APPENDIX J
CASE 10-T-0189
HDD SITE INVESTIGATION AND PLANNING REPORT & INADVERTENT RELEASE AND CONTINGENCY PLAN (HDD) (C 114M)

HDD Design Summary Report
Crossings HDD 1 to HDD 2
in Segments 1 & 2 – Packages 1A & 1B

Putnam to Whitehall
Washington County, New York

CHA Project Number: 066076

Prepared for:
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9/18/2022

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September 2022

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LIST OF REFERENCED APPENDICES

1.0 INTRODUCTION

1.1 PURPOSE

The Champlain Hudson Power Express (CHPE) consists of installing a pair of HVDC electrical transmission cables with an associated telecommunications line from Canada to New York City. The portion of the work addressed herein, is located in the upland portion of the route from the south end of Lake Champlain to New York City along the uplands of the Hudson River Valley. This work includes approximately 170 crossings under roads, railroads, wetlands water bodies, and obstructions to be installed using horizontal directional drilling (HDD) methods to minimize interference with use or impacts to the environment. This Design Summary Report addresses the design for the HDD crossings in Segments 1 & 2 – Packages 1A & 1B from Putnam to Whitehall. These crossings are designated HDD 1 through HDD 2.

The purposes of this Design Summary Report are to provide the following:

- Review of the existing geological, hydrogeological, and geotechnical conditions for HDD 1 through HDD 2 for a total of 4 crossings (2 per site) in Segments 1 & 2 – Packages 1A & 1B.
- Provide a descriptive narrative of the HDD Crossings in support of the attached design drawings and technical specifications.
- Present stress and inadvertent release analyses that support the proposed designs.
- Evaluate construction considerations including inadvertent return mitigation.

2.0 PROJECT DESCRIPTION

The proposed CHPE route follows the Hudson River Valley of New York. The new transmission line will be approximately 146 miles in length, extending from the south end of Lake Champlain to Astoria, NY. Segment 1 & 2 – Package 1A & 1B is located in approximately a 13-mile section of the route in Washington County, New York.

A Project Locus Map and a plan showing the locations of the HDD 1 through HDD 2 crossings are presented in Appendix B.

The HDD crossing addressed in this report are located as shown in Table 1 below*:*

Table 1: HDD Locations, Lengths, and Description

HDD #	Start Station	End Station	HDD Length, ft	Obstruction Crossed
1	10145+16	10154+30	896 / 881	Mill Brook Culverts
2	12920+90	12950+20	3032 / 2989	South Bay of Lake Champlain

3.0 BACKGROUND

The underground construction of two HVDC electrical transmission cables is proposed to be housed in individual 10-inch-diameter DR 9 HDPE conduits distance dependent on depth and soil Thermal Resistivity (TR) values provided by NKT and as shown on drawings plans. A third, 2-inch-diameter DR 9 conduit will be bundled with one of the 10-inch diameter conduits for a telecommunications line. Longer and deeper bores such as South Bay may require a larger diameter (i.e. 12-inch and 3 inch) conduits with larger DR values (i.e. DR 7) to resist tension stresses during installation and collapsing long-term. This is checked and determined on a case-by-case basis and design sizes are shown on the design drawings shown in Appendix E. The conduits are to be installed in a 16 to 22-inch final ream diameter bore holes. The proposal is to install the cables at least 25 feet below congested areas, roads, railroads, under/around other obstructions, 15 to 25 feet below wetland and small streams, and 35 to 45 feet below open bodies (i.e., ponds, lakes, canals, and rivers) of water using HDD methods. HDD is a widely used trenchless construction method to install conduits with limited disturbance to the ground around the bore alignment, minimal ground surface impacts above the alignment, and to minimize the potential of inadvertent releases of drilling fluids while boring. The goal for using HDD methods is to install the conduits while controlling and minimizing the amount of impact to congested areas, existing underground obstructions, and to the adjacent wetlands to the extent possible.

4.0 SITE CONDITIONS

4.1.1 Project Datum and Topography

HDD #1

The ground surface elevations along the HDD path gently undulates between El. 266 and El. 292 (reference datum NAVD 1988). Mill Brook and wetlands are present between approximately Sta. 10147+60 and Sta. 10148+60 (at about El. 268) and between approximately Sta. 10152+80 and Sta. 10153+25 (at about El. 276).

HDD #2

The ground surface elevations along the HDD path ranges between approximately El. 125 at the west end of the bore alignment, to approximately El. 79 at the mudline in the middle of the canal, to El. 120 at the east end of the bore alignment (reference datum NAVD 1988). Wetlands are present between approximately Sta. 12947+00 and Sta. 12948+80 and are at about El. 105-113. The South Bay Canal is located between approximately Sta. 12930+50 and Sta. 12941+00 with a water level at approximately El. 94 (reference datum NAVD 1988).

4.1.2 Geotechnical Data

HDD #1

Subsurface investigations were conducted by AECOM in 2020 for Transmission Developers, Inc. There are two borings at HDD #1: GTB-PD7 and GTB-PD7A that ranged in depth at approximately 50 feet below grade. Both borings show a thin layer of poorly graded sand. Boring GTB-PD7 shows a 14 foot layer of loose silt over soft to very soft organic soils and clay reaching the bottom of the bore. Boring GTB-PD7A shows an initial 14 foot layer of medium dense silt, a 14 to 15 foot layer of loose silt, all over very soft to soft clay. The Geotechnical Data Report for this location is provided in Appendix C.

Based on the borings, the soil profile for the HDD #1 BoreAid analyses was divided into two [2] layers: medium dense silt and very soft to soft lean clay. The soil profiles used for BoreAid analyses of the HDD #1 in this segment are presented in Appendix D.

HDD #2

Subsurface investigations were conducted in 2012 by TRC for Transmission Developers, Inc. and in 2022 by Kiewit. There are ten borings to date all drilled to the north of the bridge. Geophysics is planned to check for rock fill at shorelines for the alternative, and preferred, south route. These northern borings B109.7-1, B109.8-1, B110.0-1, and B110.1-1 (conducted in 2012) indicate mostly fat and lean clays at the depth of the planned drill. Borings K-109.6, K-109.7, K109.9, K110.0, K110.1, and K110.3 (conducted in 2022) indicate fill and rock at depth in addition to the fat clays. The draft geotechnical report and draft boring logs can be found in Appendix C. In addition, boring logs from the existing 1961 bridge were reviewed and considered during the evaluation of the southern route that is now considered the preferred route.

Based on these borings and historic borings for the State Route 22 bridge construction, the idealized soil profile along the HDD #2 alignment was divided into four [4] layers for BoreAid analyses: loose silt, upper soft clay, medium stiff clay, and lower soft clay. The rock fill and sand layers encountered during recent borings from the existing causeway is not expected to be present along the south of Bridge alignment selected. The soil profiles used for BoreAid analyses of the HDD #2 can be found in Appendix D. No new borings south of the bridge are planned at this time due to barge access limitations.

Archeological ruins and remains of old bridges were noted north of the bridge at HDD #2. Remains of approximately 10 sunken ships or barges, some circa 1812, and a 1913 bridge are located just north of the jetties, see Appendix F. In addition, the records appear to indicate that barges were sunk as part of the foundation system for the 1913 bridge in addition to dumping gravel, cobbles and boulders and pushing them down into the soft sediments. The locations of these ruins and related obstructions are not expected to be present along the south of bridge alignment selected as shown in the recent geophysical survey report (see Appendix C).

5.0 DESIGN SUMMARY

The HDD construction process in soils generally consists of three steps:

Step 1: Drill a small diameter (approximately 7 to 9 inches diameter) pilot hole along the preplanned bore path. During the pilot hole boring, the location of the drill bit is tracked to confirm that it is following the planned path. If the drilling is observed to start to deviate from the planned path, corrections are made using a "bent" lead drilling section and controlled rotation of drill pipe string. The drill bit is designed to cut through the soil in combination with pressurized drilling fluid assisting the cutting of the soil, and transport of the cuttings to the entry pit for removal. The drilling fluid is generally a combination of bentonite (a clay mineral) and water, combined with NSF certified additives to support sides of the borehole and to better carry the cuttings to the entry pit at lower pressures and velocities. The drilling fluids typically used under waterbodies and wetland areas are typically required in the project specifications to be "non-toxic and environmentally friendly". Once the pilot bore reaches the exit point, the next step of the process, hole enlargement begins.

Step 2: Enlarge the pilot hole to the diameter required for insertion of the conduits. This is accomplished by using successively larger reaming bits pulled through the pilot bore to gradually enlarge the bore from about 8 inches diameter 16 to 22 inches diameter to accommodate in this case a HDPE conduit about 10 inches in diameter in one bore and a bundle of two, conduits, one 10 inches diameter and the other 2 inches diameter that are to be pulled into the enlarged bore hole. HDD#2 will be the 12-inch and 3-inch bundle variation. We estimate that one and possibly a second reaming pass will be used to create the 16 to 22 inch -inch-diameter borehole. This pulling in of a bundle of conduits is sometimes referred to as a slick bore. During this step, the borehole is still filled with drilling fluid to support the sides of the bore hole in preparation for Step 3, the insertion of the conduit.

Step 3: Pull the conduits into the enlarged hole. While the pilot hole and reaming operations are ongoing, the contractor will also be fabricating the conduits to be installed. The conduits come in about 40-foot-long sections and need to be fusion butt welded, debeaded internally, and arranged for the pullback into to the borehole. Ideally, the complete conduit (or bundle of conduits) will be welded (and bundled) into one long length for insertion. The goal is usually to

pull the bundle into the bore in one, continuous, smooth, around the clock, operation. However, depending on work area and access constraints, sometimes the pipe is assembled in 2 or 3 lengths that then joined (welded), "on the fly" as the conduit (bundle) is slowly pulled into the borehole. As the conduit (bundle) is pulled into the hole it may be ballasted with clean water, and some of the drilling fluid supporting the sides of the hole is displaced by the conduit and collected for eventual disposal. Upon completion of the conduit installation, the conduit will be allowed to relax and come to equilibrium in the hole, and the conduit will be cleaned and capped as described in the HDD technical specifications.

5.1 GEOMETRY AND LAYOUT

The HDD profiles are generally defined by the following parameters:

- Entry point location;
- Exit point location;
- Entry angle;
- Exit angle;
- Horizontal and vertical radius of Curvature;
- Lengths of tangent sections;
- Length of crossing;
- Depth of crossing and depth of cover;
- Site constraints and obstructions; and
- Available work and layout areas

The proposed bore paths entry angle, exit angle, and a vertical and horizontal design radii of curvature for each HDD crossing in this segment are shown in the design drawings provided in Appendix E.

The design drawings that summarize the proposed HDD installations are in Appendix E. The HDD technical specifications are found in Section 33057.13 of the Technical Specifications. Inadvertent release prevention and mitigation plans for each HDD crossing are provided as separate documents.

The site conditions posed various challenges in developing a design that is both constructible and minimizes the potential for negative environmental impacts. The proposed design has entry and exit pits and work areas constrained by available easements and traffic considerations. Available

work areas may limit the lengths of the conduit that can be pre-assembled, necessitating having to pre-assemble the bundle several segments that will have to be welded together during the pull back. Workzone requirements are shown Appendix A. HDD specific work areas at the entry and exit ends of the bores are noted on the drawings in Appendix E. In addition, space and easement constraints will require that during pullback, the above ground sections of the conduit will not be straight and will require rollers to accommodate a horizontal bend. Conduit assembly is expected to be performed at the ends of the alignment shown on the drawings in Appendix E for HDD specific work areas. In some cases, the limited work area at the one end of the HDD alignment, may require that the drilling and reaming prior to pullback be performed by the HDD rig located at the one end of the alignment, but the HDD rig may need to be relocated to the other end of the alignment for the pullback/conduit installation phase of the work. In addition, for some longer bores in soft/weak ground conditions, the intersection bore method may be used to better control the risk of inadvertent drilling fluid releases.

5.2 SUBSURFACE MODEL DEVELOPMENT

A subsurface model was developed for each HDD location based on the boring logs to approximately represent the subsurface conditions along the proposed HDD alignment. BoreAid Version 5.0.14 (2015) modeling software (a product of Vermeer) was used to model the HDD. Geotechnical input parameters of the soil were estimated as described below.

The internal friction angles (AASHTO LRFD, Ed. 7) were estimated using the Standard Penetration Test (SPT) blow counts. The shear modulus (G) of each layer was estimated using soil density or consistency based on SPT blow count (N-value) and representative soil layer descriptions were used to estimate Young's Modulus (E) using Hunt (1986). The shear modulus was estimated using the relationship $G = E/[2(1+\nu)]$, taking Poisson's Ratio (ν) equal to 0.3. Dry and saturated unit weights were selected based on soil type using Table 2-8 from the Manual on Estimating Soil Properties for Foundation Design (EPRI, 1990). For cohesive soils, cohesion was estimated based on empirical correlations with SPT blow counts (EPRI 1990). A table with the soil properties used for the HDDs in Segment 1 & 2 – Package 1A & 1B is presented in Appendix G.

5.2.1 BoreAid Analysis

For the BoreAid analyses, the pipe configuration analyzed was for a pipe with a dimension ratio (DR) of 9 which may be assumed to be ballasted with water during pullback to create a near neutral buoyancy. The following conduit configurations were used:

1) An individual 10-inch-diameter DR 9 HDPE conduit, and

2) A bundle consisting of a 10-inch-diameter DR 9 HDPE conduit and a 2-inch-diameter DR 9 HDPE conduit

3) A bundle consisting of a 12-inch diameter DR 7 HDPE conduit and a 3-inch diameter DR 7 HDPE conduit is used for HDD#2

The stresses and deflections of the pipe are evaluated and compared to allowable values as shown on the BoreAid runs presented in Appendix D.

In addition, a run where 2-inch-diameter DR 9 or 3-inch diameter DR7 HDPE conduit is modeled alone was performed to check installation stresses in that conduit.

5.2.2 Inadvertent Return and Hydro-fracture Analysis

BoreAid modeling software was used to perform inadvertent return analyses for each HDD alignment. The bore path alignment was selected and checked so that the allowable bore pressures are greater than the static and circulating pressures throughout most of the alignment except at the ends. The allowable pressures are related to in-situ ground and water stresses around the bore hole, and the strength of the ground. The Limiting Formation Pressure Figure from BoreAid, indicates a generally acceptable factor of safety against the potential for inadvertent return along the proposed bore paths except at the ends.

Based on the bore path selection process, areas with the greatest potential for an inadvertent return were examined and adjusted during the design process to further limit the risks associated with an inadvertent return when possible. The entry and exit points exhibited the greatest potential for inadvertent returns. The depth of the entry/exit pits should be considered by the Contractor to increase the effective soil stress and provide a storage volume for returns to and near the entry and

exit points. Note that while the potential for inadvertent return has been reduced through the design process, inadvertent returns are still possible through existing fissures in the soil or rock, shrinkage cracks, weak soils, or porous deposits of coarse gravel.

Fractures within and/or inadvertent releases through the surrounding soils may cause loss of drilling fluid pressures or inadvertent return of drilling fluid into the wetlands. The areas of greatest concern are reduced soil cover over the bore alignment and where there is a risk of release to the wetlands. The contractor will be required to institute pre-emptive measures in this area to mitigate the effects of a release in the event that one should occur. Such measures may include containment booms and a standby vacuum truck to collect any released drilling fluids immediately. Ground heave or settlement from inadvertent release also pose risks to structures such as roadways. The HDD alignments were designed with geometries to providing enough soil cover to reduce the risk of inadvertent return. The Inadvertent Release Contingency Plan describes additional methods for mitigating inadvertent returns.

5.3 LIMITATIONS

The structural analysis and inadvertent return mitigation analysis were performed using the proposed design bore paths and typically anticipated equipment and means and methods. The HDD subcontractor must submit structural and inadvertent return mitigation calculations and analysis for each bore path, including their final bore path geometry reflecting its specific equipment and contractor's specific means, methods, drilling fluids, and proposed final contractor refined final planned alignment. It is important to note that the Kiewit Design Team's analysis has been done without consideration for point loading due to unpredictable subsurface features such as encountering rocks, boulders, or other extremely dense material that may damage the pipe. The risk of such pipeline damage is low yet has been reported on some projects in recent years.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 RISK AWARENESS AND ASSESSMENT

The risks to be aware of during HDD include: inadvertent returns or fluid loss; any potential obstructions blocking or causing large deviations from the planned bore path; and electromagnetic effects on the HDD steering equipment from nearby high voltage power lines.

6.2 SITE ANALYSIS

A site analysis must be performed by the HDD Subcontractor prior to commencing HDD operations to write the site-specific reports that are required. Considerations might need to be taken for items such as for site access, construction of HDD entry and exit pits, and layout area for equipment and supplies.

6.3 EROSION CONTROL

The proposed bore path crosses under roads, parking lots, water, stormwater and gas and electric utility lines, as well as under streams/wetlands, bodies of water, and railroads. The soil erosion control drawing will show where primary soil erosion control measures are required. The technical specifications and Inadvertent Release Contingency Plan both detail the requirements for both primary and secondary sediment and erosion control measures to be followed in case of an inadvertent return, which ultimately could deposit the fine bentonite sediment into the stream or wetland or bodies of water if not controlled. Construction of the entry and exit pits and related work area may be close to the stream/wetlands. Silt fence, straw bales, and other soil erosion control measures will be required to be installed as shown in the construction drawings. Secondary control measures are to be readily accessible at or near the work areas in accordance with the project specifications and Inadvertent Release Contingency Plan.

