	1
Pesticides (mg/kg)				
Sum of DDT+DDD+DDE+	< 0.003	0.003 – 0.03	> 0.3	2
Mirex*+	< 0.0014	0.0014 – 0.014	> 0.014	2
Chlordane*+	< 0.003	0.003 – 0.036	> 0.036	1
Dieldrin	< 0.11	0.11 – 0.48	> 0.48	2
Chlorinated Hydrocarbons (mg/kg)				
PCBs (sum of aroclors)[2]	< 0.1	0.1 – 1	> 1	3
2,3,7,8-TCDD*[3]	< 0.0000045	0.0000045 – 0.00005	> 0.00005	4

Notes:
+Threshold values lower than the Method Detection Limit are superseded by the Method Detection Limit. See Table 1 of the Technical & Operation Guidance Series (TOGS) 5.1.9, In-Water and Riparian Management of Sediment and Dredge Material (NYSDEC 2004).
*Indicates case-specific parameter (see Chapter II, Section A of the NYSDEC TOGS 5.1.9, In-Water and Riparian Management of Sediment and Dredge Material (NYSDEC 2004).
[1]For Sum of PAH, See Appendix E of the NYSDEC TOGS 5.1.9, In-Water and Riparian Management of Sediment and Dredge Material (NYSDEC 2004).
[2]For the sum of the 22 PCB congeners required by the USACE NYD or EPA Region 2, the sum must be multiplied by two to determine the total PCB concentration.
[3]TEQ calculation as per the NATO – 1988 method (see Appendix D of the NYSDEC TOGS 5.1.9, In-Water and Riparian Management of Sediment and Dredge Material (NYSDEC 2004)).

5 References

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Matrix New World Engineering, Land Surveying and Landscape Architecture. 2022. Environmental Findings Report, Corridor Environmental Site Assessment, North/West Battery Park City Resiliency Project, New York, New York. February 28.

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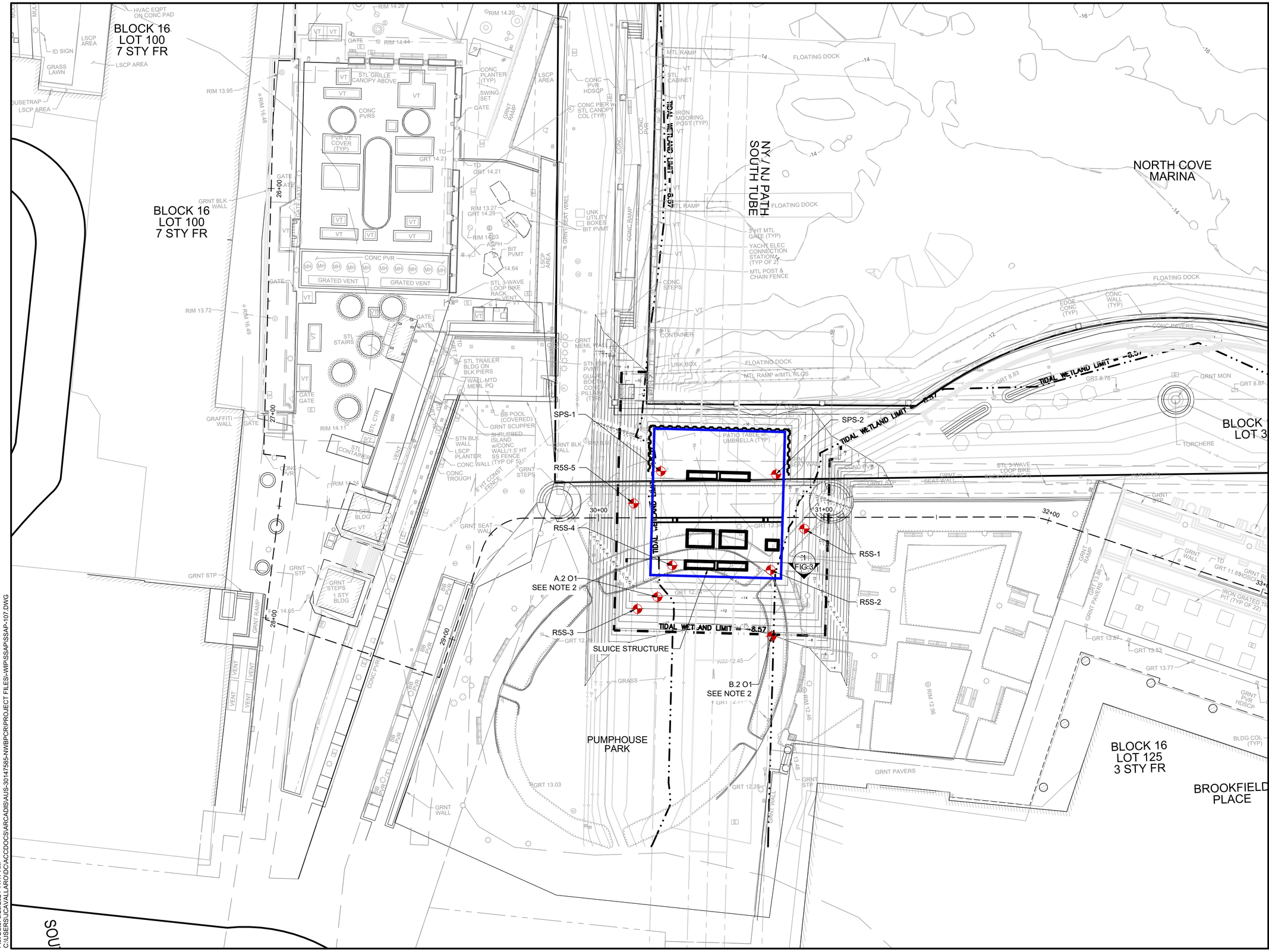
NYSDEC. 2023. 6 CRR-NY. NY-CRR Official Compilation of Codes, Rules, and Regulations of the State of New York. Title 6. Department of Environmental Conservation. Chapter IV. Quality Services. Subchapter B. Solid Wastes. Part 375.Environmental Remediation Programs. Subpart 375-6. Remedial Program Soil Cleanup Objectives. February 28. Available online at: Browse - New York Codes, Rules, and Regulations (westlaw.com)

New Jersey Department of Environmental Protection. 2021. N.J.A.C. 7:26 Remediation Standards. May 17. Available online at: https://dep.nj.gov/wp-content/uploads/rules/rules/njac7_26d.pdf

Figures



LEGEND

- BORING LOCATION
- TARGET DREDGE AREA
- 13.50 EXISTING CONTOUR
- -14- EXISTING BATHYMETRY
- -12 LIMITS OF SLOPING

NOTES:

1. SEDIMENT CORE SPN-1 AND SPN-2 WILL BE COLLECTED CONCURRENT WITH THE PROPOSED GEOTECHNICAL BORINGS AS PRESENTED IN THE NORTH WEST BATTERY PARK CITY RESILIENCY PROJECT, GEOTECHNICAL INVESTIGATION - NORTH PATH AND SOUTH PATH BOREHOLE PLAN (AECOM 2023). COORDINATION WITH THE GEOTECHNICAL BORING PROGRAM WILL BE PERFORMED TO FACILITATE SEDIMENT SAMPLING. SEDIMENT CORES R5S-1, R5S-2, R5S-3, R5S-4 AND R5S-5 WILL BE COLLECTED AFTER THE EXISTING STRUCTURES AND PLATFORMS ARE REMOVED DURING CONSTRUCTION. THE SEDIMENT SAMPLES WILL BE COLLECTED FOR LABORATORY ANALYSIS IN ACCORDANCE WITH TABLE 4 OF THIS SEDIMENT SAMPLING AND ANALYSIS PLAN.
2. CONTINGENCY BORINGS WILL BE COLLECTED AT A.2 O1 AND B.2 O1 ONLY IF THE PRIMARY BORINGS AT SPS-1 AND SPS-2 CAN'T BE COMPLETED DUE TO NEARBY UNDERGROUND UTILITIES AND IMPACTS TO STRUCTURAL INTEGRITY OF THE EXISTING PLATFORMS.
3. SAMPLE LOCATIONS AND DEPTHS ARE SUBJECT TO CHANGE BASED ON POTENTIAL ADJUSTMENTS TO THE BRIDGING STRUCTURE LOCATIONS AND SITE CONDITIONS AT THE TIME OF SAMPLE COLLECTION.
4. THE BRIDGING STRUCTURE SHOWN IS UNDER DESIGN AND SUBJECT TO CHANGE; THE SIZE OF THE BRIDGING STRUCTURE MAY BE LARGER THAN SHOWN; A CONSERVATIVE AREA OF THE STRUCTURE FOOTPRINT (420 SY) WAS USED TO CALCULATE THE NUMBER OF REQUIRED SAMPLES FOR THE SOUTH FBS STRUCTURE.
5. HORIZONTAL DATUM IS NY LONG ISLAND STATE PLANE COORDINATE SYSTEM NAD 83 (2011) BASED ON SIMULTANEOUS STATIC GPS OBSERVATIONS BY MATRIX NEW WORLD ON 08/04/2021.
6. ELEVATIONS SHOWN ARE IN NAVD88, BASED ON SIMULTANEOUS STATIC GPS OBSERVATIONS BY MATRIX NEW WORLD ON 08/04/2021 AND UNDERWATER INSPECTIONS PERFORMED BY MARINE SOLUTIONS FROM JANUARY 2024 THROUGH FEBRUARY 2024.
7. CONTROL SURVEY, BOUNDARY SURVEY, TOPOGRAPHIC SURVEY, AND UTILITIES SURVEY WAS PERFORMED BY MATRIX NEW WORLD AND PROVIDED TO ARCADIS AS RELIANCE DOCUMENTS FOR THIS PROJECT, DATED AUGUST 29, 2022. PDB CONTRACT REFERENCE DOCUMENTS APPENDIX 14 - DOC # 110 REV 10.17.22.

SCALE: 1" = 20'

NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT

SEDIMENT SAMPLING AND ANALYSIS PLAN

DREDGE EXTENTS AND SAMPLE LOCATIONS

ARCADIS

FIGURE 1

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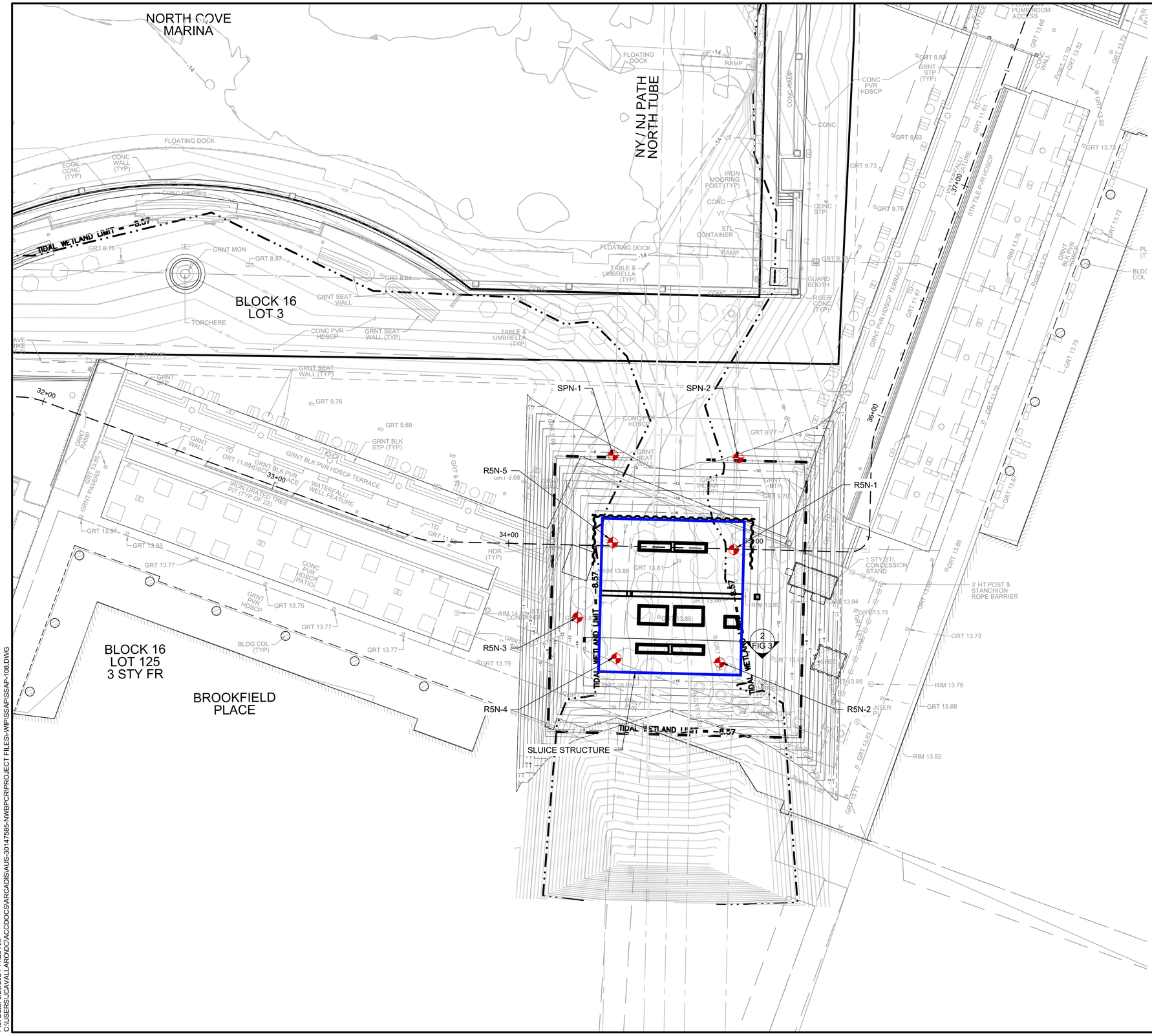

LEGEND

- BORING LOCATION
- TARGET DREDGE AREA
- 13.50 EXISTING CONTOUR
- -14 EXISTING BATHYMETRY
- -12 LIMITS OF SLOPING

NOTES:

1. SEDIMENT CORE SPN-1 AND SPN-2 WILL BE COLLECTED CONCURRENT WITH THE PROPOSED GEOTECHNICAL BORINGS AS PRESENTED IN THE NORTH WEST BATTERY PARK CITY RESILIENCY PROJECT, GEOTECHNICAL INVESTIGATION - NORTH PATH AND SOUTH PATH BOREHOLE PLAN (AECOM 2023). COORDINATION WITH THE GEOTECHNICAL BORING PROGRAM WILL BE PERFORMED TO FACILITATE SEDIMENT SAMPLING. SEDIMENT CORES R5N-2, R5N-3, R5N-4 AND R5N-5 WILL BE COLLECTED AFTER THE EXISTING STRUCTURES AND PLATFORMS ARE REMOVED DURING CONSTRUCTION. THE SEDIMENT SAMPLES WILL BE COLLECTED FOR LABORATORY ANALYSIS IN ACCORDANCE WITH TABLE 5 OF THIS SEDIMENT SAMPLING AND ANALYSIS PLAN.
2. SAMPLE LOCATIONS AND DEPTHS ARE SUBJECT TO CHANGE BASED ON POTENTIAL ADJUSTMENTS TO THE BRIDGING STRUCTURE LOCATIONS AND SITE CONDITIONS AT THE TIME OF SAMPLE COLLECTION.
3. THE BRIDGING STRUCTURE SHOWN IS UNDER DESIGN AND SUBJECT TO CHANGE; THE SIZE OF THE BRIDGING STRUCTURE MAY BE LARGER THAN SHOWN; A CONSERVATIVE AREA OF THE STRUCTURE FOOTPRINT (400 SY) WAS USED TO CALCULATE THE NUMBER OF REQUIRED SAMPLES FOR THE NORTH FBS STRUCTURE.
4. HORIZONTAL DATUM IS NY LONG ISLAND STATE PLANE COORDINATE SYSTEM NAD 83 (2011) BASED ON SIMULTANEOUS STATIC GPS OBSERVATIONS BY MATRIX NEW WORLD ON 08/04/2021.
5. ELEVATIONS SHOWN ARE IN NAVD88, BASED ON SIMULTANEOUS STATIC GPS OBSERVATIONS BY MATRIX NEW WORLD ON 08/04/2021 AND UNDERWATER INSPECTIONS PERFORMED BY MARINE SOLUTIONS FROM JANUARY 2024 THROUGH FEBRUARY 2024.
6. CONTROL SURVEY, BOUNDARY SURVEY, TOPOGRAPHIC SURVEY, AND UTILITIES SURVEY WAS PERFORMED BY MATRIX NEW WORLD AND PROVIDED TO ARCADIS AS RELIANCE DOCUMENTS FOR THIS PROJECT, DATED AUGUST 29, 2022. PDB CONTRACT REFERENCE DOCUMENTS APPENDIX 14 - DOC # 110 REV 10.17.22.