6.4 SURVEILLANCE AND MONITORING

During installation of the pipe by HDD, monitoring the stream, wetlands, waterbodies and bore alignment for indications of potential inadvertent returns or inadvertent releases will be necessary. The contractor will have primary responsibility for this monitoring and associated response and reporting in real-time. This will be accomplished as detailed in the Inadvertent Release

Contingency Plan. Continuous visual inspection of the entire path is the most significant method of detection. However, an experienced drill crew can often prevent a return by monitoring drilling fluid pressures. A loss of pressure may indicate that an inadvertent release has occurred. Regardless of the level of preparation, inspection, monitoring, etc., inadvertent returns are not always possible to predict or prevent. However, a significant effort can minimize the possibility but not eliminate it.

7.0 REFERENCES

American Association of State Highway and Transportation Officials. (2014). AASHTO LRFD bridge design specifications, Seventh edition, U.S. customary units. Washington, DC: American Association of State Highway and Transportation Officials.

Mayne, P.W., and Kulhawy, F.H. (1990). Manual on Estimating Soil Properties for Foundation Design. Electric Power Research Institute (EPRI).

Hunt, R.E. (1986). Geotechnical Engineering Analysis and Evaluation, McGraw-Hill Book Company, New York.

Appendix A

Workzones

Appendix A

HDD WORK ZONE CONFIGURATION CONSIDERATIONS

Introduction:

In general, HDD requires ample space for both entry and exit operations, work area, or Work zones. The HDD contractor or subcontractor ideally wants to consolidate all operations within these footprints. The exit Work zone also includes a narrower extension for the assembly of the full length pull back string of conduit or pipe. The size of these desired Work zones is driven by rig size in Table 1.

TYPICAL HDD ENTRY AND EXIT WORKSPACE		
SYSTEM DESCRIPTION	ENTRY WORKSPACE	EXIT WORKSPACE
MAXI (24″-48″)	150′ X 350′	150′ X 250′
MIDI (12″-<24″)	150′ X 250′	100′ X 200′
MINI (2″-<12″)	VARIES PER SITE	VARIES PER SITE

TABLE 1

An example of an entry Work zones is shown in Figure 1a below.

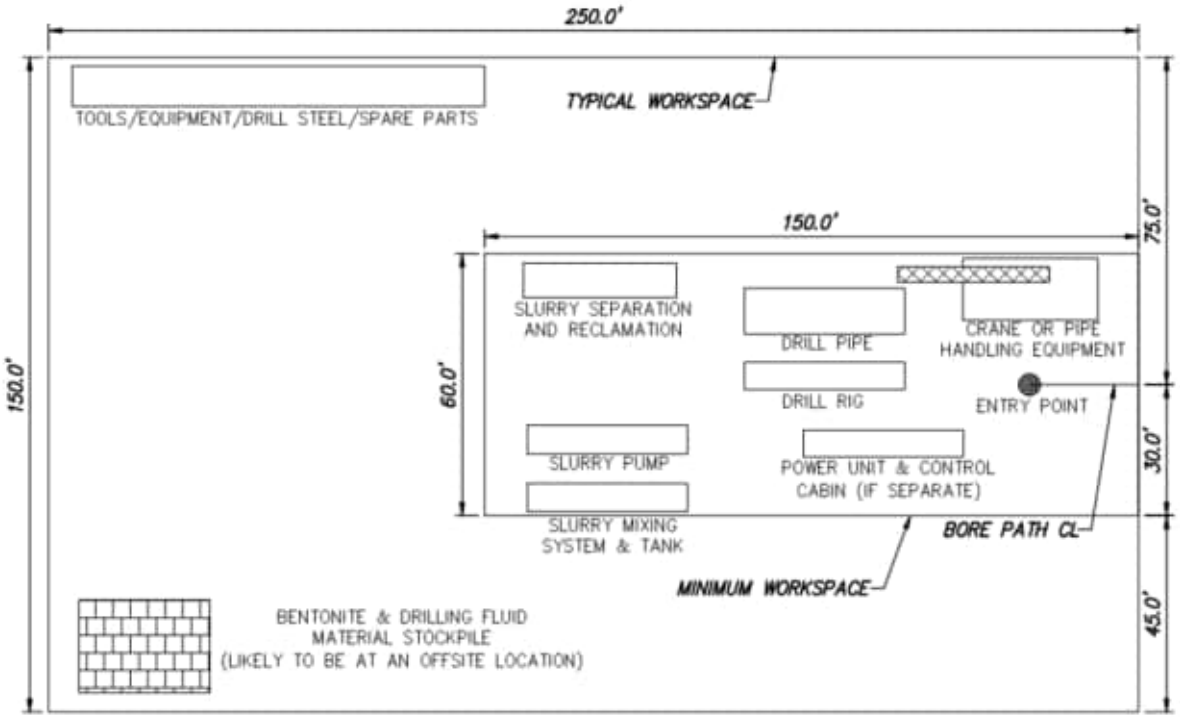


FIGURE 1a: Typical Entry Work Zone Configuration

An example of an exit Work zones is shown in Figure 1b below.

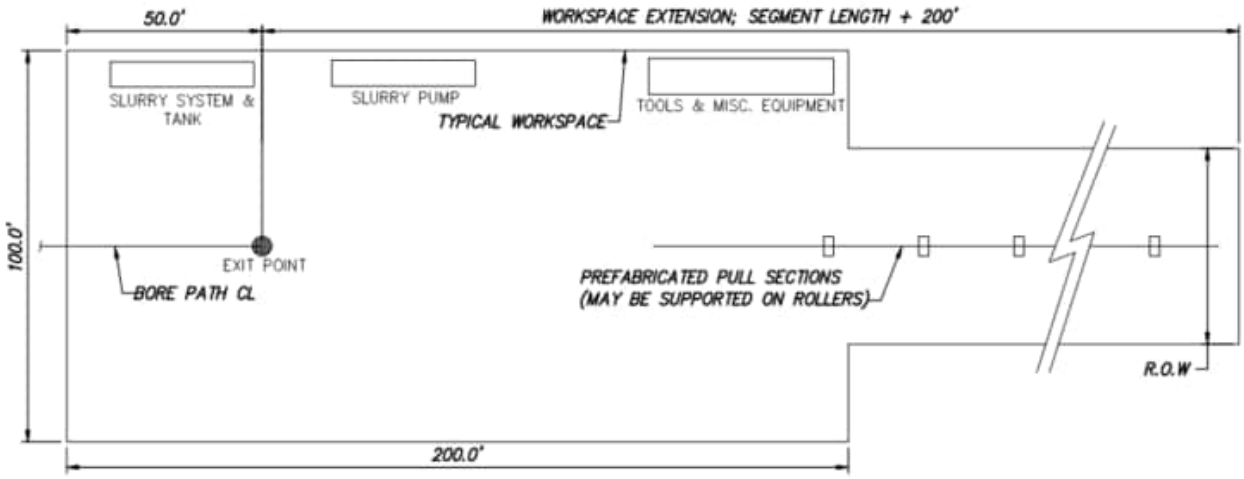


FIGURE 1b: Typical Exit Work Zone Configuration

Work zones should also be able to facilitate contingencies for space to recover a failed bore hole and a new offset bore, the ability swap entry for exit, or in some cases rigs on both ends.

CHPE Project Limitations:

Available Work zone areas for the Central Hudson Power Express Project (CHPE) are constrained because the project occupies a narrow existing corridor and is essential in a linear brown field. This is complicated by the rail corridor which precedes most forms of environmental regulations, and it traverses numerous wetlands or other sensitive areas which affects available Work zone areas.

We have assumed the majority of HDDs will be accommodated by a Mini or Midi HDD class machine and support equipment, <12-inch diameter and 1500 feet individual bores.

1. Ideally, an Entry workspace approximately 20 to 25 feet wide x 150 to 200 feet long for a small rig with a mounted pipe rack and self-contained power unit and operator control cabin on the rig; a separate mud mixing and pumping unit, plus a separate mud processing and separation unit support by equipment arranged linearly. Since each crossing is a pair two, 20 x 150 Work zones are equivalent to a 40 x 150 overall work area, and we have assumed the support equipment will be set once for both HDDs. It is also assumed existing roads or access roads will parallel one side of a Work zone.
2. Ideally, an exit workspace approximately 15 to 20 feet wide and between 60% and 110% of the bore length is needed to layout and assemble the conduit for pullback.

A somewhat smaller entry Work zones may be possible depending on drill rig specifics and the availability of nearby areas for support equipment support operations. The project will have remote

yards. Small work areas tend to reduce access and efficiency of operations, raise costs, but are necessitated by the specific project and site constraints.

See Figure 1c below covers general considerations and typical workspace configurations drafted for the CHPE Project.

GROUND TYPE	RIG SIZE	BORE LENGTH (ft)	WORK AREA (ft^2)	NOMINAL FOOTPRINT (ft x ft)
SOIL	Large/Maxi	>2,500	37,500*	150 x 250*
	Medium/Midi	1000-2500	15,000*	100 x 150*
	Small/Mini	<1000	3,000*	30 x 100*
ROCK	Large/Maxi	>2,500	37,500*	150 x 250*
	Small/Mini & Medium/Midi	1000-2500	15,000*	100 x 150*
PIPE ASSEMBLY	ALL	ALL	**	25 x (conduit length + 50)**

Notes:

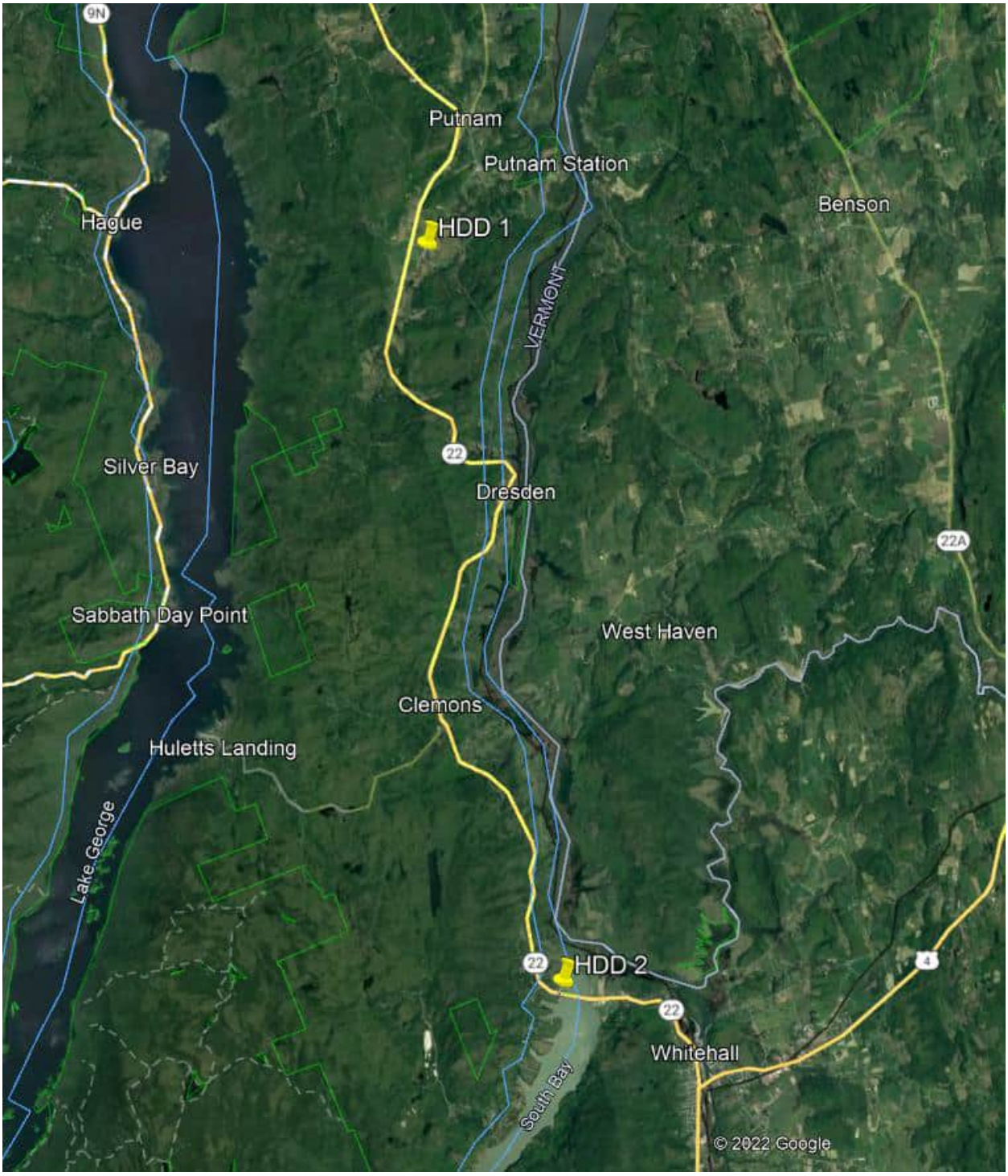
* The entry and exit workspaces typically need space for a drill rig and support equipment such as a pipe rack, power unit operator control cabin, a mud mixing and pumping unit, plus a separate mud processing and separation unit support equipment arranged linearly in line may be possible. Somewhat smaller work areas may be possible depending on drill rig specifics and availability of nearby areas for support equipment and support operations. Often need to coordinate final work areas with selected contractor's specific operations. Smaller work areas tend to reduce access and efficiency of operations.

** For HDD conduit bundle assembly and pullback, need a corridor equal to at least 1/3 to ½ of the length of the total bundle length and minimum 20 feet wide, typically at the exit end. Best if corridor equals the full length of the total bundle length plus about 50 ft

FIGURE 1c

Appendix B

Locus Map


9N
Putnam
Putnam Station
Hague
HDD 1
Benson
VERMONT
22
Silver Bay
Dresden
22A
Sabbath Day Point
West Haven
Clemons
Huletts Landing
Lake George
22
HDD 2
4
22
Whitehall
South Bay
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Appendix C

HDD Geotechnical Data Reports for CHPE Segment 1 & 2 – Package 1A & 1B HDDs

Kiewit

MEMORANDUM

DATE: April 14, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

FROM: Matthew Hawley, P.E.; Kiewit Engineering (NY) Corp. MKH
Jaren Knighton; Kiewit Engineering (NY) Corp.

SUBJECT: Geotechnical Data: Segment 1 - HDD Crossing 1
Champlain Hudson Power Express Project
Putnam Station, New York

Kiewit Engineering is providing the enclosed geotechnical data for use in the Lake Road horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located west of Putnam Station, New York. The approximate station for HDD crossing Number 1 is STA 10148+00 (43.722099° N, 73.418212° W).

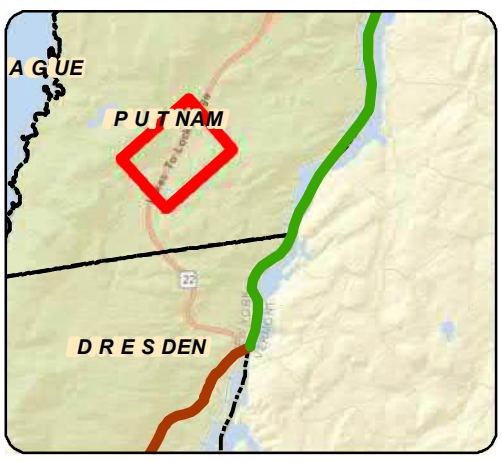
The geotechnical data at this HDD crossing is enclosed. The available data is from the previous investigation by AECOM, referenced below. No additional exploratory borings were performed at this HDD location.

- AECOM, Geotechnical Data Report, Upland Segments, Champlain Hudson Power Express, dated May 28, 2021.

Contact us if you have questions or require additional information.

HDD 1
Boring PD-7, PD-7A
Segment 1

PD-7A
PD-7
PD-6
PD-8
PD-9
2.8
2.9
3.1
3.2
3.3
3.4
3.5
3.6
3.7
3.8
3.9
4
4.1
4.2
4.3
PUTNAM
Lakes To Locks Path
Lake Rd
Putch Point Rd
0
1,000
Feet



LEGEND

- 111.8 Certified Milepost - Tenths
- 135 Certified Milepost
- 111.8 Preferred Alternative Milepost - Tenths
- 135 Preferred Alternative Milepost
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- 2021 Boring Location
- Previous (2013) Boring Location
- Streams/Ditches
- Railroad ROW
- Deviation Zone
- Deviation Zone Outside ROW
- Preferred Alternative Deviation Zone
- Preferred Alternative Deviation Zone Outside ROW
- Town Boundary
- Village Boundary
- State Park (OPRHP)

Parcel Ownership
TOWN NAME

Road Name
Village Name

DATA SOURCES: ESRI, NETWORK MAPPING 2010, NYSDOT, OPRHP, TDI, TRC

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Putnam to Dresden

Figure A-1

Sheet 3 of 6

Prepared by: AECOM 5/18/2021

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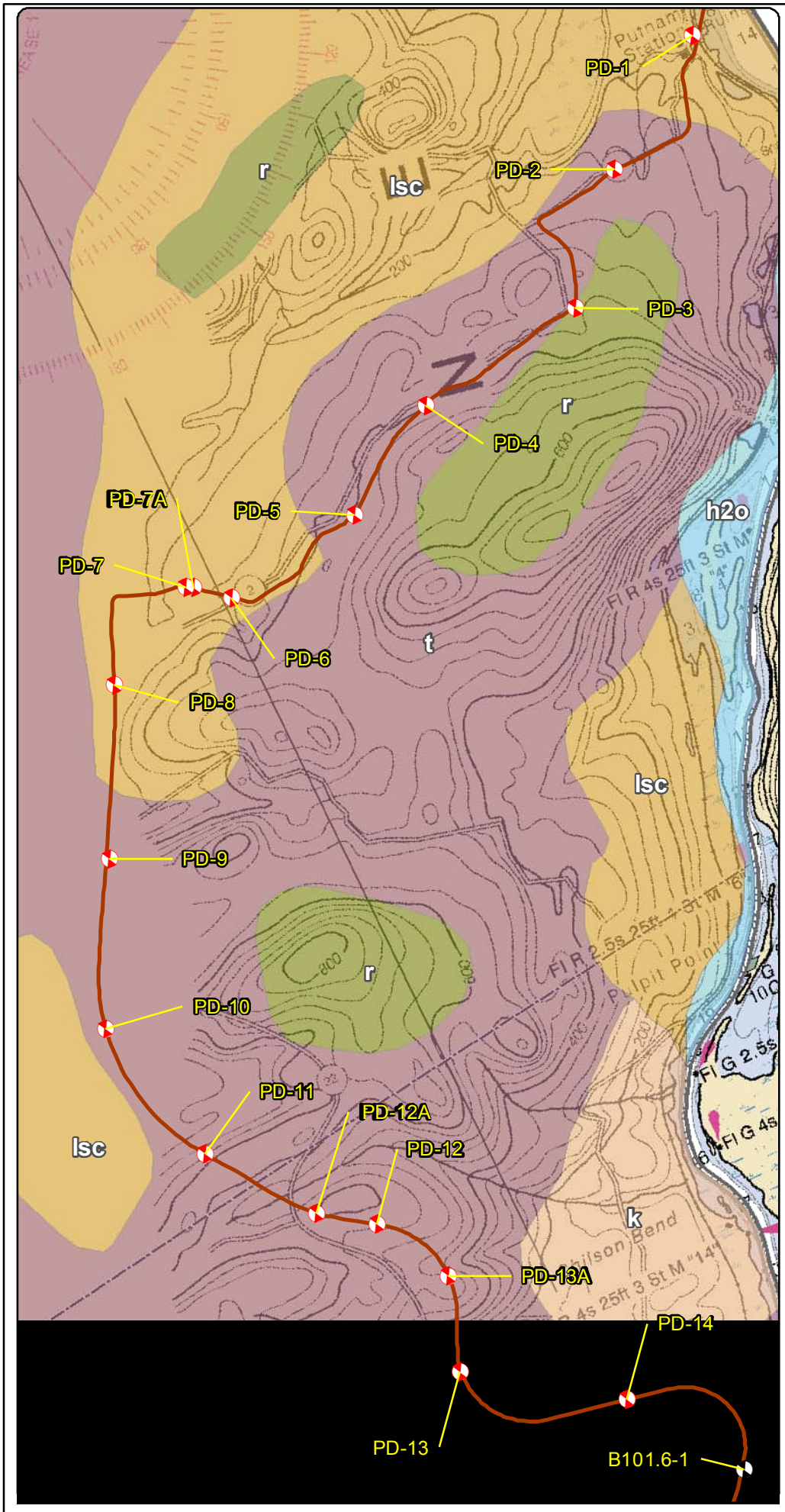
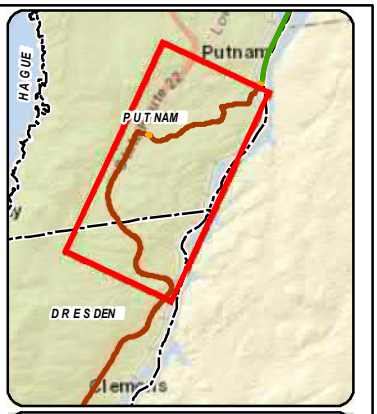




LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- h2o - Water
- k - Kame deposits
- lsc - Lacustrine silt and clay
- r - Bedrock
- t - Till

0.2 0.1 0 0.2 Miles

Transmission

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Putnam to Dresden Figure 3-1

Prepared on 5/5/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

Y:\Projects\CHPE\IRoute\Consensus_Alternative_Routes\MXD\Alt 5_Routes_DZ_20190\Boring_Locations\Maps_for_May_2021_Report\Putnam_to_Dresden_Boring_Locations_Surficial_May_2021_Report.mxd

BORING CONTRACTOR: ADT	AECOM		SHEET 1 OF 3
			PROJECT NAME: CHPE -
DRILLER: Chris Chaillou			PROJECT NO.: 60323056
			HOLE NO.: **PD-7**
SOILS ENGINEER: Chris French	**BORING LOG**		START DATE: 12/30/20
			FINISH DATE: 12/30/20
LOCATION: MP - 3.03 (Lake Road)			OFFSET: N/A

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: Geoprobe 7822DT
Water at 20' (inferred)	TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit		BORING TYPE: SPT
	SIZE I.D.	4"	2.5"	- -		BORING O.D.: 4.5"
	SIZE O.D.	4.5"	3"	3 7/8"		SURFACE ELEV.:
	HAMMER WT.	140 lbs	140 lbs			LONGITUDE:
	HAMMER FALL	30"	30"			LATITUDE:

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)	N Corr.(2)	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		0'-5'				Hand Cleared		SP		0.0'-1.0'; Dark brown fine-coarse SAND, some cobbles, little gravel; dense, frozen-mud
1.0								ML		1.0'-5.0'; Gray SILT, little clay, trace medium-fine sand; stiff, moist
2.0										
3.0										
		3'-5'	S-1							TR-1; (3.0'-5.0')
4.0										
5.0										
		5'-7'	S-2	24"	12"	4 5 5 4	7	ML		Gray SILT and clay; medium stiff, moist
6.0										
7.0										
		7'-9'	S-3	24"	18"	8 7 7 8	5	CL		Brown CLAY and silt; medium stiff, moist
8.0										
9.0										
		9'-11'	S-4	24"	18"	6 8 9 11	11	ML		Gray brown SILT, some glay; stiff, moist
10.0										
11.0										
		11'-'13'	S-5	24"	15"	8 10 9 10	12	ML		SAA
12.0										
										TR-2; (12.0'-12.5')
13.0										
		13'-15'	S-6	24"	24"	5 11 11 8	14	ML		Gray brown clayey SILT; stiff, moist
14.0										
15.0										
		15'-17'	S-7	24"	24"	3 2 3 4	3	CL		Gray and brown CLAY and silt, ~1" lenses of stiff silt; soft, moist
16.0										TR-3; (16.0'-16.5')
17.0										
18.0										
19.0										
20.0										

NOTES:

(1) Thick-wall ring lined drive sampler (California sampler) used for SPT samples. Rings dimensions = 2-1/2" O.D. by 2-7/16" I.D. by 6" length.

(2) Correction factor: $Ncorr=N*(2.0^2-1.375^2)in./(3.0^2-2.4^2)in. = N*0.65$.

Soil description represents a field identification after D.M. Burmister unless otherwise noted.

SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

BORING CONTRACTOR: ADT

DRILLER: Chris Chaillou

SOILS ENGINEER: Chris French

LOCATION: MP - 3.03 (Lake Road)

AECOM

BORING LOG

SHEET 2 OF 3

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **PD-7**

START DATE: 12/30/20

FINISH DATE: 12/30/20

OFFSET: N/A

DEPTH	CORING RATE MIN/FT	DEPTHS FROM - TO (FEET)	TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)				N Corr.	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		20'-22'	S-8	24"	24"	WOH					CL		Gray CLAY and silt; stiff, wet
21.0													
22.0													
23.0													
24.0													
25.0													
		25'-27'	S-9	24"	24"	WOH	WOH	WOH	2		CL		Gray CLAY and silt; soft, wet
26.0													
27.0													TR-4; (26.0'-26.5')
28.0													
29.0													
30.0													
		30'-32'	S-10	24"	24"	WOH					CL		SAA
31.0													
32.0													
33.0													
34.0													
35.0													
		35'-37'	S-11	24"	24"	WOH					CL		SAA
36.0													
37.0													
38.0													
39.0													
40.0													
		40'-42'	S-12	24"	24"	WOH					CL		Gray silty CLAY; soft, wet
41.0													
42.0													
43.0													
44.0													
45.0													

NOTES:

Soil description represents a field identification after D.M. Burmister unless otherwise noted.

The information contained on this log is not warranted to show the actual subsurface condition. The contractor agrees that he will make no claims against AECOM if he finds that the actual conditions do not conform to those indicated by this log.

SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

BORING CONTRACTOR: ADT

DRILLER: Chris Chaillou

SOILS ENGINEER: Chris French

LOCATION: MP - 3.03 (Lake Road)

AECOM

BORING LOG

SHEET 3 OF 3

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **PD-7**

START DATE: 12/30/20

FINISH DATE: 12/30/20

OFFSET: N/A

DEPTH	CORING RATE MIN/FT	DEPTHS FROM - TO (FEET)	TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)				N Corr.	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		45'-47'	S-13	24"	24"	WOR	WOH	WOH	2		CL		SAA
46.0													
													TR-5; (46.0'-46.5')
47.0													
48.0													
		48'-50'	S-14	24"	24"	WOR	WOR	WOH	WOH		CL		SAA
49.0													
50.0													
													Boring PD-7 terminated at 50', grouted to surface
51.0													
52.0													
53.0													
54.0													
55.0													
56.0													
57.0													
58.0													
59.0													
60.0													
61.0													
62.0													
63.0													
64.0													
65.0													
66.0													
67.0													
68.0													
69.0													
70.0													

NOTES:

Soil description represents a field identification after D.M. Burmister unless otherwise noted.

The information contained on this log is not warranted to show the actual subsurface condition. The contractor agrees that he will make no claims against DMJM Harris AECOM if he finds that the actual conditions do not conform to those indicated by this log.

SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

BORING CONTRACTOR: ADT			AECOM										SHEET 1 OF 3	
DRILLER: Chris Chaillou													PROJECT NAME: CHPE -	
													PROJECT NO.: 60323056	
													HOLE NO.: **PD-7A**	
SOILS ENGINEER: Chris French			**BORING LOG**										START DATE: 12/29/20	
													FINISH DATE: 12/29/20	
LOCATION: MP - 2.99 (Lake Road)													OFFSET: N/A	
GROUND WATER OBSERVATIONS				CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: Geoprobe 7822DT						
Water at 15' (inferred)			TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit		BORING TYPE: SPT						
			SIZE I.D.	4"	2.5"	- -		BORING O.D.: 4.5"						
			SIZE O.D.	4.5"	3"	3 7/8"		SURFACE ELEV.:						
			HAMMER WT.	140 lbs	140 lbs			LONGITUDE:						
			HAMMER FALL	30"	30"			LATITUDE:						

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)				N Corr.(2)	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		0'-5'				Hand Cleared					SP		0.0'-2.0'; Brown fine-coarse SAND, little silt, little subangular gravel; loose, moist
1.0													
2.0													
											ML		2.0'-5.0'; Brown clayey SILT, little fine-medium sand, medium stiff, moist
3.0													
		3'-5'	S-1										TR-1; (3.0'-5.0')
4.0													
5.0													
		5'-7'	S-2	24"	24"	12	14	16	19	20	ML		Brown silt, some clay; very stiff, moist
6.0													
7.0													
		7'-9'	S-3	24"	16"	15	15	12	10	8	ML		Brown SILT, some clay; medium stiff, moist, pink mottling
8.0													
													TR-2; (8.0'-8.5')
9.0													
		9'-11'	S-4	24"	18"	9	15	15	15	20	ML		Brown clayey SILT; very stiff, moist
10.0													
11.0													
		11'-'13'	S-5	24"	24"	9	12	11	15	15	ML		Brown clayey SILT, stiff, moist
12.0													
13.0													
		13'-15'	S-6	24"	24"	9	8	10	9	12	ML		SAA
14.0													
15.0													
		15'-17'	S-7	24"	22"	3	4	5	5	6	ML		Brown SILT and clay, trace fine-medium sand, trace subangular gravel; medium stiff, wet
16.0													
													TR-3; (16.0'-16.5')
17.0													
18.0													
19.0													
20.0													

NOTES:

(1) Thick-wall ring lined drive sampler (California sampler) used for SPT samples. Rings dimensions = 2-1/2" O.D. by 2-7/16" I.D. by 6" length.

(2) Correction factor: $N_{corr}=N*(2.0^2-1.375^2)in./(3.0^2-2.4^2)in. = N*0.65$.

Soil description represents a field identification after D.M. Burmister unless otherwise noted.

The information contained on this log is not warranted to show the actual subsurface condition. The contractor agrees that he will make no claims against AECOM if he finds that the actual conditions do not conform to those indicated by this log.

SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

BORING CONTRACTOR: ADT

DRILLER: Chris Chaillou

SOILS ENGINEER: Chris French

LOCATION: MP - 2.99 (Lake Road)

AECOM

BORING LOG

SHEET 2 OF 3

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **PD-7A**

START DATE: 12/29/20

FINISH DATE: 12/29/20

OFFSET: N/A

DEPTH	CORING RATE MIN/FT	DEPTHS FROM - TO (FEET)	TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)				N Corr.	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		20'-22'	S-8	24"	20"	WOH	1	1	2	1	ML		Gray SILT and clay; very soft, wet
21.0													
22.0													
23.0													
24.0													
25.0													
		25'-27'	S-9	24"	18"	WOH	WOH	WOH	3		ML		SAA
26.0													
													TR-4; (26.0'-26.5')
27.0													
28.0													
29.0													
30.0													
		30'-32'	S-10	24"	24"	WOH	WOH	2	2	1	CL		Gray CLAY and silt; soft, wet
31.0													
32.0													
33.0													
34.0													
35.0													
		35'-37'	S-11	24"	24"	WOH	WOH	WOH	3		CL		SAA, very soft
36.0													
													TR-5; (36.0'-36.5')
37.0													
38.0													
39.0													
40.0													
		40'-42'	S-12	24"	24"	WOH	WOH	1	1	1	CL		SAA
41.0													
42.0													
43.0													
44.0													
45.0													

NOTES:

Soil description represents a field identification after D.M. Burmister unless otherwise noted.

The information contained on this log is not warranted to show the actual subsurface condition. The contractor agrees that he will make no claims against AECOM if he finds that the actual conditions do not conform to those indicated by this log.

SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

BORING CONTRACTOR: ADT

DRILLER: Chris Chaillou

SOILS ENGINEER: Chris French

LOCATION: MP - 2.99 (Lake Road)

AECOM

BORING LOG

SHEET 3 OF 3

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **PD-7A**

START DATE: 12/29/20

FINISH DATE: 12/29/20

OFFSET: N/A

DEPTH	CORING RATE MIN/FT	DEPTHS FROM - TO (FEET)	TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)				N Corr.	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		45'-47'	S-13	24"	20"	WOH	WOH	WOH	1		CL		Gray silty CLAY; very soft, wet
46.0													
													TR-6; (46.0'-46.5')
47.0													
48.0													
		48'-50'	S-14	24"	24"	WOR	WOR	WOH	3		CL		SAA
49.0													
50.0													
													Boring terminated at 50', grouted to surface
51.0													
52.0													
53.0													
54.0													
55.0													
56.0													
57.0													
58.0													
59.0													
60.0													
61.0													
62.0													
63.0													
64.0													
65.0													
66.0													
67.0													
68.0													
69.0													
70.0													

NOTES:

Soil description represents a field identification after D.M. Burmister unless otherwise noted.