0 20 40 Feet
SCALE: 1" = 20'

NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT

SEDIMENT SAMPLING AND ANALYSIS PLAN

DREDGE EXTENTS AND SAMPLE LOCATIONS

ARCADIS FIGURE 2

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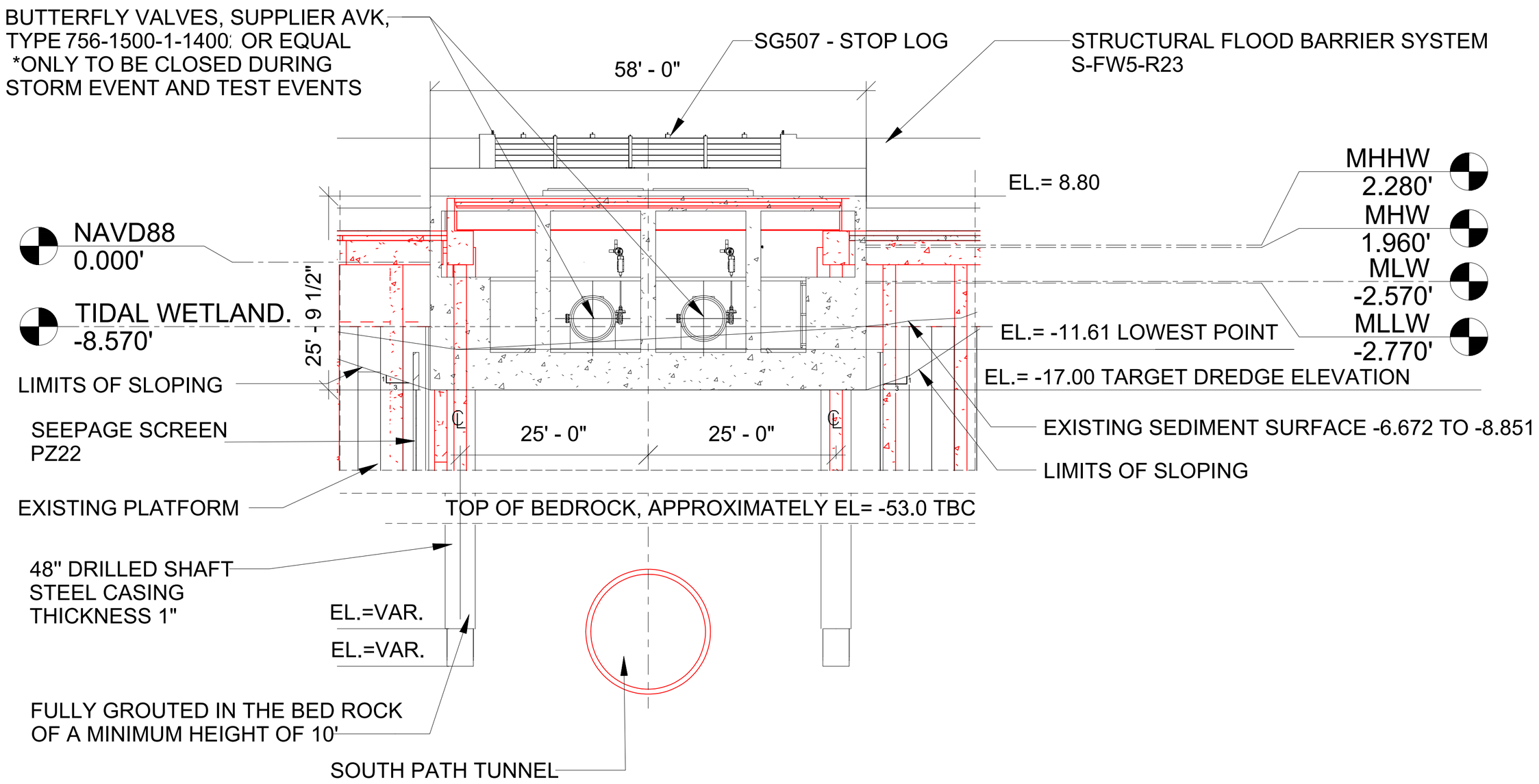
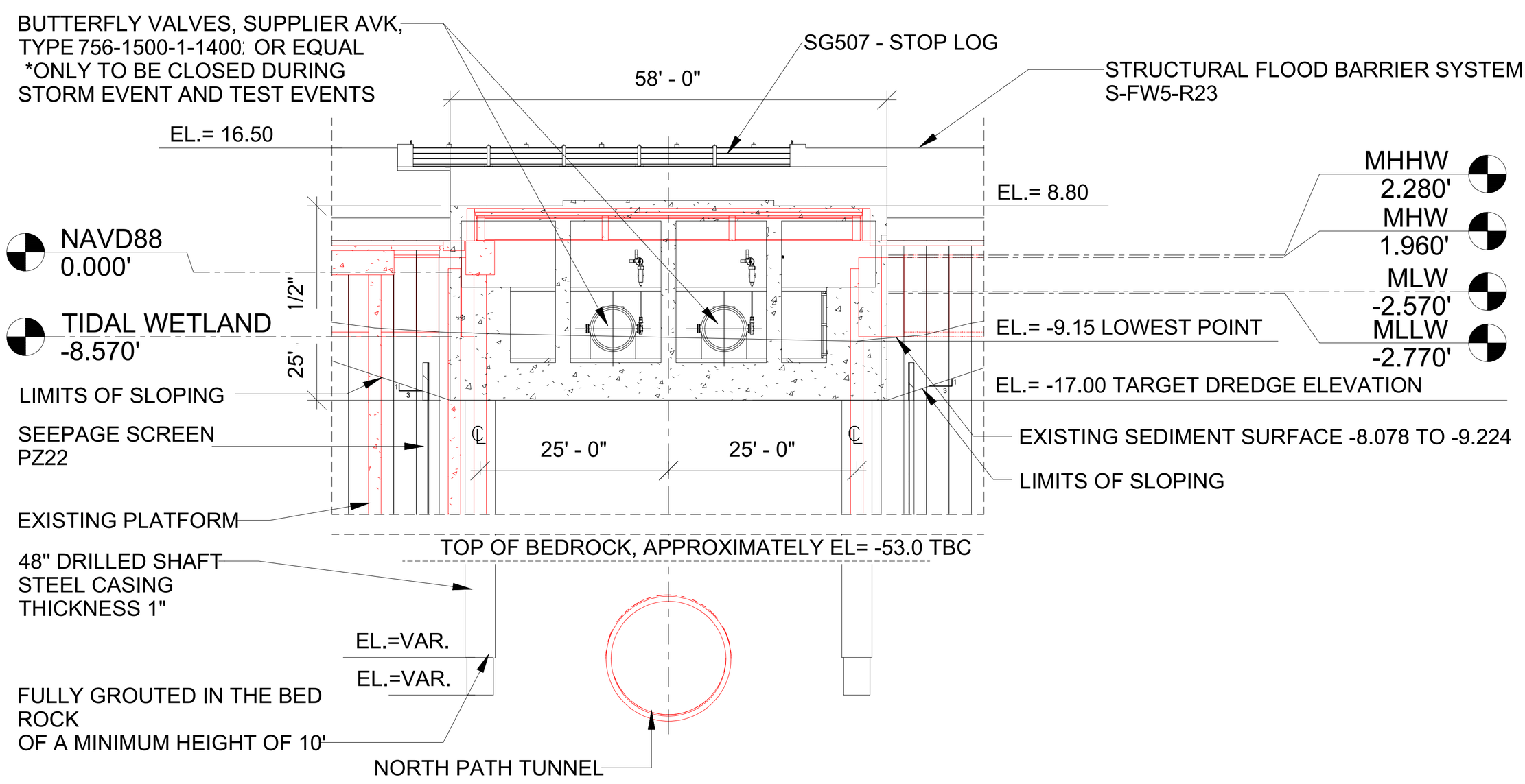