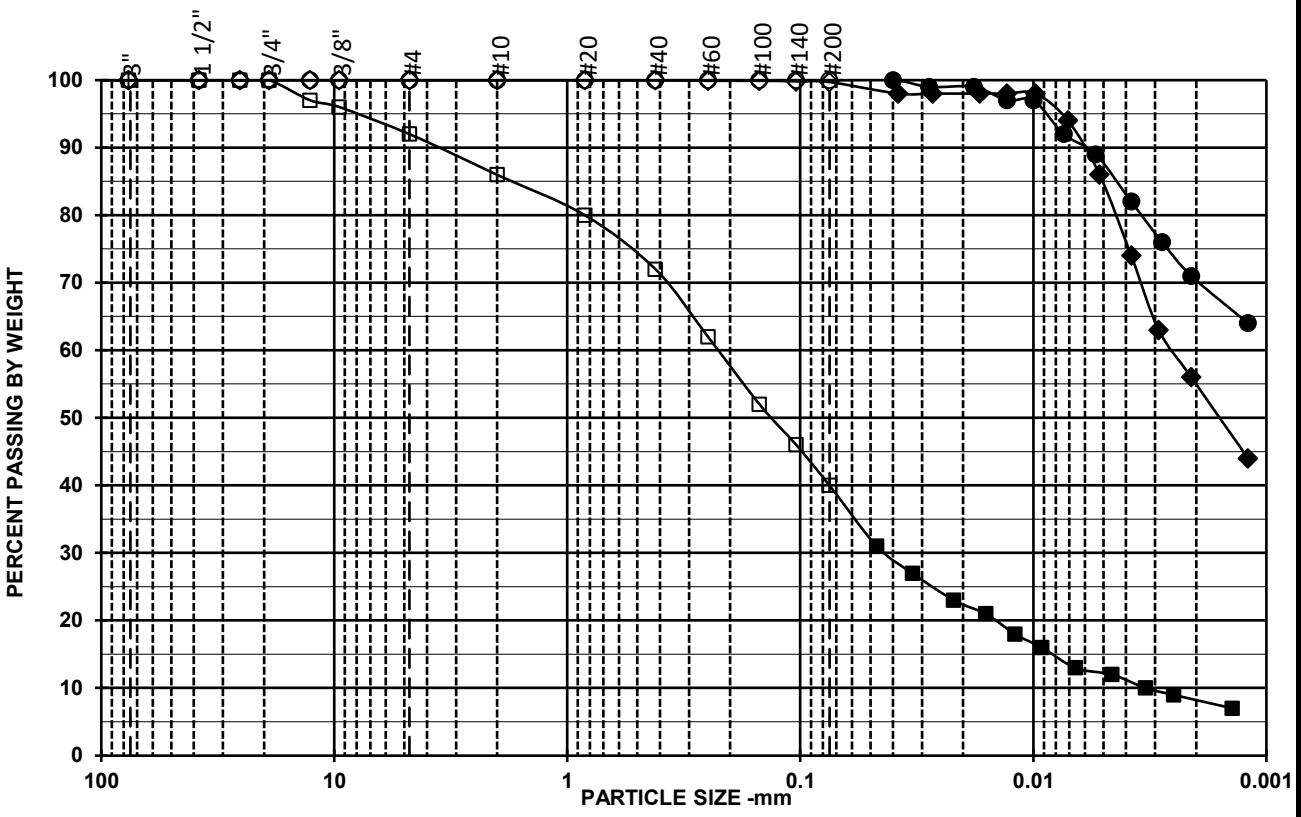
The information contained on this log is not warranted to show the actual subsurface condition. The contractor agrees that he will make no claims against DMJM Harris AECOM if he finds that the actual conditions do not conform to those indicated by this log.

SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

Table 3-1: Summary of Geotechnical Laboratory Testing of Soil Samples Putnam to Dresden Segment (PD)												
Boring ID	Sample ID	Depth (ft)	USCS Symbol	% Gravel	% Sand	% Silt	% Clay	LL [(1)] (%)	PL [(2)] (%)	PI [(3)] (%)	Water Content	Org. Content (%)
PD-1	S-4	9-11	ML	0	27.5	65.5	7	-	-	-	19.2	-
	S-8	20-22	SM	0	63.9	32.1	4	-	-	-	18.8	-
	S-10	30-32	ML	0	37.6	57.4	5	-	-	-	18.0	-
	S-12	40-42	SM	0	83.8	13.2	3	-	-	-	18.6	-
PD-2	S-2	5-7	ML	0	2.3	82.7	15	-	-	-	18.5	-
PD-4	S-2	5-7	CH	3	9	14	74	81	30	51	42.2	-
	S-2	7-9	CH	0	5.7	19.3	75	72	24	48	37.8	-
	S-3	11-13	CH	2	11	40	47	60	21	39	33.1	-
PD-5	S-3	7-9	SM	8	52	32	8	12	12	NP	7.2	-
PD-7	S-4	9-11	CH	0	0.3	44.7	55	59	20	39	34.4	-
	S-8	20-22	OH	0	0	30	70	50	19	31	68.4	-
	S-10	30-32	OH	0	0	30	70	63	20	43	37.3	-
	S-12	40-42	OH	0	0	28	72	70	22	48	61.7	-
PD-9	S-1	5-7	CH	0	0.1	19.9	80	70	23	47	30.7	-
	S-3	9-11	CH	0	0	21	79	66	23	43	44	-
	S-5	13-15	CH	0	0	8	92	75	24	51	43.8	-
PD-10	S-1	6-8	GW	49	47	3	1	-	-	-	8.5	-
	S-2	8-10	SM	13	49	33	5	-	-	-	8.7	-
PD-13	S-1	5-7	SM	21	42	28	9	-	-	-	4.2	-
	S-2	7-8	SM	22	42	27	9	-	-	-	4.6	-
PD-14	S-1	5-7	ML	0.2	7	85.8	7	-	-	-	24.1	-
	S-3	9-11	ML	0	23	72	5	-	-	-	24.2	-
	S-5	13-15	ML	0	15.3	80.7	4	-	-	-	22.7	-

Notes:
(1) LL = Liquid Limit
(2) PL = Plastic Limit
(3) PI = Plasticity Index
(4) SG = Specific Gravity



Open Symbols: Sieve analysis by ASTM D6913
Filled symbols: Hydrometer analysis by ASTM D7928 corrected for complete sample

SYMBOL	w (%)	LL	PL	PI	USCS	AASHTO	USCS DESCRIPTION AND REMARKS	DATE
□	7.2	12	12	NP	SM		Brown, Silty sand, Insufficient sample size	3/15/2021
◇	34.4	59	20	39	CH		Brown, Fat clay	03/17/21
○	68.4	50	19	31	OH		Gray, Organic clay	03/17/21

Aquifer #602201207

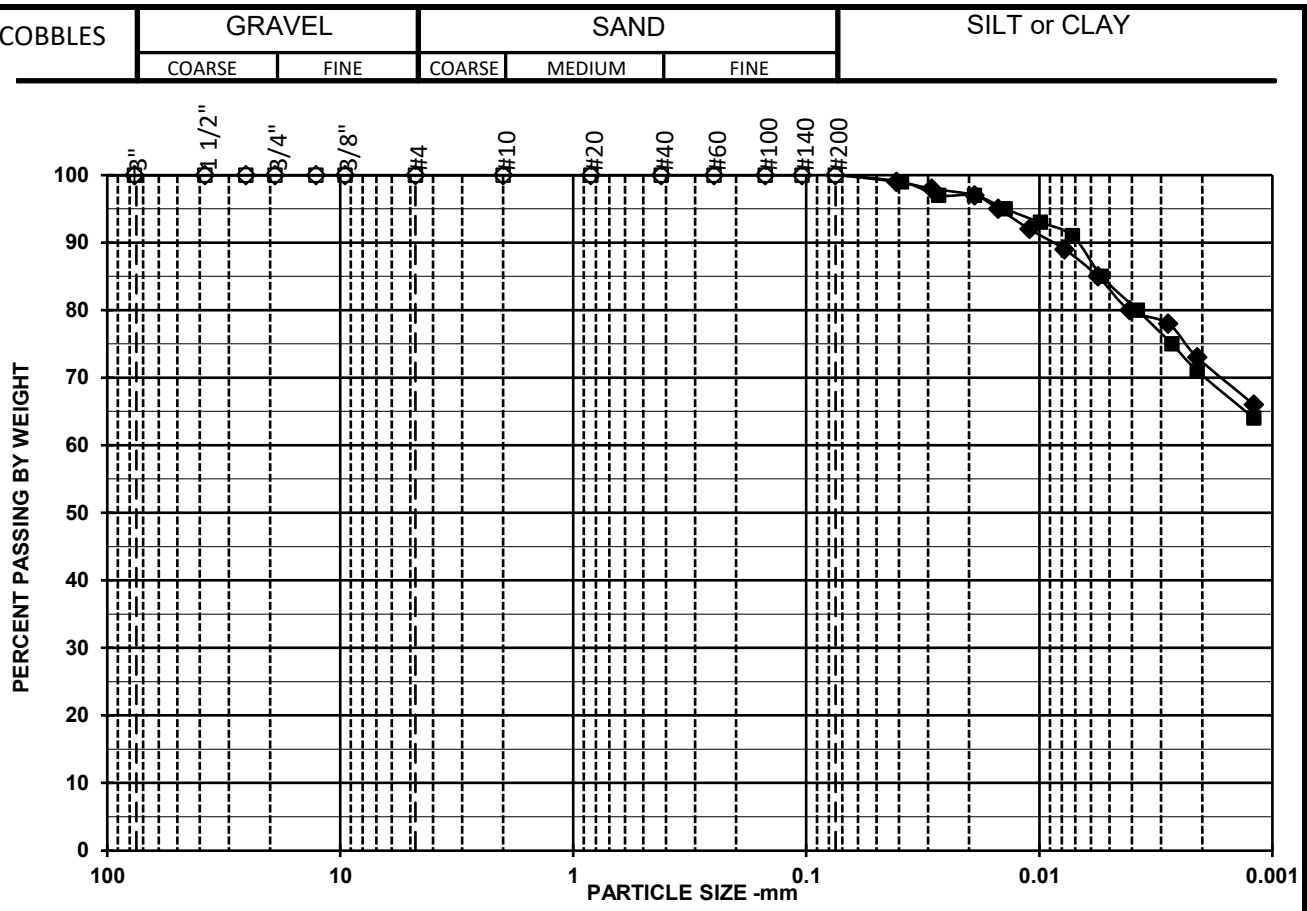
TerraSense, LLC #7853-21001

CHPE - Putnam-Dresden Borings

Symbol	□	◇	○
Boring	PD-5	PD-7	PD-7
Sample	S-3	S-4	S-8
Depth	7-9	9-11	20-22
% +3"	0	0	0
% Gravel	8	0	0
% SAND	52	0.3	0
%C SAND	6	0	0
%M SAND	14	0	0
%F SAND	32	0.3	0
% FINES	40	99.7	100
D_{100} (mm)	19.1	2	0.075
D_{60} (mm)	0.225	0.003	
D_{30} (mm)	0.043		
D_{10} (mm)	0.003		
Cc	2.5		
Cu	68.2		

Sieve Size/ID #	Percent Finer Data		
6"	100	100.0	100
4"	100	100.0	100
3"	100	100.0	100
1 1/2"	100	100.0	100
1"	100	100.0	100
3/4"	100	100.0	100
1/2"	97	100.0	100
3/8"	96	100.0	100
#4	92	100.0	100
#10	86	100.0	100
#20	80	100.0	100
#40	72	100.0	100
#60	62	99.9	100
#100	52	99.9	100
#140	46	99.8	100
#200	40	99.7	100
5μ m	12	85	87
2μ m	8	55	70
1μ m	6	40	62

PARTICLE SIZE DISTRIBUTION
ASTM D6913 & ASTM D7928



Open Symbols: Sieve analysis by ASTM D6913
Filled symbols: Hydrometer analysis by ASTM D7928 corrected for complete sample

SYMBOL	w (%)	LL	PL	PI	USCS	AASHTO	USCS DESCRIPTION AND REMARKS	DATE
□	37.3	63	20	43	OH		Gray, Organic clay	03/17/21
◇	61.7	70	22	48	OH		Gray, Organic clay	03/17/21
○								

Aquifer	#602201207
TerraSense, LLC	#7853-21001

CHPE - Putnam-Dresden Borings

Symbol	□	◇	○
Boring	PD-7	PD-7	
Sample	S-10	S-12	
Depth	30-32	40-42	
% +3"	0	0	
% Gravel	0	0	
% SAND	0	0	
%C SAND	0	0	
%M SAND	0	0	
%F SAND	0	0	
% FINES	100	100	
D_{100} (mm)	0.075	0.075	
D_{60} (mm)			
D_{30} (mm)			
D_{10} (mm)			
Cc			
Cu			

Sieve Size/ID #	Percent Finer Data		
6"	100.0	100	
4"	100.0	100	
3"	100.0	100	
1 1/2"	100.0	100	
1"	100.0	100	
3/4"	100.0	100	
1/2"	100.0	100	
3/8"	100.0	100	
#4	100.0	100	
#10	100.0	100	
#20	100.0	100	
#40	100.0	100	
#60	100.0	100	
#100	100.0	100	
#140	100.0	100	
#200	100.0	100	
5μ m	84	83	
2μ m	70	72	
1μ m	62	64	

PARTICLE SIZE DISTRIBUTION
ASTM D6913 & ASTM D7928

Kiewit

MEMORANDUM

DATE: June 17, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

FROM: Matthew Hawley, P.E.; Kiewit Engineering (NY) Corp. MKH
Jaren Knighton; Kiewit Engineering (NY) Corp.

SUBJECT: Geotechnical Data: Segment 2 – Package 1B - HDD Crossing 2
Champlain Hudson Power Express Project
Whitehall, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located west of Whitehall, New York. The approximate station for the start of HDD crossing Number 2 is STA 12920+00 (43.5748° N, 73.4359° W).

The geotechnical data at this HDD crossing is attached. The available data is from the previous investigations by S.W. Cole and the State of New York and the recent investigations by Kiewit Engineering and Schnabel Engineering, referenced below.

- Kiewit Engineering Group Inc., Segment 2 Package 1B HDD – South Bay, Champlain-Hudson Power Express, dated May 11, 2022.
- Schnabel Engineering, Geophysical Survey North and South of the Rt. 22 Bridge, Champlain Power Express: Rt 22-Whitehall, NY, dated June 10, 2022.
- State of New York Departments of Public Works and Transportation, South Bay Bridge, S.H. 9113, Whitehall-Dresden, Route 22, Washington County, dated 1971.
- S.W. Cole Engineering, Inc., Geotechnical and Geophysical Data Report, Champlain Hudson Power Express Project, Route 22 Terrestrial Route, dated January 4, 2013.

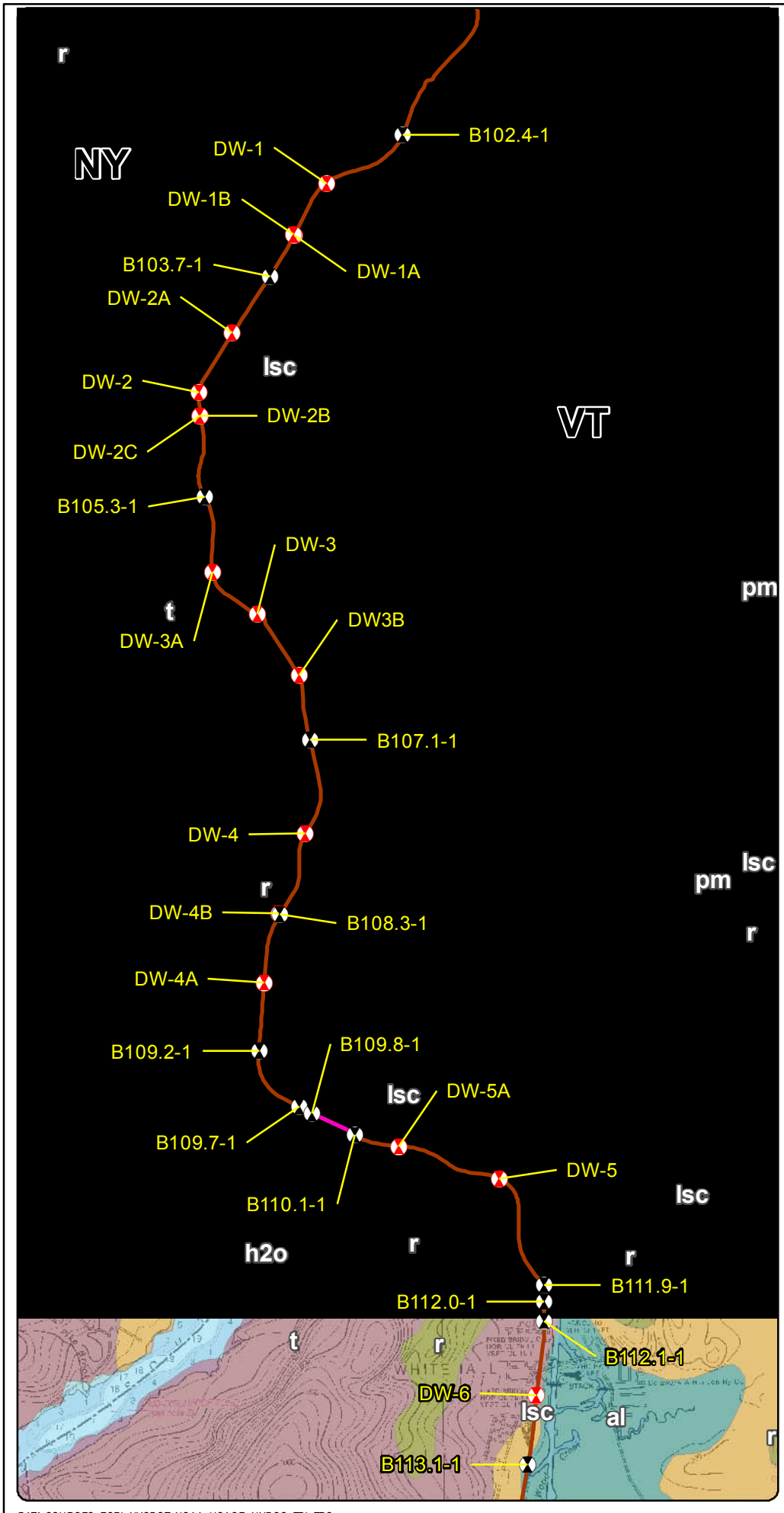
Contact us if you have questions or require additional information.

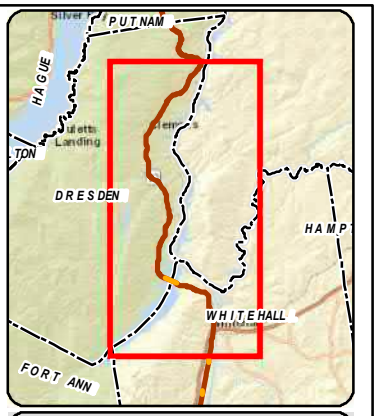
HDD 2

Boring List:
S.W. Cole: B109.7-1, B109.8-1, B110.1-1
Kiewit: K-109.6, K-109.7, K-109.9, K-110.0, K-110.1, K-110.3
State of New York DOT: SB-1 to SB-11, P-1 to P-6

Schnabel Engineering Geophysics Report

Segment 2 - Package 1B





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- al - Recent alluvium
- h2o - Water
- lsc - Lacustrine silt and clay
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

0.5 0.25 0 0.5 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Dresden to Whitehall Figure 4-2

Prepared on 5/5/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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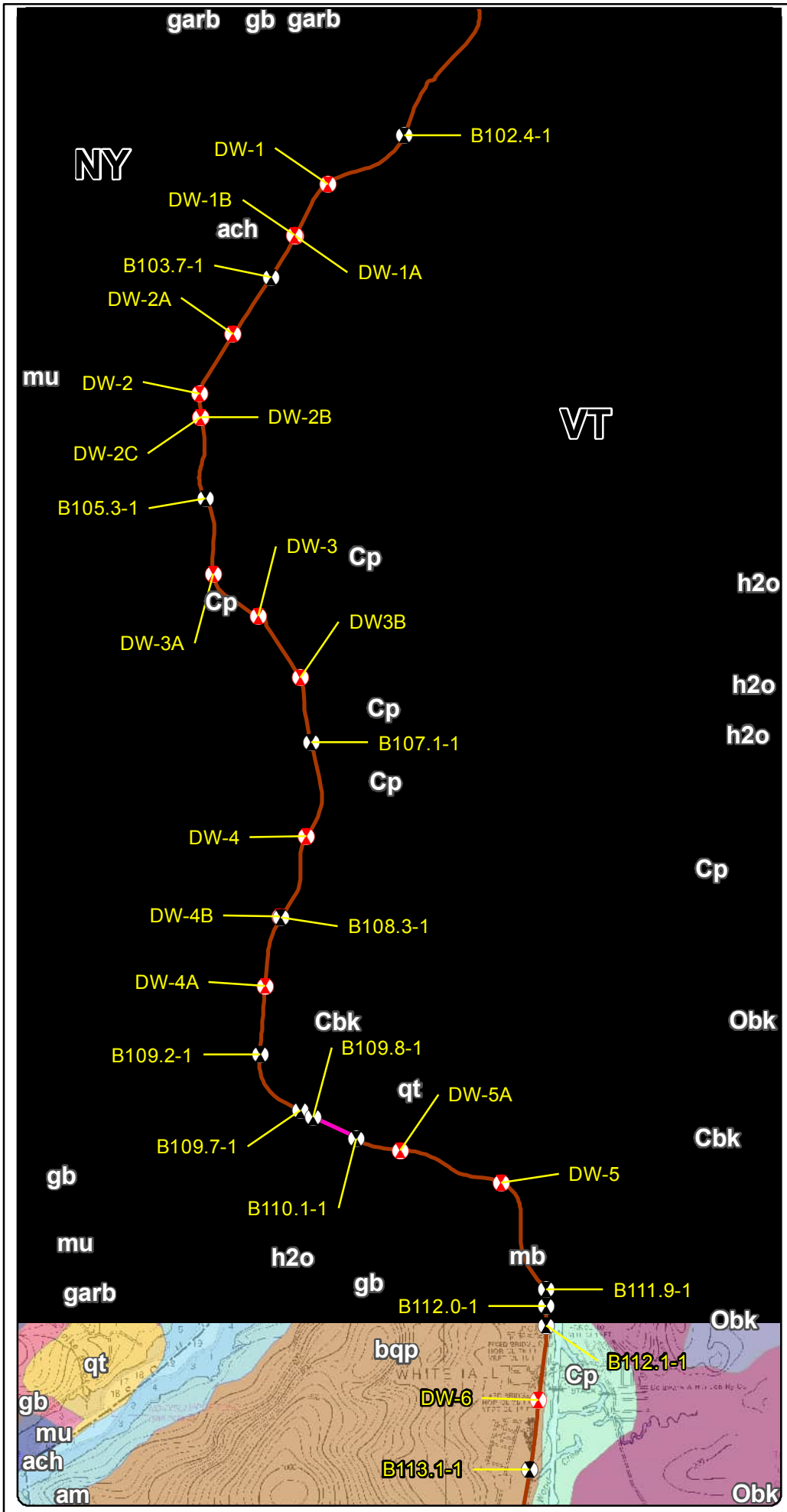

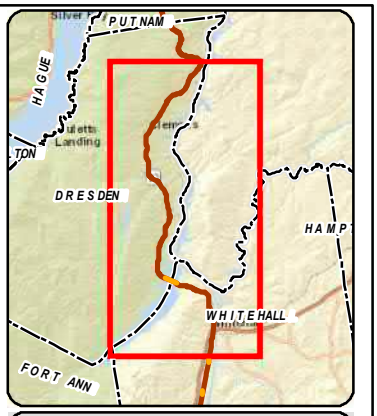

LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Bedrock Geology

- Cbk - Beekmantown Group
- Cp - Potsdam Sandstone
- Obk - Beekmantown Group
- ach - metanorthosite and anorthositic
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- qt - Quartzite

N

0.5 0.25 0 0.5 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Bedrock Geology and Geotechnical Borings Dresden to Whitehall Figure 4-2

Prepared on 5/5/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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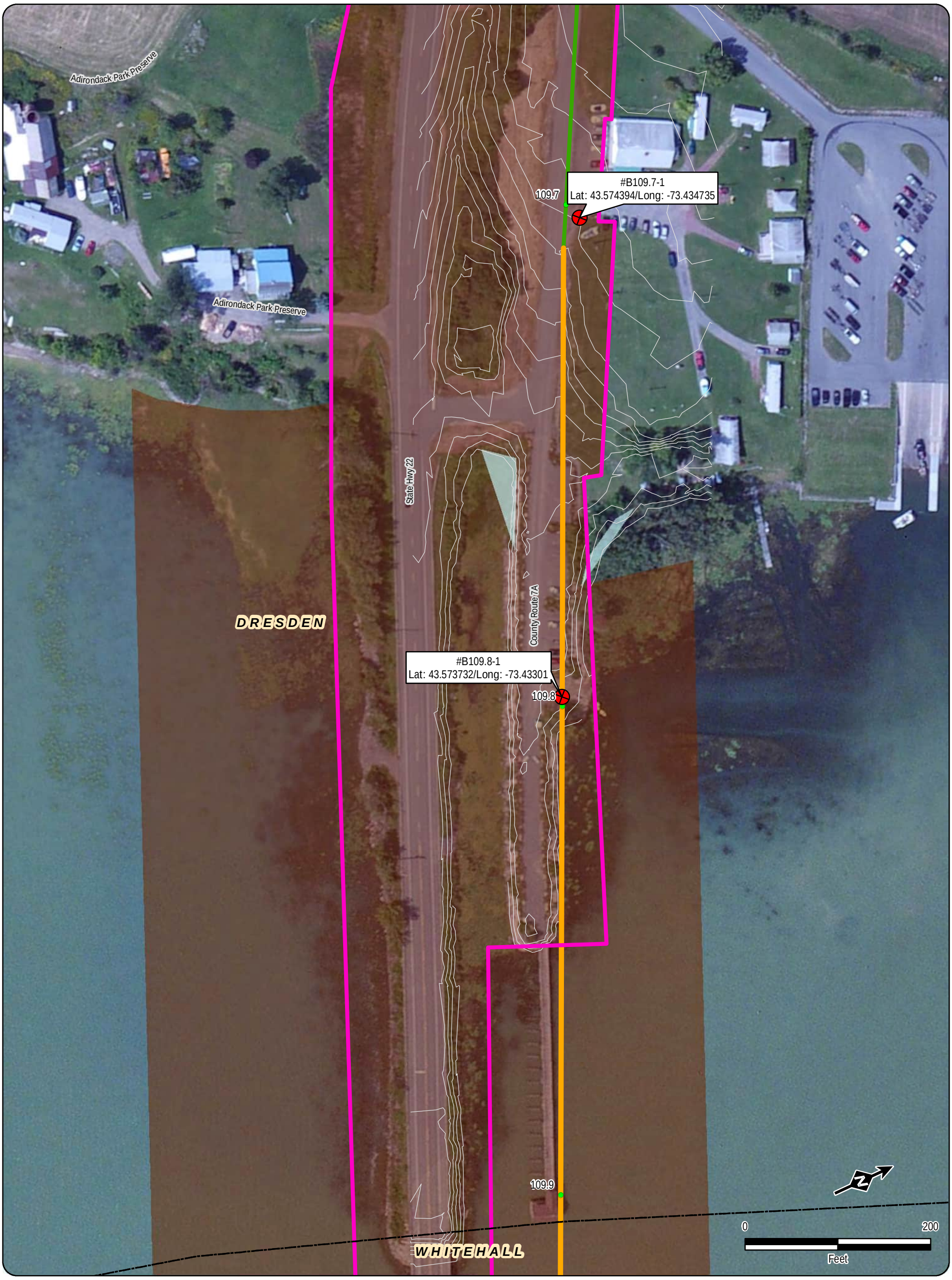

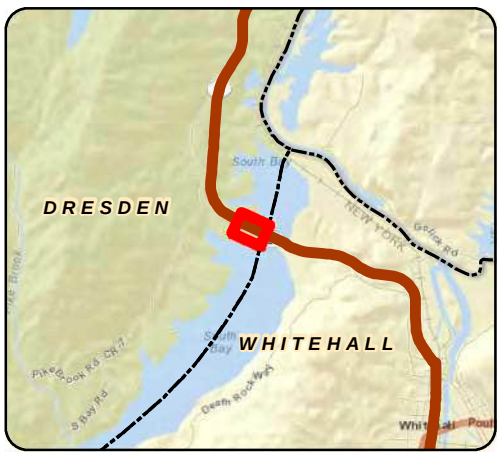

LEGEND

111.8 Milepost - Tenths

135 Milepost

Terrestrial Route HVDC

Submarine Route HVDC

Preliminary HDD Locations

Preliminary Pipe Bridge Location

Approximate RR Mileposts

CP/CSX ROW

DOT ROW

Perennial Stream

Intermittent Stream

Ditch

Surface Water

Wetland

Deviation Zone

Contour-2'

Town Boundary

Village Boundary

Geotechnical Borings

Desktop

Field Collected

Drilled

As Built

Road Name

TOWN NAME

Village Name

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Geotechnical Boring Locations

Dresden/Whitehall - Route 22

Sheet 8 of 10

Prepared by: HDR | DTA & TRC 12/13/2012

DATA SOURCES: ESRI, NETWORK MAPPING 2010, NYSDOT, OPRHP, TDI, TRC

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DRESDEN

#B110.0-1
Lat: 43.572445/Long: -73.42949

110

WHITEHALL

County Route 7A

110.1

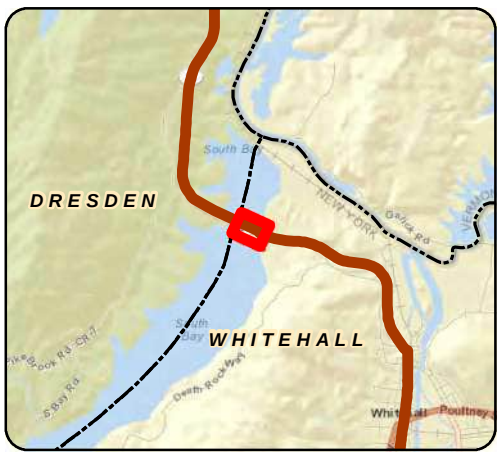
#B110.1-1
Lat: 43.571662/Long: -73.427461

State Hwy 22

Whitehall

N

0 200
Feet



LEGEND

111.8 Milepost - Tenths
135 Milepost
Terrestrial Route HVDC
Submarine Route HVDC
Preliminary HDD Locations
Preliminary Pipe Bridge Location
Approximate RR Mileposts
CP/CSX ROW
DOT ROW

Perennial Stream
Intermittent Stream
Ditch
Surface Water
Wetland
Deviation Zone
Contour-2'
Town Boundary
Village Boundary

Geotechnical Borings
Desktop
Field Collected
Drilled
As Built
Road Name
TOWN NAME
Village Name

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Geotechnical Boring Locations

Whitehall/Dresden - Route 22

Sheet 9 of 10

Prepared by: HDR | DTA & TRC 12/13/2012

DATA SOURCES: ESRI, NETWORK MAPPING 2010, NYSDOT, OPRHP, TDI, TRC

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S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B109.7-1**
SHEET: 1 OF 1
PROJECT NO.: 10-1256

PROJECT / CLIENT: CHAMPLAIN HUDSON POWER EXPRESS PROJECT / TRC
LOCATION: DRESDEN AND WHITEHALL, NEW YORK
DRILLING CO. : TRC COMPANIES, INC. DRILLER: RICK CARUSO

DATE START: 11/3/2012
DATE FINISH: 11/3/2012
ELEVATION: NOT AVAILABLE
SWC REP.: NBS

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	4 1/4"		
SAMPLER:	SS	2"	140 lbs	30 in
CORE BARREL:				

WATER LEVEL INFORMATION
SOILS APPEAR SATURATED BELOW 7.0' ±

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
										BROWN SILTY GRAVELLY SAND
	1D	24"	4"	2.0'	12	5	5	9	2.0'	~ MEDIUM DENSE ~
									4.0'	BROWN CLAY SOME SAND TRACE SILT AND GRAVEL
	2D	24"	13"	4.0'	7	8	11	13		$w = 33.0\%$, $W_L = 66$, $W_P = 27$ ~ MEDIUM DENSE ~
	3D	24"	18"	6.0'	10	9	9	12		LIGHT BROWN CLAYEY SILT
										~ MEDIUM DENSE ~
	4D	24"	18"	8.0'	5	6	7	8	8.0'	
										GRAY - BROWN CLAYEY SILT
	5D	24"	24"	10.0'	10	8	9	13		~ MEDIUM DENSE ~
									12.0'	
	6D	24"	18"	15.0'	6	7	10	9		GRAY - BROWN SILT AND CLAY
	7D	24"	18"	20.0'	4	5	6	7		~ LOOSE TO MEDIUM DENSE ~
	8D	24"	18"	25.0'	4	6	7	8	25.0'	
										BOTTOM OF EXPLORATION @ 25.0'

SAMPLES:
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[X] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: **B109.7-1**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B109.8-1**
SHEET: 1 OF 1
PROJECT NO.: 10-1256

PROJECT / CLIENT: CHAMPLAIN HUDSON POWER EXPRESS PROJECT / TRC
LOCATION: DRESDEN AND WHITEHALL, NEW YORK
DRILLING CO. : TRC COMPANIES, INC. DRILLER: RICK CARUSO

DATE START: 11/1/2012
DATE FINISH: 11/1/2012
ELEVATION:
SWC REP.: NBS

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	4 1/4"		
SAMPLER:	SS	2"	140 lbs	30 in
CORE BARREL:				

WATER LEVEL INFORMATION
ANTICIPATED TO BE IN AGREEMENT WITH
WATER LEVEL OF LAKE

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
	1D	5"	5"	0.4'	50-5"				0.4'	BROWN GRAVELLY SAND WITH SOME SILT
										STONE RIPRAP (FILL) (OBSERVED DIFFICULT AUGER ADVANCEMENT - NO SAMPLING)
									13.0'	
	2D	24"	12"	15.0'	6	2	2	2		GRAY - BROWN SILTY CLAY WITH TRACE FINE SAND ~ MEDIUM TO STIFF ~
	3D	24"	18"	20.0'	3	3	2	11	19.5'	
	4D	24"	24"	25.0'	7	5	7	8		GRAY - BROWN CLAYEY SILT WITH FEW WOOD FRAGMENTS ~ MEDIUM DENSE ~
									27.0'	
	5D	24"	24"	30.0'	10	8	8	9		GRAY SILT AND CLAY ~ MEDIUM DENSE ~
	6D	24"	24"	35.0'	10	10	10	10	35.0'	
										BOTTOM OF EXPLORATION @ 35.0'

SAMPLES:
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: **B109.8-1**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B110.1-1**
SHEET: 1 OF 1
PROJECT NO.: 10-1256

PROJECT / CLIENT: CHAMPLAIN HUDSON POWER EXPRESS PROJECT / TRC
LOCATION: DRESDEN AND WHITEHALL, NEW YORK
DRILLING CO. : TRC COMPANIES, INC. DRILLER: RICK CARUSO