1 / FIGURE 1 — SPS - LONGITUDINAL SECTION 1 AREA 7 - REACH 5
SCALE 3/32" = 1'-0"



2 / FIGURE 2 — SPN - LONGITUDINAL SECTION 2 AREA 8 - REACH 5
SCALE 3/32" = 1'-0"

LEGEND

EXISTING FEATURE

PROPOSED BRIDGING STRUCTURE

NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT

SEDIMENT SAMPLING AND ANALYSIS PLAN

LONGITUDINAL SECTIONS AND DREDGE ELEVATIONS AREAS 7 AND 8 - REACH 5

ARCADIS

FIGURE 3

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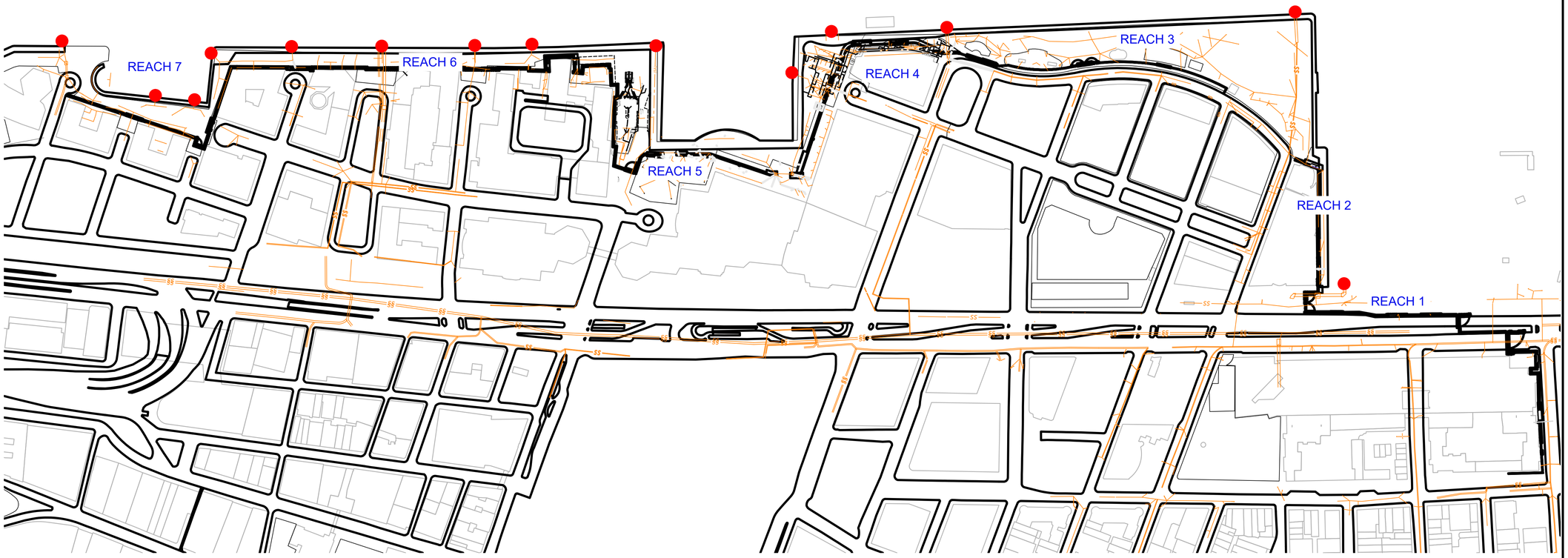

LEGEND

EXISTING OUTFALLS

NOTES:

1. CONTROL SURVEY, BOUNDARY SURVEY, TOPOGRAPHIC SURVEY, AND UTILITIES SURVEY WAS PERFORMED BY MATRIX NEW WORLD AND PROVIDED TO ARCADIS AS RELIANCE DOCUMENTS FOR THIS PROJECT, DATED AUGUST 29, 2022. PDB CONTRACT REFERENCE DOCUMENTS APPENDIX 14 - DOC # 110 REV 10.17.22.

0 200 400 Feet

SCALE: 1" = 200'

NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT

SEDIMENT SAMPLING AND ANALYSIS PLAN

OUTFALL LOCATIONS

ARCADIS

FIGURE 4

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Appendix

SOP: Chain of Custody, Handling, Packing and Shipping

1 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the chain-of-custody (COC), handling, packing, and shipping procedures for the management of samples to decrease the potential for cross-contamination, tampering, misidentification, and breakage, and to ensure that samples are maintained in a controlled environment from the time of collection until receipt by the analytical laboratory.

2 EQUIPMENT LIST

The following materials and supplies, as appropriate, are necessary for chain-of custody handling, packing, and shipping:

- Indelible ink pens (black or blue)
- Polyethylene bags (resealable-type)
- Clear packing tape, strapping tape, duct tape
- COC forms
- Department Of Transit (DOT) shipping forms, as applicable
- Custody seals or tape
- Appropriate sample containers and labels
- Insulated coolers of adequate size for samples and ice
- Ice
- Cushioning and absorbent material (i.e., bubble wrap or bags)
- Temperature blank (if provided by laboratory)
- Sample return shipping papers and addresses
- Field log book

3 CHAIN-OF-CUSTODY PROCEDURES

- Prior to collecting samples, complete the COC form header information by filling in the project number, project name, and the name(s) of the sampling technician(s). Please note that it is important that COC information is printed legibly using indelible ink. An example COC form is provided as Exhibit 1-1.
- After sample collection, enter the individual sample information on the COC as described below. Note that the descriptions below are based on a typical COC; however information included may be modified based on the selected laboratory's preference.

- Sample Identification indicates the station number or location that the sample was collected from (including depth) and the year of sampling. An example of a complete sample name is “SB-3-2015 (0.5-1.0)”, where the 0.5-1.0 represents the depth interval in feet from where the sample was collected. Please note it is very important that the use of hyphens in sample names and the depth units (i.e., feet or inches) remain consistent for all samples entered on the COC form. Sample names may also use the abbreviations “MS/MSD,” “FB,” “TB,” and “DUP” as prefixes or suffixes to indicate that the sample is a matrix spike/matrix spike duplicate, field blank, trip blank, or field duplicate, respectively.
- List the date of sample collection. The date format to be followed should be mm/dd/yyyy (e.g., 10/01/2015).
- List the time at which the sample was collected. The time value should be presented using the military format. For example, 3:15 P.M. should be entered as 15:15.
- The “composite” field should be marked with an “X” if the sample was collected as a composite of a period of time or from several different locations and mixed prior to placing in sample containers.
- The “grab” field should be checked if the sample was collected as an individual grab sample.
- Any sample preservation should be noted.
- The analytical parameters for which the samples are being analyzed should be written legibly on the diagonal lines. As much detail as possible should be presented to allow the analytical laboratory to properly analyze the samples. For example, polychlorinated biphenyl (PCB) analyses may be represented by entering “PCBs” or “Method 8082.” These columns should also be used to present project-specific parameter lists. Each sample that requires a particular parameter analysis will be identified by placing the number of containers in the appropriate analytical parameter column.
- Number of containers for each method requested. This information may be included under the parameter or as a total for the sample based on the COC form used.
- Note any special analytical requirements to the laboratory. These requirements may be on a per sample basis such as “extract and hold sample until notified” or may be used to inform the laboratory of special reporting requirements for the sample. Reporting requirements that should be specified in the remarks column include: 1) turnaround time; 2) contact and address where data reports should be sent; 3) name of laboratory project manager; and 4) type of sample preservation used (if any).
- If available, attach or reference the Laboratory Work Authorization forms.
- Provide contact name and phone number in the event there are problems encountered when the samples are received by the laboratory.
- The “Relinquished By” field should contain the signature of the sampling technician that relinquished custody of the samples to the shipping courier or the analytical laboratory.