DATE START: 11/4/2012
DATE FINISH: 11/4/012
ELEVATION: NOT AVAILABLE
SWC REP.: NBS

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	4 1/4"		
SAMPLER:	SS	2"	140 lbs	30 in
CORE BARREL:				

WATER LEVEL INFORMATION
SOILS APPEAR SATURATED BELOW 5.5' ±

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
										BROWN GRAVELLY SILTY SAND
	1D	24"	2"	2.0'	21	28	18	6		~ MEDIUM DENSE TO DENSE ~
									3.0'	
	2D	24"	0"	4.0'	13	8	6	8		GRAY - BROWN SILT AND CLAY
										~ MEDIUM DENSE ~
	3D	24"	16"	6.0'	6	6	5	6	6.0'	
										GRAY - BROWN SILT AND CLAY WITH SOME FINE SAND
	4D	24"	2"	8.0'	9	8	8	7	8.0'	~ MEDIUM DENSE ~
	5D	24"	18"	10.0'	7	7	7	6		
	6D	24"	18"	15.0'	8	9	9	10		
	7D	24"	18"	20.0'	9	9	10	9		BROWN CLAY TRACE SILT ~ MEDIUM DENSE ~ w = 36.0%, W_L = 53, W_P = 25
	8D	24"	18"	25.0'	9	10	11	11		
									27.0'	
	9D	24"	18"	30.0'	10	11	11	10		GRAY SILTY CLAY ~ STIFF ~ (PROBABLE ROD FRICTION AGAINST INSIDE OF AUGER)
									32.0'	
	10D	24"	18"	35.0'	15	15	13	12		DARK GRAY CLAY TRACE SILT w = 45.0%, W_L = 62, W_P = 26 ~ MEDIUM DENSE ~
	11D	24"	18"	40.0'	11	10	8	9	40.0'	BOTTOM OF EXPLORATION @ 40.0'

SAMPLES:
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[X] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: **B110.1-1**

Laboratory Testing Results Summary
TDI Champlain Hudson Power Express
10-1256 S

Boring Designation	Sample Depth (ft)	SWCE Sample Number	Natural Moisture Content (%)	Grain Size Analysis					Atterberg Limits			Laboratory Thermal Conductivity						Laboratory Resistivity	
												Moisture Point 1		Moisture Point 2		Moisture Point 3			
				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Silt and Clay (%)	LL (%)	PL (%)	PI	As-received Moisture Content (%)	Thermal Conductivity (W / (m*K)	Moisture Content (%)	Thermal Conductivity (W / (m*K)	Moisture Content (%)	Thermal Conductivity (W / (m*K)	As-received Resistivity (ohm-cm)	Saturated Resistivity (ohm-cm)
B101.6-1	2-4	10319S	11.6	20.0	51.2	-	-	28.8				11.4	2.451					5200	4800
B101.6-1	13-13.4 & 15-17	10540S	4.5	41.9	34.1	-	-	23.9				11.5	1.192	1.5	0.605	15.8	2.020		
B102.4-1	3-5 & 5-7	10541S	7.1	39.2	40.6	-	-	20.2				12.0	1.822	2.0	0.866	9.7	2.759		
B102.4-1	13-15	10320S	9.5	16.6	38.8	-	-	44.6											
B103.7-1	6-8	10321S	29.8	2.2	22.3	46.1	29.4	75.5	28	18	10							1600	1300
B103.7-1	8-10 & 13-15	10542S	28.7	0.0	6.3	-	-	93.7				28.7	1.555	2.7	0.381	8.7	1.612		
B105.3-1	6-8	10322S	5.7	42.6	44.4	-	-	13.0											
B107.1-1												9.7	1.651						
A108.3-1	0-2 & 2-2.9	10543S	5.0	36.0	40.5	-	-	23.5				13.0	1.458	1.9	0.748	8.3	2.600		
B108.3-1	2-4	10323S	5.6	45.8	36.3	-	-	17.9										8800	6100
B109.7-1	2-4	10330S	33.0	0.2	6.0	4.0	89.7	93.7	66	27	39							470	410
109.7-1	8-10 & 13-15	10544S	34.2	0.0	0.3	-	-	99.7				34.2	1.372	3.0	0.268	14.5	0.895		
B109.8-1	18-20 & 23-25	10545S	34.6	0.0	0.5	-	-	99.5				34.6	1.088	2.6	0.422	13.1	0.488		
B110.0-1	18-20	10324S	36.0	0.0	0.0	3.2	96.8	100.0	53	25	28								
B110.0-1	23-25 & 33-35	10546S	42.7	0.0	0.7	-	-	99.3				42.7	1.170	1.1	0.403	10.5	0.760		
B110.1-1	28-30	10325S	45.0	0.0	0.0	2.4	97.6	100.0	62	26	36								
B111.9-1	3-5	10326S	20.4	3.0	38.2	-	-	58.8										1300	1100
B111.9-1	6-8 & 8-9.7	10547S	14.7	32.0	51.7	-	-	16.3				14.7	1.622	5.4	0.451	11.5	2.388		
B111.9-1	13-15 & 18-20	10548S	36.9	0.0	0.0	-	-	100.0				36.9	1.316	2.1	0.400	14.5	0.914		
B112.0-1	13-15	10327S	37.0	0.0	0.6	6.0	93.4	99.4	45	24	21								
B112.0-1	9-11 & 18-20	10549S	32.6	0.0	0.6	-	-	99.4				32.6	1.635	2.3	0.338	8.4	0.600		
B112.1-1	2-4 & 4-6	10551S	5.1	33.7	46.4	-	-	19.9				5.1	1.358	2.1	2.287	10.1	2.360		
B112.1-1	6-10	10328S	24.0	1.0	32.0	30.6	36.3	66.9	32	21	11							780	760
B112.1-1	13-15 & 18-20	10550S	38.7	2.8	9.5	-	-	87.7				38.7	1.078	2.4	0.306	12.6	0.741		

S. W. Cole Engineeing, Inc.
Somersworth, NH
(603) 692-0088

S.W.COLE ENGINEERING, INC.

Report of Hydrometer

ASTM D-422

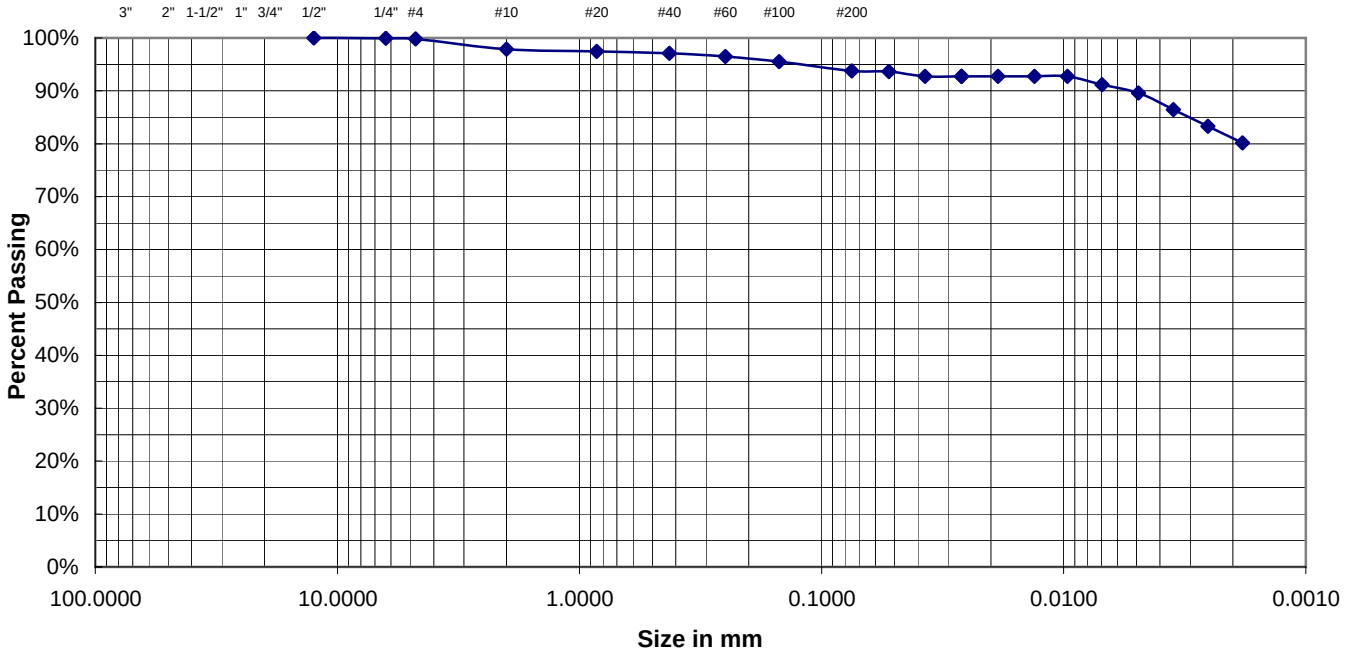
Project Name	CHAMPLAIN HUDSON POWER EXPRESS PROJECT	Project Number	10-1256
Client	TRC COMPANIES, INC	Lab ID	10330S
Material Type	BROWN CLAY SOME SAND TRACE SILT AND GRAVEL (CH)	Date Received	11/16/2012
Material Source	BULK SAMPLE 2'-4'	Date Completed	11/26/2012
Exploration	B-109.7-1	Tested By	MJS

Sieve Analysis

Sieve Size	Standard Designation (mm)	Amount Passing (%)
3"	75	**100**
2"	50	**100**
1-1/2"	37.5	**100**
1"	25	**100**
3/4"	19	**100**
1/2"	12.5	**100**
1/4"	6.3	**100**
No. 4	4.75	**100**
No. 10	2	**98**
No. 20	0.85	**97**
No. 40	0.425	**97**
No. 60	0.25	**96**
No. 100	0.15	**96**
No. 200	0.075	**93.7**

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.053	93.7
0.037	92.7
0.026	92.7
0.019	92.7
0.013	92.7
0.010	92.7
0.007	91.2
0.005	89.6
0.004	86.4
0.003	83.3
0.002	80.2



Particle Distribution	
Gravel, retained on #4	0.2%
Sand, passing #4 and retained on #200	6.0%
Fines, 0.074 to 0.005	4.0%
Clay Fraction, <0.005	89.7%

Comments: MOISTURE CONTENT = 33%

Chad B. Michaud

Reviewed By

S.W.COLE ENGINEERING, INC. • Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

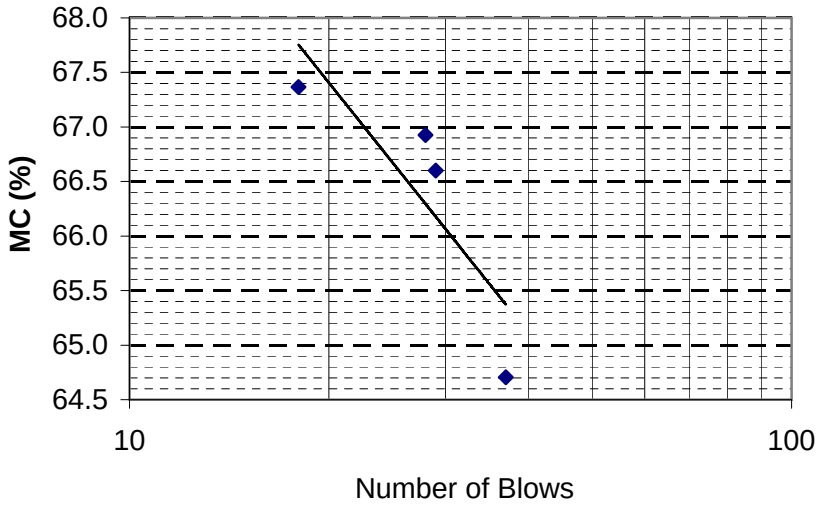
REPORT OF ATTERBERG LIMITS
ASTM D4318

Project Name	CHAMPLAIN HUDSON POWER EXPRESS	Project Number	10-1256
Client	TRC COMPANIES, INC	Laboratory ID	10330S
Soil Description	BR CLAY SOME SAND TRACE SILT AND GVL (CH)	Date Received	11/16/2012
Soil Source	B-109.7-1, BULK SAMPLE 2'-4'	Date Completed	11/28/2012
		Tested By	MJS

TEST RESULTS

Estimate of Material Retained On the No. 40 Sieve	Liquid Limit	Plastic Limit	Plasticity Index
3%	66	27	39

LIQUID LIMIT CURVE



Chad B. Michaud
Reviewed By

S.W.COLE ENGINEERING, INC.

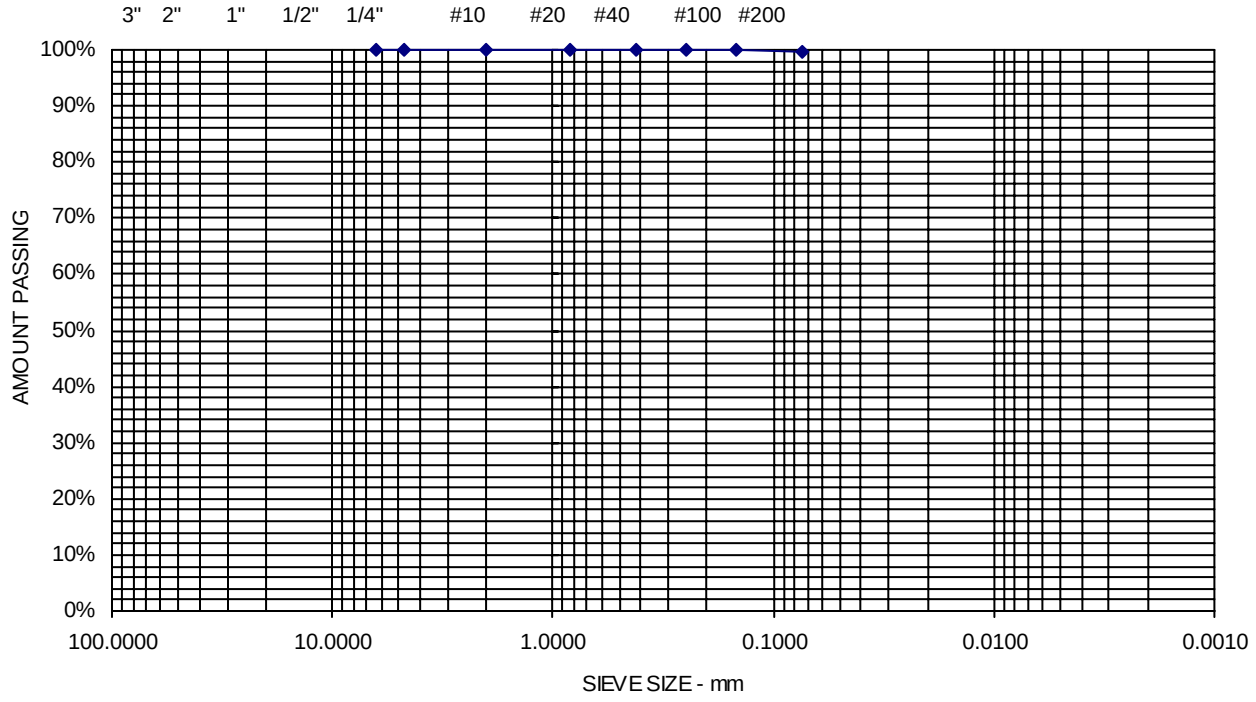
Report of Gradation

ASTM C-117 & C-136

Project Name	EASTERN NY - CHAMPLAIN HUDSON POWER EXPRESS PROJECT - GEOTECHNICAL EXPLORATIONS, SOIL THERMAL CONDUCTIVITY,	Project Number	10-1256
Client	TRC COMPANIES, INC.	Lab ID	10544S
Exploration	**B-109.7-1**	Date Received	12/21/2012
Material Source	**S-5(8.0'-10.0') & S-6(13.0'-15.0')**	Date Completed	12/28/2012
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	0.3% Sand
250 um	**No. 60**	**100**	
150 um	**No. 100**	**100**	
75 um	**No. 200**	**99.7**	99.7% Fines

GRAY-BROWN SILTY CLAY TRACE SAND (CL)



Comments: MOISTURE CONTENT = 34.2%

Sheet

S.W.COLE ENGINEERING, INC.

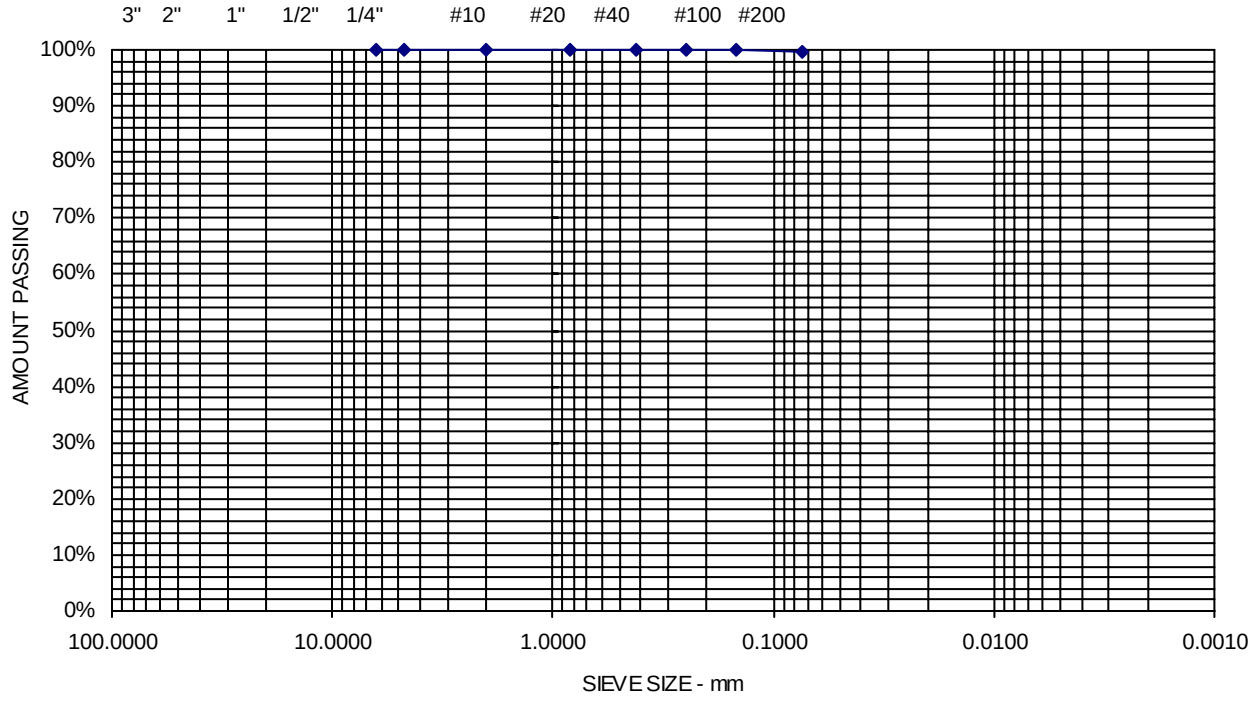
Report of Gradation

ASTM C-117 & C-136

Project Name	EASTERN NY - CHAMPLAIN HUDSON POWER EXPRESS PROJECT - GEOTECHNICAL EXPLORATIONS, SOIL THERMAL CONDUCTIVITY,	Project Number	10-1256
Client	TRC COMPANIES, INC.	Lab ID	10545S
Exploration	**B-109.8-1**	Date Received	12/21/2012
Material Source	**S-7(18.0'-20.0') & S-8(23.0'-25.0')**	Date Completed	12/28/2012
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	0.5% Sand
250 um	**No. 60**	**100**	
150 um	**No. 100**	**100**	
75 um	**No. 200**	**99.5**	99.5% Fines

GRAY CLAY TRACE SAND (CL)



Comments: MOISTURE CONTENT = 34.6%

Sheet

S.W.COLE ENGINEERING, INC.

Report of Hydrometer

ASTM D-422

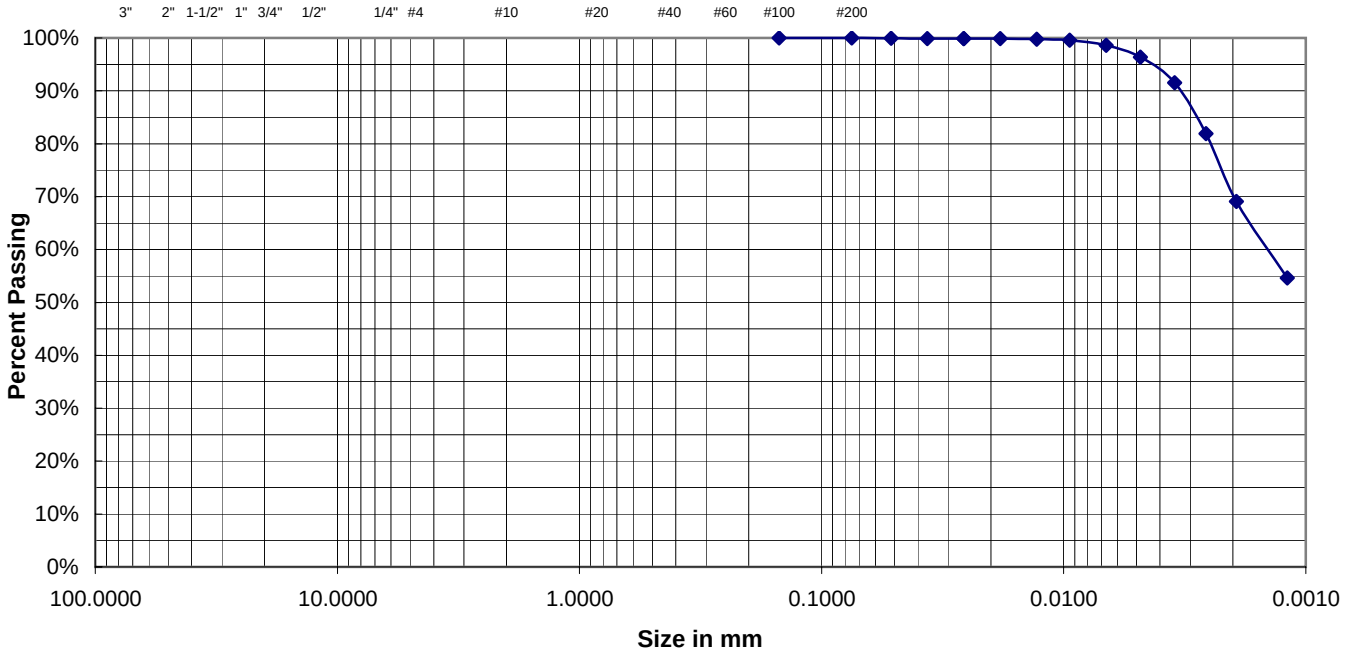
Project Name	CHAMPLAIN HUDSON POWER EXPRESS PROJECT	Project Number	10-1256
Client	TRC COMPANIES, INC	Lab ID	10324
Material Type	BROWN CLAY TRACE SILT (CH)	Date Received	11/16/2012
Material Source	S-7, 18' - 20'	Date Completed	11/21/2012
Exploration	B-110.1-1	Tested By	MJS

Sieve Analysis

Sieve Size	Standard Designation (mm)	Amount Passing (%)
3"	75	**100**
2"	50	**100**
1-1/2"	37.5	**100**
1"	25	**100**
3/4"	19	**100**
1/2"	12.5	**100**
1/4"	6.3	**100**
No. 4	4.75	**100**
No. 10	2	**100**
No. 20	0.85	**100**
No. 40	0.425	**100**
No. 60	0.25	**100**
No. 100	0.15	**100**
No. 200	0.075	**100.0**

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.052	99.9
0.037	99.9
0.026	99.9
0.018	99.9
0.013	99.7
0.009	99.6
0.007	98.6
0.005	96.4
0.003	91.5
0.003	81.9
0.002	69.1



Particle Distribution	
Gravel, retained on #4	0.0%
Sand, passing #4 and retained on #200	0.0%
Fines, 0.074 to 0.005	3.2%
Clay Fraction, <0.005	96.8%

Comments: MOISTURE CONTENT = 36%

Chad B. Michaud
Reviewed By

S.W.COLE ENGINEERING, INC. • Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

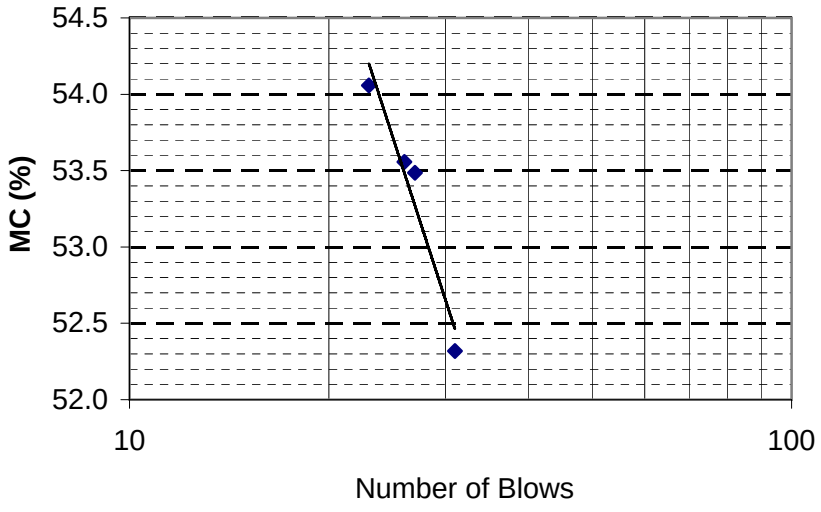
REPORT OF ATTERBERG LIMITS
ASTM D4318

Project Name	CHAMPLAIN HUDSON POWER EXPRESS	Project Number	10-1256
Client	TRC COMPANIES, INC	Laboratory ID	10324S
Soil Description	BROWN CLAY TRACE SILT (CH)	Date Received	11/16/2012
Soil Source	B-110.1-1 ,S-7, 18'-20'	Date Completed	11/26/2012
		Tested By	MJS

TEST RESULTS

Estimate of Material Retained On the No. 40 Sieve	Liquid Limit	Plastic Limit	Plasticity Index
0%	53	25	28

LIQUID LIMIT CURVE



Chad B. Michaud
Reviewed By

S.W.COLE ENGINEERING, INC.

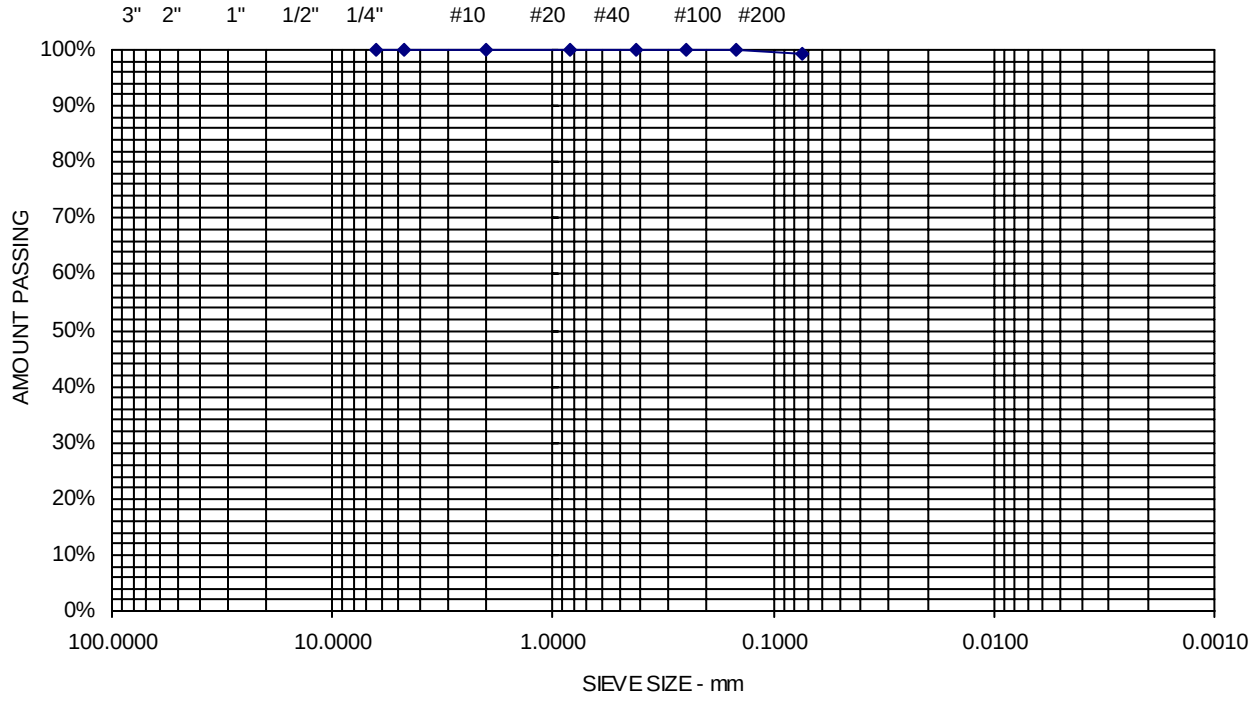
Report of Gradation

ASTM C-117 & C-136

Project Name	EASTERN NY - CHAMPLAIN HUDSON POWER EXPRESS PROJECT - GEOTECHNICAL EXPLORATIONS, SOIL THERMAL CONDUCTIVITY,	Project Number	10-1256
Client	TRC COMPANIES, INC.	Lab ID	10546S
Exploration	**B-110.1-1**	Date Received	12/21/2012
Material Source	**S-8(23.0'-25.0') & S-10(33.0'-35.0')**	Date Completed	12/28/2012
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	0.7% Sand
250 um	**No. 60**	**100**	
150 um	**No. 100**	**100**	
75 um	**No. 200**	**99.3**	99.3% Fines

BROWN-DARK GRAY CLAY TRACE SAND (CL)



Comments: MOISTURE CONTENT = 42.7%

Sheet

S.W.COLE ENGINEERING, INC.

Report of Hydrometer

ASTM D-422

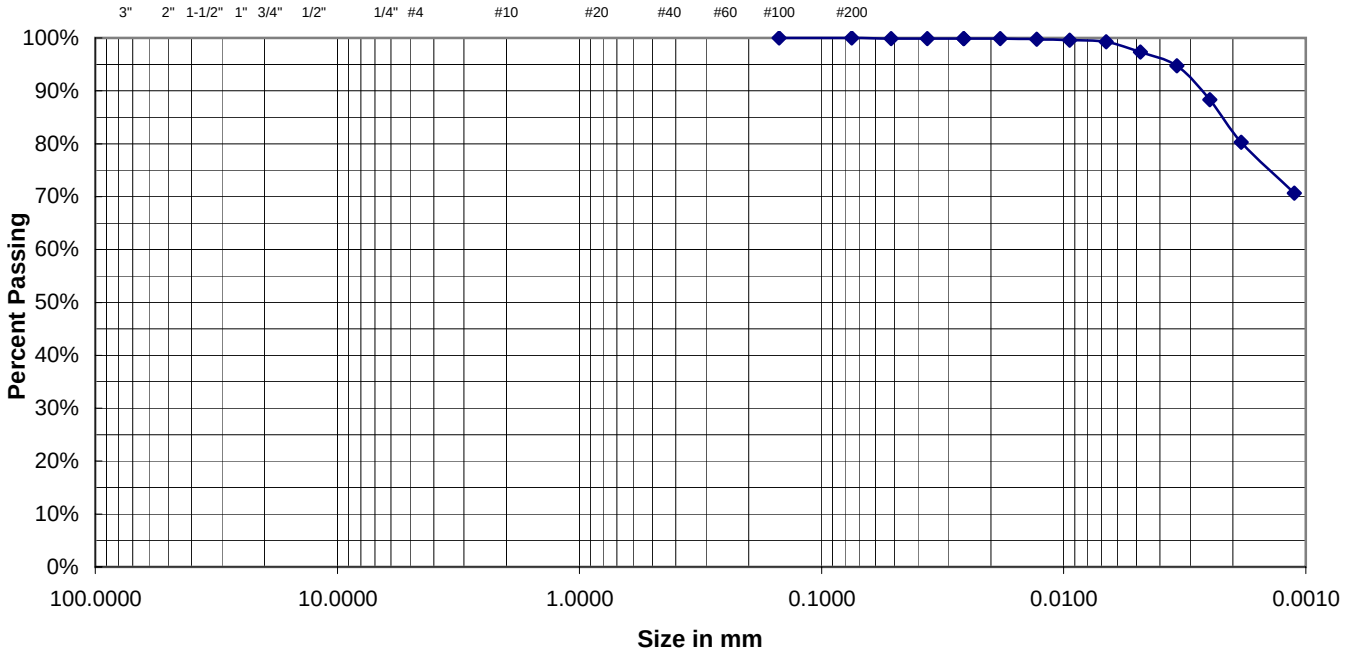
Project Name	CHAMPLAIN HUDSON POWER EXPRESS PROJECT	Project Number	10-1256
Client	TRC COMPANIES, INC	Lab ID	10325
Material Type	DARK GRAY CLAY TRACE SILT (CH)	Date Received	11/16/2012
Material Source	S-9, 28' - 30'	Date Completed	11/21/2012
Exploration	B-110.1-1	Tested By	MJS

Sieve Analysis

Sieve Size	Standard Designation (mm)	Amount Passing (%)
3"	75	**100**
2"	50	**100**
1-1/2"	37.5	**100**
1"	25	**100**
3/4"	19	**100**
1/2"	12.5	**100**
1/4"	6.3	**100**
No. 4	4.75	**100**
No. 10	2	**100**
No. 20	0.85	**100**
No. 40	0.425	**100**
No. 60	0.25	**100**
No. 100	0.15	**100**
No. 200	0.075	**100.0**

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.052	99.9
0.037	99.9
0.026	99.9
0.018	99.9
0.013	99.7
0.009	99.6
0.007	99.3
0.005	97.3
0.003	94.8
0.002	88.3
0.002	80.3