  - The "Date" field following the signature block indicates the date that the samples were relinquished. The date format should be mm/dd/yyyy (e.g., 10/01/2015).
  - The "Time" field following the signature block indicates the time that the samples were relinquished. The time value should be presented using the military format. For example, 3:15 P.M. should be entered as 15:15.
  - The "Received By" section is signed by the sample courier or laboratory representative that received the samples from the sampling technician or it is signed upon laboratory receipt from the overnight courier service.
- Complete as many COC forms as necessary to properly document the collection and transfer of the samples to the analytical laboratory.
- Upon completion of the COC forms, forward two copies to the analytical laboratory and retain one for the field records. A copy of the completed chain-of-custody form will be sent to the Project Manager or designee for review.
- If electronic chain-of-custody forms are utilized, sign the form and make one copy for Arcadis of New York, Inc.'s (Arcadis') internal records and forward the original with the samples to the laboratory.

4 HANDLING

- After completing the sample collection procedures, record the following information in the field notebook with indelible ink:
  - project number and site name;
  - sample identification code and other sample identification information, if appropriate;
  - sampling method;
  - date;
  - name of sampler(s);
  - time;
  - location (project reference);
  - location(s) that field quality control (QC) samples were collected including blind duplicates and additional sample volume for matrix spikes; and
  - any other comments.
- Fill in sample label with the following information in indelible ink (note that the descriptions below are based on a typical labels; however information included may be modified based on the selected laboratory's preference):
  - sample type (e.g., sediment);
  - project number and site name;

- sample identification code and other sample identification information, if applicable;
- analysis required;
- date sampled;
- time sampled;
- initials of sampling personnel;
- sample type (composite or discrete);
- tissue preparation procedure (biota; e.g. fillets, whole body), if applicable; and
- preservative added, if applicable.

An example label is provided in Exhibit 1-2.

- If water proof labels are not used, cover the label with clear packing tape to secure the label onto the container.
- Check the caps on the sample containers to ensure that they are tightly sealed.
- In some instances it may be necessary to wrap the sample container cap with clear packing tape to prevent it from becoming loose.
- Custody seal label evidence tape may be placed on the shipping container or they may be placed on each sample container such that the cooler or cap cannot be removed without breaking the custody seal. The custody seal should be initialed and dated prior to relinquishing the samples. An example custody seal is provide in Exhibit 1-3.

5 PACKING PROCEDURES

Following collection, samples must be placed on wet ice to initiate cooling to 6°C immediately. Retain samples on ice until ready to pack for shipment to the laboratory.

- Using duct tape, secure the outside and inside of the drain plug at the bottom of the cooler that is used for sample transport.
- Place each container or package in individual polyethylene bags (resealable-type) and seal. If a cooler temperature blank is supplied by the laboratory, it should be packaged following the same procedures as the samples. If the laboratory did not include a temperature blank, do not add one since the sample temperature will be determined by the laboratory using a calibrated infrared thermometer.
- Place 1 to 2 inches of cushioning material (i.e., vermiculite) at the bottom of the cooler.
- Place the sealed sample containers upright in the cooler.
- Package ice or blue ice in small resealable-type plastic bags and place loosely in the cooler. Do not pack ice so tightly that it may prevent addition of sufficient cushioning material. Samples placed on ice will be cooled to and maintained at a temperature of approximately 6°C.

- Fill the remaining space in the cooler with cushioning material. The cooler must be securely packed and cushioned in an upright position and be surrounded (Note: to comply with 49 CFR 173.4, filled cooler must not exceed 64 pounds).
- Place the completed COC forms in a large resealable-type bag and tape the bag to the inside of the cooler lid.
- Close the lid of the cooler and fasten with packing tape.
- Wrap strapping tape around both ends of the cooler.
- Mark the cooler on the outside with the following information: shipping address, return address, “Fragile, Handle with Care” labels on the top and on one side, and arrows indicating “This Side Up” on two adjacent sides.
- Place custody seal evidence tape over front right and back left of the cooler lid, initial and date, and then cover with clear plastic tape.

Note: Some procedures may be modified in cases where laboratories provide customized shipping coolers. These coolers are designed so the sample bottles and ice packs fit snugly within preformed Styrofoam cushioning and insulating packing material.

6 SHIPPING PROCEDURES

All samples will be delivered by an express carrier within 48 hours of sample collection. Alternatively, a laboratory courier may be used for sample pickup or the samples may be hand delivered.

The following COC procedures will apply to sample shipping:

- Relinquish the sample containers to the laboratory via express carrier or laboratory courier. The signed and dated forms should be included in the cooler. The express carrier will not be required to sign the COC forms.
- When the samples are received by the laboratory, the laboratory personnel shall complete the COC by recording the data and time of receipt of samples, measure and record the internal temperature of the shipping container, and then check the sample identification numbers on the containers to ensure that they correspond to the COC forms.
- If parameters with short holding times are required, sampling personnel will take precautions to ship or deliver samples to the laboratory so that the holding times will not be exceeded.
- Samples must be maintained at 6°C±2°C until shipment and through receipt at the laboratory.
- All shipments must be in accordance with DOT regulations and dangerous goods shipping requirements.
- When the samples are received by the laboratory, the laboratory personnel shall complete the COC by recording the data and time of receipt of samples, measure and record the internal temperature of

the shipping container, and then check the sample identification numbers on the containers to ensure that they correspond to the COC forms.

Any deviations between the COC and the sample containers, broken containers, or temperature excursions will be communicated to Arcadis immediately by the laboratory.

Exhibit 1-1

ARCADIS

CHAIN OF CUSTODY LABORATORY ANALYSIS REQUEST FORM

Lab Work Order #

Send Results to:

Contact & Company Name:	Telephone:
Address:	Fax:
City State Zip	E-mail Address:
Project Name/Location (City, State):	Project #:
Sampler's Printed Name:	Sampler's Signature:

Preservative								
Filtered (✓)								
# of Containers								
Container Information								

PARAMETER ANALYSIS & METHOD

Keys

Preservation Key:	Container Information Key:
A. H2SO4	1. 40 mL Vial
B. HCL	2. 1 L Amber
C. HNO3	3. 250 mL Plastic
D.NaOH	4. 500 mL Plastic
E. None	5. Encore
F.	6. 2 oz. Glass
G.	7. 4 oz. Glass
H.	8. 8 oz. Glass
	9. 125 mL Plastic
	10. 4 oz. Amber

Matrix Key:

SO- Soil	SE- Sediment	NL- NAPL/Oil
W- Water	SL- Sludge	SW- Sample Wipe
T- Tissue	A- Air	

Sample ID	Collection Date	Collection Time	Type Comp	Type Grab	Matrix	REMARKS

Special Instructions/Comments:

☐ **Special QA/QC Instructions (✓)**

Laboratory Information and Receipt		Relinquished By	Received By	Relinquished By	Laboratory Received By
Lab Name: Test America	Cooler Custody Seal (✓)	Printed Name: Ronald D Kuhn	Printed Name:	Printed Name:	Printed Name:
☑ Cooler packed with ice (✓)	☐ Intact ☐ Not Intact	Signature:	Signature:	Signature:	Signature:
Specify Turnaround Requirements 24-48hr	Sample Receipt:	Firm: Arcadis	Firm:	Firm:	Firm:
Shipping Tracking #:	Condition/Cooler Temp:	Date/Time: 7/23/09	Date/Time:	Date/Time:	Date/Time:

Exhibit 1-2

ARCADIS

Project #		Date
Sample I.D.		
Sample Type ☐ Soil/Sediment ☐ Water	Collection Mode ☐ Composite ☐ Grab	Time
Analysis		
Sampler(s)	Preservative	

Exhibit 1-3

CUSTODY SEAL

ARCADIS

SEALED BY

DATE _____ TIME _____

6723 Towpath Road, P.O. Box 66 • Syracuse, New York 13214-0066 • Tel 315.446.9120

Appendix

SOP: Sediment Sampling

1 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the field sampling procedures for sediment sampling. Sediment samples may be collected through a variety of mechanisms, however vibracoring is the primary method described herein. The core will be inserted with a straight, vertical entry into the sediments so as to secure a reliably representative cross-section sample. Samples of subsurface material encountered during the core collection will typically be collected continuously to the required depth of the core, or as directed by the supervising geologist or technician, using the methods described below. Core processing and sample collection procedures described in Section 2.3 are applicable to the vibracore and geotechnical boring collection activities.

Personnel will also be responsible for documenting probing and sampling events in the field log notebook. Only qualified personnel (e.g., holds degree in engineering, geology, or related science, and/or has at least two years of relevant experience) will provide descriptions of sediment samples.

2 SEDIMENT SAMPLING

2.1 Sampling Equipment

The following equipment, as appropriate, shall be available during sediment sampling:

- Health and safety equipment (as required in the HASP and the Dive Plan);
- Cleaning equipment (as required in Appendix D);
- Boat (as needed for access);
- Real-time kinematic- (RTK-) global positioning system (GPS) and associated equipment user's manual or proposed survey control as approved by the Engineer;
- Table of target location coordinates (to be provided by the Engineer);
- Stainless steel core driver block;
- Vibracore device (Rossfelder P-3C or equivalent);
- 3-inch (outside diameter) core tube (Lexan® and/or aluminum) with end caps;
- Surveyor's rod or 6-foot rule;
- Graduated rod for sediment depth measurement;
- Duct tape;
- Hacksaw and/or pipe cutters;
- Appropriate sample containers and forms;
- Coolers with ice or "blue ice;"
- Push rod;

- Aluminum pan;
- Stainless steel utensils (or equivalent clean dedicated/disposable equipment);
- Measuring tape;
- Camera; and
- Field notebook.

2.2 Sediment Sampling Procedures

- Before initial use of an RTK-GPS, inspect, calibrate, and maintain the RTK-GPS per equipment user's manual.
- Establish a reference station over a survey control point with precisely known x,y coordinates and elevation (z) relative to the project grid and datum to achieve RTK-GPS precision. The reference station transmits pseudo-range correctors to the RTK-GPS receiver aboard the vessel (either using the shipboard antenna or the "transit" mount), which the unit computes to precise x,y,z position of the shipboard antenna.
- Identify the area to be sampled and navigate as close as possible to the target sample location;
- Don personal protective equipment (PPE) as required by HASP and the Dive Plan;
- If using a boat for access, secure the boat in place using spuds, anchors, or tie lines;
- Select the appropriate length of core tube (Lexane® or aluminum, depending on collection method – use Lexane® with either the hand-push or Vibracore methods in soft sediments and aluminum with the Vibracore method for coarse sediments) based on the probing information in the target sample location;
- For Vibracore core collection method:
    - Mount a clean coring tube into the Vibracore device.
    - Lower the coring apparatus with the core tube attached vertically through the water column, tube end first, until the sediment surface is reached. Measure the depth of water, and survey the water surface elevation (see Survey section below).
    - Vibrate the core into the sediment to refusal. Measure and record the depth of the sediment.
    - Pull the apparatus upward out of the sediment (using a winch) and raise it to the surface while maintaining the core in a vertical position.
    - Before the tube is fully removed from the water, place a cap on the bottom end of the tube while it is still submerged.
    - Keeping the tube upright, wipe the bottom end dry, seal the cap with duct tape, and label. Evaluate the integrity of the core. If the core is not suitably intact, repeat coring procedure a minimum distance of 2 feet from the previously attempted location but within 5 to 10 feet of the

first location attempted. A maximum of three attempts to collect a core will be made for a given location.

- Water overlying the core tube in the coring apparatus will be allowed to drain prior to removal of the core tube.
- Remove the core tube from the Vibracore device and place a second cap on top of the core tube labeled with the site location ID and the word "top." Secure the cap in place with duct tape. Rinse the outside of the core tube with a small amount of site water.
- Measure and record the length of sediment recovered. The length of the cores recovered in the Lexan® tubing will be determined by visual observation and direct measurement. The approximate length of the cores recovered in the aluminum tubing will be determined indirectly by tapping the core with a metal rod. The spot where the pitch of the sound changes corresponds to the approximate top of the recovered core. The distance between the top of the sediment in the core tube and the bottom of the coring tube corresponds to the estimated length of the recovered core.

- After core recovery, enter additional information into the field notebook.
  - date;
  - time of recovery;
  - sample position;
  - water depth (feet);
  - core penetration depth and recovery (inches); and
  - other observations.
- If the sediment recovered within the core is within 90% of the target core depth (i.e., 10.5 feet below sediment surface (bss) for the North FBS area and 11.5 feet bss for the South FBS area), keep the core for analysis. Note, the target depth for the geotechnical borings is 45 feet bss.

2.3 Core Processing Procedures

The general procedures to be utilized for the processing sediment cores and the extraction of samples for chemical analyses are outlined below. Core processing includes observational and photographic logging of the cores and collection of samples from the cores for chemical analyses.

- Maintain the core vertically in the core rack and dry the surface of the core tube with clean paper towels.
- While the core tube is vertical in the core rack, remove the top cap from the core and inspect the sediments within the core to determine if they are comprised of loose, watery sediments (that would slump if placed horizontally) or cohesive sediments. Remove any loose sediment and surface water with a stainless-steel utensil while maintaining the core tube in a vertical position.

- Place the core horizontally on the core processing table and cut the core tube open lengthwise. Split the core in half.
- Mark the sample interval ranges on the outside of the core tube.
- Segment the core into two parts, the upper segment, and the lower segment. These are to represent the sediment to be dredged, the sediment to be exposed after dredging, respectively. The upper segment will be from the top of the core to the proposed dredge depth, and the lower segment will be from the proposed dredge depth to the bottom of the core.
- Describe each core while the core is split open on the core processing table. As cores are processed, qualified personnel will describe each sediment sample interval. Additional information regarding procedures to identify soil types may be found in ASTM Standard D2488-00, entitled "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)." Soil descriptions will be entered in the field notebook or on the Subsurface Log (Exhibit 3-1) for the following parameters.
    - soil type;
    - color;
    - percent recovery;
    - moisture content;
    - texture;
    - grain size and shape;
    - consistency;
    - blow counts, if collected; and
    - miscellaneous observations.

A common soil sample description format should be utilized in the field notes, such as: Color; primary constituent (underlined or capitalized); secondary constituent(s) designated by "and" (if approximately 50 % of the sample, should only be utilized if a second primary constituent is identified), "some" (if approximately 30% to 50% of the sample), "little" (if approximately 10% to 30% of the sample), and/or "trace" (if less than 10% of the sample); description of consistency; moisture content; miscellaneous observations; and initial interpretations (capitalized in parentheses).

- Example 1: Brown fine SAND, some Silt, little medium-coarse Sand, trace concrete and brick debris, loose, wet, trace black staining.
- Example 2: Olive-gray SILT and CLAY, trace fine Gravel, angular dense, wet.

In addition, the boring logs must identify the specific depth of a landfill waste/native sediment interface (if present) and will provide a detailed description of any debris observed in the fill. Observations of staining, sheens, or other potential visual indicators of impacted soil should also be described in detail, including the starting and ending depths of such observations.

- Photograph the opened core. In the photograph, include a ruler or measuring tape for scale and mark the top and bottom ends of the core. Photograph any foreign objects or gaps. Record the photograph number and a description of each photograph in the field notebook.
- Prior to collecting sediment for chemical analysis, remove the smear zone (i.e., the portion of the sediment core that comes into contact with the core tube) over the interval to be sampled, to the extent practical.
- For each sample interval, remove sediment from the open core tube using a decontaminated stainless-steel utensil and place sediment in a clean disposable aluminum pan and remove any debris (e.g., rocks, sticks) greater than ½-inch-diameter. Homogenize the sediment in the pan.
    - Composite samples within the limits of sloping should be made by homogenizing the cores from the same sample area into two samples, one upper and one lower interval. Cores shall be separated into two segments as follows:
        - North and South FBS Structure
            - Upper interval: homogenize over the dredge depth as identified in Table 4 of the SSAP.
            - Lower interval: homogenize remaining 6 inches to be exposed after dredging.
        - The remaining 6 inches can be excluded from the analysis. Individual cores should be homogenized if color, odor, grain size, total organic carbon, or likelihood of contamination differs among horizons.
    - Composite samples within the target dredge area should be made by homogenizing the cores from the same sample area into one sample for the interval identified in Table 4 of the SSAP. Individual cores should be homogenized if color, odor, grain size, total organic carbon, or likelihood of contamination differs among horizons.
        - North and South FBS Structure Area
            - Upper interval: homogenize over the dredge depth as identified in Table 4 of the SSAP.
            - Lower interval: Not applicable; The NYSDEC requirement sample 6 inches below project depth is not applicable within the target dredge area because a concrete slab, as part of the FBS installation, will be placed on the post dredge surface in each of the target dredge areas. Therefore, sampling below the project depth within the target dredge area will not be performed because the post dredge surface will not be exposed.
- Composite samples should represent sediments with similar characteristics (e.g., grain size, TOC, color) taken from approximately the same depth and geographic area. If core segments do not share similar characteristics as described above, analyze individual cores separately. Composite samples should be comprised of no more than three samples. Composites should consist of equal amounts of each individual homogenized core.

  - Core material above the project depth will be composited separately from core material below project depth (next 6 inches of sediment to be exposed).
  - Cores from areas of known or suspected contamination (e.g., proximity to outfall or historical spill areas) are not to be composited with cores form other areas.

- Place samples into clean, laboratory-supplied sample containers for analysis as presented in Table 5 of the SSAP
- Sample containers will be labeled, stored on site, and transported to the appropriate testing laboratory. Label all sample containers with the following:
  - site;
  - project number;
  - boring number;
  - sample interval;
  - sample type (i.e., composite, and discrete)
  - date;
  - time of sample collection; and
  - initials of sampling personnel.
- Handle, pack, and ship the samples in accordance with the procedures set forth in Appendix A to the SSAP
- Record all appropriate information in the field notebook and on the proper forms.

3 DUPLICATE SAMPLE COLLECTION

Field duplicates will be prepared by homogenizing sediment collected at the same time and depth and then filling two sets of sample jars. The duplicate sample will be labeled in such a way that the sample designations will not indicate the duplicate nature of the samples. Information concerning the source of sample duplicates should be documented in the field notebook and on the version of the chain-of-custody form that is retained by the sampling team. This information should NOT be provided in the copy of the chain-of-custody form that is submitted to the laboratory.

4 SURVEY

A field survey control program will be conducted using standard instrument survey techniques or proposed survey control as approved by the Engineer to document the sediment sampling location and elevation of the water surface at that location. Generally, to accomplish this, a local control baseline will be set up. This local baseline control can then be tied into the appropriate vertical and horizontal datum for the site, as specified in the SSAP.

5 FIELD CLEANING PROCEDURES

Cleaning of sampling equipment is to follow the procedures specified in Appendix D to the SSAP. If disposable / sample-specific equipment is not used, the sampling equipment is to be cleaned prior to the start of sampling activities, between samples, and following the completion of sampling activities. In addition, tools utilized in the handling and opening of sampling equipment, such as hacksaw for cutting Lexan® cores, are to be cleaned with a non-phosphate soap and water prior to the start of sampling activities, between samples, and following the completion of sampling activities, at a minimum.

6 DISPOSAL METHODS

Rinse water, PPE, and other residuals generated during the equipment cleaning procedures will be placed in appropriate containers. Containerized waste will be disposed of consistent with the disposal practices outlined in the SSAP.

Exhibit 3-1

Date Start/Finish: / Drilling Company: Driller's Name: Drilling Method: Bit Size: Auger Size : Rig Type: Spoon Size:	Northing: Easting: Well Casing Elev.: ft. Corehole Depth: ft. Borehole Depth: ft. Ground Surface Elev.: ft. Descriptions by:	Well No. Client: Site:

DEPTH / ELEVATION	Sample Depth / Sample Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation ft.									GROUND SURFACE	
5										
10										
15										

Remarks:

Water Levels

Date / Time	Elevation	Depth

Appendix

SOP: Field Documentation

1 SCOPE AND APPLICATION

This standard operating procedure (SOP) covers the entries needed in a field book. This SOP does not address equipment decontamination, sample preservation, sample packaging, chain-of-custody, or laboratory analysis documentation. Refer to additional SOPs, as well as the project SSAP as appropriate.

2 EQUIPMENT

- Field Book;
- Indelible ink pen (if weather conditions prevent the use of such a pen, indicate so in the log and use an alternate writing instrument); and
- Re-sealable baggie or other weather-proof container to protect the field book from the elements.

3 PROCEDURES

- Print legibly. Do not use cursive writing;
- The name of the project, site location, project number, and date(s) of use should be written in indelible ink on the outside of the field book (additional books, as needed, will be labeled with their dates of application from start to finish [e.g., September 1, 2022 to May 5, 2023]);
- On the inside of the front cover, write “If Found, Please Return to ARCADIS,” and include the appropriate address and phone number, the name of the person to which the book is assigned, and the name of the Project Manager;
- Reserve the first page of the book for a Table of Contents;
- Reserve the last five pages of the book for important contacts, notes, reminders, etc.;
- Each day of field work, the following should be recorded in the field book as applicable:
    - Project name;
    - Date and time arrived;
    - Names of people on-site related to the project including employees, visitors, subcontractor employees, agency personnel, client representatives, etc.;
    - Briefly describe the work to be performed;
    - Indicate the health and safety level being used;
    - Record instrument calibrations and checks, if applicable;
    - Record time and general content of daily safety meeting, if applicable; and
    - Describe weather conditions, including temperature, precipitation, and wind speed and direction.
    - Minimize unused space on each page.

- If H&S monitoring is performed, record the time and results of initial/follow-up monitoring;
- Note factual observations including collection of samples, delays, damage noted, accidents, problems, and problem resolutions;
- Describe work performed and how documented such as photographs, sampling logs, etc.;
- Describe basis for field decisions including pertinent conversations with visitors, regulators, or project personnel;
- Note final instrument calibrations and checks, if applicable;
- Note the time off-site; and
- Sign the note book at the end of each day at a minimum. Draw a line to the end of the page to indicate no further entries on that page.
- If an entry to the field book is changed, strike out the deleted text or item with a single line such that the entry remains legible, and initial and date the change. Such changes should only be made by the same person that made the initial entry.
- Whenever possible, field book entries should be made in the field at the site, not at a later time at a different location. Supplemental entries to the field book may be made at a later date. The supplemental entry must be clearly identified as such and the entry must be signed and dated as described in this SOP.
- Problems noted in the field book must be brought to the attention of the Project Manager in a timely fashion. Problems may be reported in person, on the telephone, or via email.

4 DATA RECORDING AND MANAGEMENT

Each page of the field book should be scanned for electronic/digital archiving at periodic intervals. This will ensure that copies of the field notes are available in the event the field book is lost or damaged, and that field data can be easily disseminated to others without the risk of physically sending the field book. Field books that are full should be archived with the project files, and readily retrievable.

5 QUALITY ASSURANCE

Be mindful that the field book may appear in reports or other future uses. As discussed above, all entries should be legible. Entries should also be in English.

Appendix

SOP: Field Equipment

1 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) outlines the cleaning procedures performed to ensure that sampling equipment that contacts a sample is free from analytes of interest and/or constituents that would interfere with laboratory analysis for analytes of interest. Non-disposable equipment will be cleaned after completing each sampling event, between sampling events, and prior to leaving the site.

Equipment that may require cleaning includes sampling devices and equipment. Cleaning procedures for sampling equipment will be monitored by collecting equipment blank samples. Dedicated and/or disposable (not to be re-used) sampling equipment will not require cleaning.

2 CLEANING OF RELATIVELY SMALL SAMPLING EQUIPMENT

This procedure applies to the cleaning of relatively small sampling equipment used for the collection of soil or sediment samples or for water testing or geophysical investigations. Such equipment may include soil core samplers, spatulas, etc. Such equipment will be cleaned in the field prior to and between sample collections (or other use) at a designated equipment cleaning area established within or adjacent to the specific work area.

2.1 Equipment

The following equipment/materials will be available as required during field cleaning activities:

- Health and safety equipment (as required in the Site Health and Safety Plan [HASP]);
- Distilled/deionized water;
- Non-phosphate detergent (e.g., Alconox);
- Clean tap water;
- Appropriate cleaning solvent (e.g., hexane, acetone);
- Rinse collection plastic containers;
- Brushes;
- Large heavy-duty garbage bags;
- Spray bottles;
- Re-sealable-type bags;
- Hand wipes or paper towels;
- Plastic sheeting; and
- Field book.

2.2 Procedures

- Don personal protective equipment (PPE) as required by HASP;
- If equipment is very dirty, on clean piece of plastic sheeting, in a clean wash bucket, pre-clean with a brush;
- Within the bucket, on top of the protective sheeting, use a non-phosphate detergent and water wash to removal all visible particulate matter and any residual oils or grease;
- Within the bucket, on top of the protective sheeting, use a tap water rinse to remove the detergent solution;
- Within the bucket, use a solvent rinse with hexane;
- Within the 5-gal bucket, use a distilled/deionized water rinse;
- Repeat solvent and water rinse two more times (i.e., triple rinse) and allow to air dry.

3 CLEANING OF HEAVY EQUIPMENT AND SUBSURFACE SOIL SAMPLING EQUIPMENT

This procedure applies to the cleaning of heavy equipment, such as drill rigs, auger flights, split spoons, etc. Such equipment will be cleaned within an appropriate location on the site.

If heavy equipment brought on site is suspected to contain contaminants from a prior job, it will be thoroughly cleaned according to the procedures described below. It will also be cleaned between drilling locations. Portions of the equipment that are in close proximity to materials being sampled, such as auger flights, drill rods, and drill bits, will be targeted for cleaning.

3.1 Safety Precautions

Before a piece of equipment can be cleaned, it must be disconnected and disabled in accordance with standard Energy Control and Power Lock-Out Procedures. All energy sources including stored energy must be removed prior to cleaning.

Do not attempt to clean equipment that is in service or still connected to power.

Protective clothing, in addition to that specified by the HASP (i.e., safety glasses, safety-toe shoes), may be required during some extensive cleaning. The cleaning contractor shall have a written HASP appropriate for the expected operations including measurements for determining the need for more stringent levels of protection. The additional protective clothing may include:

- plastic face shields;
- disposable Tyvek coveralls (Dupont/Saranex 23-P or equal);
- impervious rubber boots (neoprene, viton, or equal); and
- impervious gloves (neoprene, viton, or equal).

3.2 Equipment

The following equipment, as appropriate, shall be available during large equipment cleaning activities:

- Health and safety equipment (as required in the HASP);
- Utility pump;
- 6-mil polyethylene sheeting;
- Assorted scrub brushes;
- Waste disposal drums;
- Cleaning fluids such as Knights Super Kleen, Simple Green, Aquanex MC, Zep Formula 50, Zep Big Orange, or equal;
- Duct tape;
- Oil/water absorbent Speedi-Dry compounds; and
- Field book.

3.3 Procedures

- Don personal PPE as required by HASP;
- Set up the temporary area. This area should be larger than the intended items to be cleaned;
- Construct the area out of wood planks or similar (e.g., hay bales) to create a four-sided berm. Placed on top of the berm should be two layers of plastic sheeting. All solids and liquids produced during the procedure should pool in this area until disposed of appropriately;
- Place the item(s) to be cleaned on a surface (e.g., plastic/wood pallet) inside the temporary area;
- Pre-clean the entire piece of equipment to remove all loose dust, dirt, scale, etc. using a metal scraper and/or steel brush, by scraping, chipping, brushing and spot cleaning with solvent or detergent to remove encrusted materials;
- Apply the cleaning solution to each surface of the item via a mist, aerosol spray, or plastic brush soaked in the cleaning solution. Make sure that all surfaces are wetted. Use scrubbing brushes, if necessary, to loosen any visible dirt, stains, grease, etc. and then wipe down all surfaces with clean absorbent towels to remove any remaining particles. For larger items, it may be appropriate to clean the equipment in sections;
- Rinse the equipment with water supplied on-site or a potable water source;
- Repeat above two steps. The item should be clean and dry. The equipment is ready to be re-used on site. However, if the equipment is leaving the site to be used elsewhere, it must be wipe tested to demonstrate that it meets the applicable conditions for off-site re-use; and
- Use the designated utility pump to pump all liquids from the plastic sheeting to a 55-gallon drum, which will be staged prior to disposal.

4 DATA RECORDING AND MANAGEMENT

Equipment cleaning and decontamination will be noted in the field log book. Information will include the type of equipment cleaned, the decontamination location and any deviations from this SOP. Any unusual field conditions should be noted if there is potential to impact the efficiency of the decontamination or subsequent sample collection. Containers with decontamination fluids will be labeled.

5 DISPOSAL METHODS

Rinse water, PPE, and other residuals generated during the equipment cleaning procedures will be placed in appropriate containers. Containerized waste will be disposed of consistent with the disposal practices outlined in the SSAP.

Appendix

SOP: Water Quality Sampling

APPENDIX E
SOP: WATER QUALITY SAMPLING
STANDARD OPERATING PROCEDURE
Rev. #: 1 | Rev Date: August 22, 2023

1 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the field sampling procedures for water quality sample collection to monitor the impact, if any, of the remedial action activities on water quality. Related SOPs included in the SSAP:

- Appendix A - Chain of Custody, Handling, Packing, and Shipping
- Appendix C - Field Documentation.

2 EQUIPMENT LIST

- Health and safety equipment (as required in the Site Health and Safety Plan [HASP])
- Cleaning equipment
- Boat (as required by conditions at the time of sampling)
- Graduated rod for water depth measurements
- Measuring tape
- Duct tape
- Disposable gloves
- Appropriate sample containers
- Appropriate forms, coolers with ice, etc. as specified in SSAP Appendix A
- Camera
- Field book (see SSAP Appendix C).

3 WATER COLUMN SAMPLING PROCEDURES

- Identify the area to be sampled and, if the area requires a boat for access, navigate the boat to the target sample location.
- Don personal protective equipment (PPE) as required by the HASP.
- Secure the boat in place (if a boat is used).
- Prior to collecting surface water samples, measure the total depth of the water column using a surveyor's rod to the nearest 0.1 foot (and record such depth in the field activity logbook).
- Collect temperature, pH, turbidity, conductivity, and dissolved oxygen at 0.5 times the total water column depth and record results in the field book.
- Dip sampling container(s) into the water to a depth 0.5 times the total depth of the water column at each sample location. As appropriate based on water depth, alternate means and methods (e.g., a peristaltic pump and tubing) may be used to achieve a target sampling depth of 0.5 times total depth.
- Collect the appropriate number of samples as described in the SSAP.
- Label, store, and transport sample containers to the appropriate testing laboratory in accordance with the requirements specified in SSAP Appendix A.
- Handle, pack, and ship the samples in accordance with the procedures set forth in SSAP Appendix A.
- Record all appropriate information in the field book and on the proper forms.

4 DUPLICATE SAMPLE COLLECTION

If collection of field duplicates is required, the field duplicates will be prepared by collecting an additional water sample at the same time and depth and then filling two sets of sample jars. The duplicate sample will be labeled in such a way that the sample designations will not indicate the duplicate nature of the samples. Information concerning the source of sample duplicates should be documented in the field book and on the version of the chain-of-custody (COC) form that is retained by the sampling team. This information should NOT be provided in the copy of the COC form that is submitted to the laboratory.

5 FIELD CLEANING PROCEDURES

If disposable/sample-specific equipment is not used, the sampling equipment is to be cleaned prior to the start of sampling activities, between samples, and following the completion of sampling activities. The following cleaning equipment will be available, as required, during field cleaning activities:

- Non-phosphate detergent (e.g., Alconox®)
- Distilled/deionized water
- Rinse collection containers
- Brushes
- Large heavy-duty garbage bags
- Spray bottles
- Hand wipes or paper towels.

6 DISPOSAL METHODS

Investigation-derived waste generated during water quality sampling may include decontamination fluids, used PPE, and disposable equipment. The management of these materials will be handled and disposed with other materials generated during the remedial action.

7 QUALITY ASSURANCE

Overall project quality assurance will be maintained by following the procedures specified in the BMP and the other supporting deliverables to be developed during the RD. The need for quality control samples (i.e., matrix spike/matrix spike duplicates, field duplicates, trip blanks, and field blanks) and associated frequency for collection of such samples will be determined in the remedial design.

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