Particle Distribution	
Gravel, retained on #4	0.0%
Sand, passing #4 and retained on #200	0.0%
Fines, 0.074 to 0.005	2.4%
Clay Fraction, <0.005	97.6%

Comments: MOISTURE CONTENT = 45%

Chad B. Michaud
Reviewed By

S.W.COLE ENGINEERING, INC. • Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

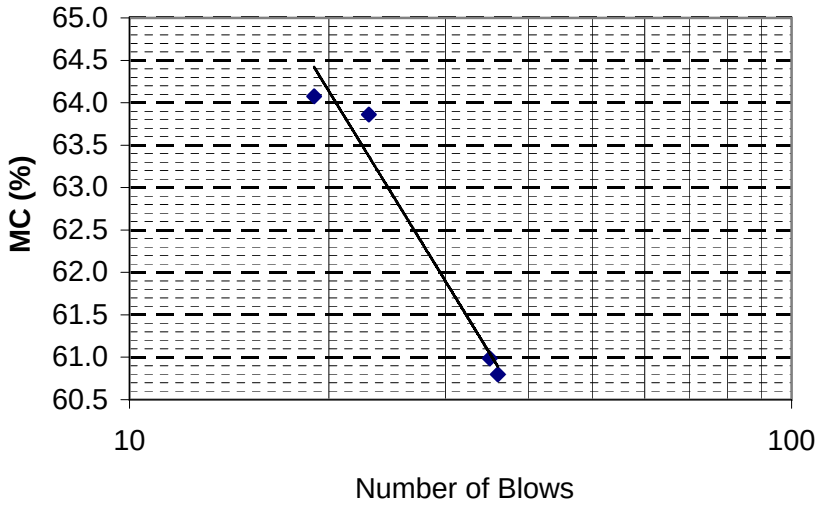
REPORT OF ATTERBERG LIMITS
ASTM D4318

Project Name	CHAMPLAIN HUDSON POWER EXPRESS	Project Number	10-1256
Client	TRC COMPANIES, INC	Laboratory ID	10325S
Soil Description	DARK GRAY CLAY TRACE SILT (CH)	Date Received	11/16/2012
Soil Source	B-110.1-1, S-9, 28'-30'	Date Completed	11/26/2012
		Tested By	MJS

TEST RESULTS

Estimate of Material Retained On the No. 40 Sieve	Liquid Limit	Plastic Limit	Plasticity Index
0%	62	26	36

LIQUID LIMIT CURVE



Chad B. Michaud
Reviewed By

Field Soil Electrical Resistivity Testing Summary

TDI Champlain Hudson Power Express Project

10-1256 S

Boring Number	Apparent Resistivity (ohm-meters) A - Spacing (ft)							Geomean (ohm-m)	Min (ohm-m)	Max (ohm-m)	Median (ohm-m)	Std. Dev.	Bedrock Depth (ft)	Soil Type	Soil Moisture Depth to Saturation
	1	2	3.5	5	6.5	8	10								
B101.6	503.5	350.4	216.8	184.2	163.8	156.7	181.9	228.8	156.7	503.5	184.2	129.5	>25	TILL	± 5
B103.7	108.3	86.4	62.4	53.4	47.7	43.1	34.3	58.0	34.3	108.3	53.4	26.3	>20	TILL	± 5
B107.11	759.8	1177.1	1767.2	2187.4	2439.3	2601.1	2468.6	1768.7	759.8	2601.1	2187.4	710.3	5.5	FILL	± 2
B109.77	35.5	34.2	18.1	16.1	15.6	15.1	14.0	19.8	14.0	35.5	16.1	9.4	>25	FILL/ CLAYEY SILT	± 7
B111.9	27.1	30.8	41.8	45.8	47.1	46.2	41.6	39.3	27.1	47.1	41.8	8.0	± 23	FILL	± 18.5

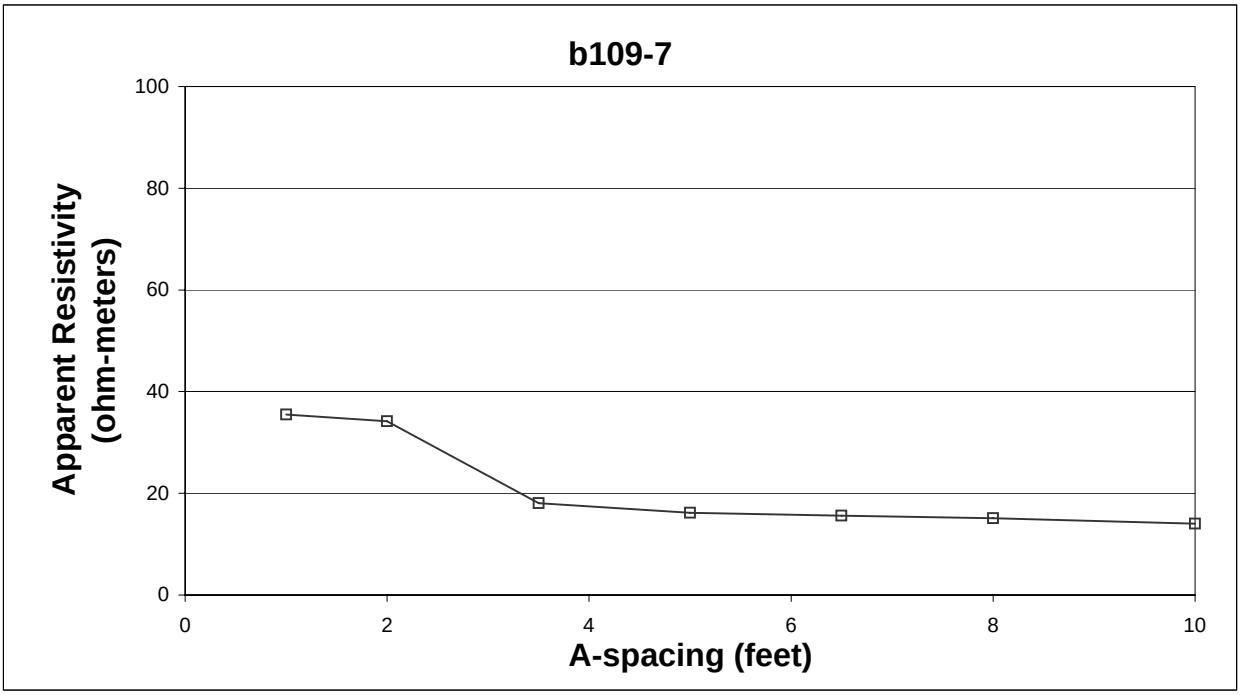
S. W. Cole Engineering, Inc.
Somersworth , NH
(603) 692-0088

S. W. COLE ENGINEERING, INC.
RESISTIVITY COMPUTATION DATA SHEET
Champlain Hudson Power Express - Transmission Line
Wenner Configuration

Job Number **10-1256** Date 11/5/2012
Spread No **b109-7** lat/long: Mid point
Orientation C1 Max See GPS Coordinates
C2 Max

A - Spacing (distance-feet)	A/2 ft	A+A/2 ft	I mA	Resistance (v/I) Ω	Apparent Resistivity (ohm-meters)	% Error
1	0.50	1.50	200	18.5	35.5	0.140728
2	1.00	3.00	200	8.9	34.2	0.028728
3.5	1.75	5.25	200	2.7	18.1	0.049159
5	2.50	7.50	200	1.7	16.1	0.047192
6.5	3.25	9.75	200	1.3	15.6	0.028181
8	4.00	12.00	200	1.0	15.1	0.007173
10	5.00	15.00	200	0.7	14.0	0.009154

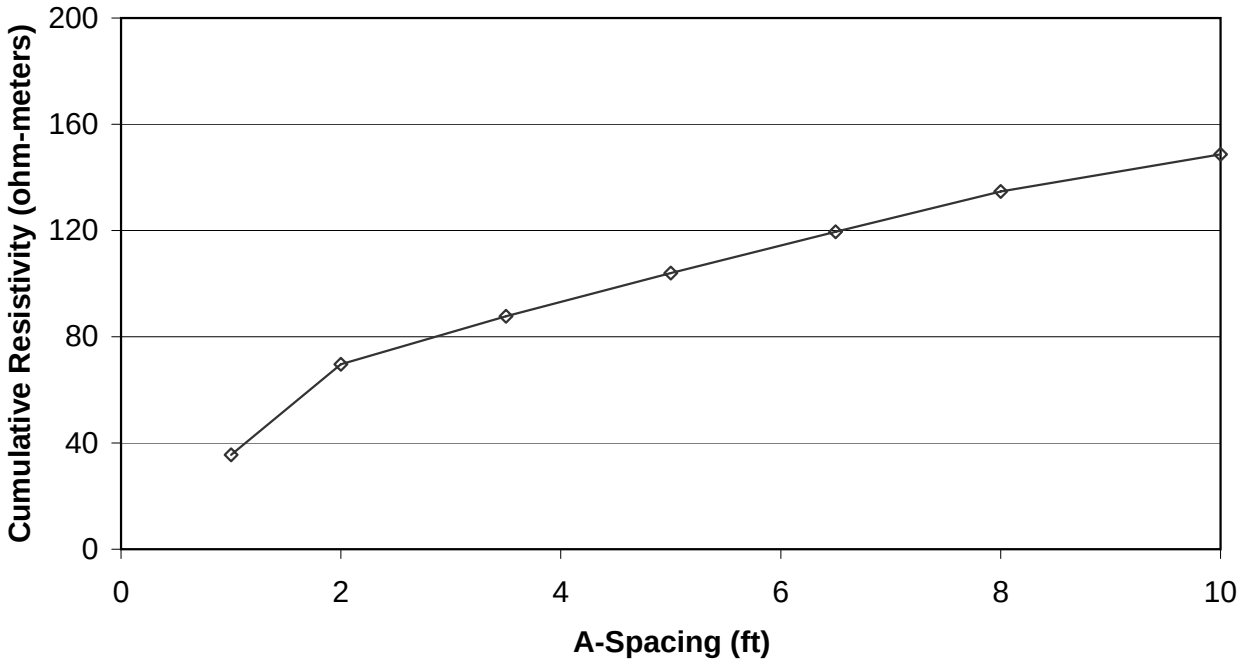
Geomean	20
Min	14
Max	35
Median	16
Std. Dev.	9



Cumulative Resistivity Sheet **b109-7**

A - Spacing (distance-feet)	A/2 ft	A+A/2 ft	I mA	(2piV/I) mV	Apparent Resistivity (ohm-meters)	% Error	Cumulative Resistivity
1	0.5	1.5	200	116.4597507	35.49693202	0.140728	35
2	1	3	200	56.08192134	34.18753925	0.028728	70
3.5	1.75	5.25	200	16.95225387	18.08466443	0.049159	88
5	2.5	7.5	200	10.59524114	16.14714749	0.047192	104
6.5	3.25	9.75	200	7.885805968	15.62335878	0.028181	120
8	4	12	200	6.196257438	15.10895414	0.007173	135
10	5	15	200	4.599888547	14.02046029	0.009154	149

b109-7
CUMULATIVE APPARENT RESISTIVITY



Segment 2 Package 1B HDD - South Bay

Champlain Hudson Power Express

New York

PROJECT NUMBER 20001480

CREATED BY Kiewit

DATE 05/11/2022

Legend Key

- Borings by Others
- Kiewit Borings (2022)

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-109.6

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1729316.31 E 773989.17
START DATE	02/14/2022	**DRILLER/RIG**	Ian / Diedrich D-90	**GROUND ELEV.**	128.0 ft
FINISH DATE	02/15/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
0	FAT CLAY (CH), very stiff to firm, brown to grayish brown, semi-moist to moist, ice present in first 2 ft			75%		8-7-9 (16)	Boring advanced with 3.5" ID HSA
2				100%		3-4-7-9 (11)	
5				84%		2-2-3-7 (5)	
7				100%		5-6-6-8 (12)	
9				75%		3-3-4-7 (7)	
13				100%		3-4-4-6 (8)	
18				100%		2-3-4-6 (7)	
23				100%		3-4-6-7 (10)	
28				100%		4-4-8-8 (12)	

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-109.6

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1729316.31 E 773989.17
START DATE	02/14/2022	**DRILLER/RIG**	Ian / Diedrich D-90	**GROUND ELEV.**	128.0 ft
FINISH DATE	02/15/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
35			FAT CLAY (CH), very stiff to firm, brown to grayish brown, semi-moist to moist, ice present in first 2 ft			100%		3-4-5-8 (9)	
40						100%		1-2-3-5 (5)	
45	83.0		Boring Terminated at 45 ft			100%		3-3-5-8 (8)	
50									
55									
60									

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-109.7

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1729079.71 E 774330.69
START DATE	02/15/2022	**DRILLER/RIG**	Ian / Diedrich D-90	**GROUND ELEV.**	117.3 ft
FINISH DATE	02/16/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
0	FAT CLAY (CH), very stiff to soft, brown, semi-moist to moist, ice present in first 2 ft			84%		17-20-8-9 (28)	Boring advanced with 3.5" ID HSA
				0%		3-2-4-4 (6)	
5				96%		2-2-2-4 (4)	
				84%		4-11-10-11 (21)	
10	- with orange-brown clay seams			100%		2-4-4-6 (8)	
15				100%		2-4-4-5 (8)	
20				100%		2-3-5-7 (8)	
25	- color change to dark gray			100%		4-8-7-9 (15)	
30				100%		2-4-4-6 (8)	

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-109.7

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1729079.71 E 774330.69
START DATE	02/15/2022	**DRILLER/RIG**	Ian / Diedrich D-90	**GROUND ELEV.**	117.3 ft
FINISH DATE	02/16/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
			SAA			100%		4-8-9-10	3-inch ring sampler
						100%		4-5-7-9 (12)	
35						100%		4-5-6-9 (11)	
40	77.3		Silty CLAY (CL), firm, gray, moist			100%		7-10-9-12	3-inch ring sampler
						100%		4-4-4-6 (8)	
45						100%		2-3-3-4 (6)	
50						100%		4-5-9-17	3-inch ring sampler
						100%		3-2-3-4 (5)	
55						100%		2-4-3-4 (7)	
60									

Legend

SPT N Value
MC (%)
PL & LL (%)
Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-109.7

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1729079.71 E 774330.69
START DATE	02/15/2022	**DRILLER/RIG**	Ian / Diedrich D-90	**GROUND ELEV.**	117.3 ft
FINISH DATE	02/16/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
			Silty CLAY (CL), firm, gray, moist						
						100%		2-4-5-8 (9)	
65	52.3		Boring Terminated at 65 ft						
70									
75									
80									
85									
90									

Legend

▲ SPT N Value
● MC (%)
— PL & LL (%)
⊠ Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-109.9

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1728748.47 E 775045.06
START DATE	02/21/2022	**DRILLER/RIG**	Joel / Sonic Drill Rig	**GROUND ELEV.**	102.1 ft
FINISH DATE	02/22/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
0	101.1		ASPHALT PAVEMENT						Boring performed using sonic drilling techniques to advance through shotrock fill.
			SILT (ML), brown, semi-moist, with sand, medium coarse to coarse, with clay, FILL						
5	97.1		ROCK FILL, dark bluish gray, 3 to 6 inches						
10									
15									
20									
25									
30									

Legend

▲ SPT N Value
● MC (%)
— PL & LL (%)
⊠ Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-109.9

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1728748.47 E 775045.06
START DATE	02/21/2022	**DRILLER/RIG**	Joel / Sonic Drill Rig	**GROUND ELEV.**	102.1 ft
FINISH DATE	02/22/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
			ROCK FILL, dark bluish gray, 3 to 6 inches						
50	52.1		LEAN CLAY (CL), firm to soft, dark gray, semi-moist to moist						Consistency based on visual/manual review of samples obtained from sonic drilling.
						100%			
60						100%			

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-109.9

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1728748.47 E 775045.06
START DATE	02/21/2022	**DRILLER/RIG**	Joel / Sonic Drill Rig	**GROUND ELEV.**	102.1 ft
FINISH DATE	02/22/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
			LEAN CLAY (CL), firm to soft, dark gray, semi-moist to moist						
65	37.1		FAT CLAY (CH), firm to soft, dark gray, semi-moist to moist						
						100%			
70						100%			
75									
						100%			
80						100%			
85	17.1		LEAN CLAY (CL), firm to soft, dark gray, semi-moist to moist						
						100%			
90						100%			

Legend
- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-109.9

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1728748.47 E 775045.06
START DATE	02/21/2022	**DRILLER/RIG**	Joel / Sonic Drill Rig	**GROUND ELEV.**	102.1 ft
FINISH DATE	02/22/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
95			LEAN CLAY (CL), firm to soft, dark gray, semi-moist to moist						
100	2.1		Boring Terminated at 100 ft						
105									
110									
115									
120									

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-110.0

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1728458.86 E 775712.37
START DATE	02/22/2022	**DRILLER/RIG**	Joel / Sonic Drill Rig	**GROUND ELEV.**	101.8 ft
FINISH DATE	02/28/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
0			SILT (ML), brown, semi-moist, with sand, medium coarse to coarse, with clay, FILL						Boring performed using sonic drilling techniques to advance through shotrock fill.
5	96.8		ROCK FILL, dark bluish gray, 3 to 6 inches						
10									
15									
20									
25									
30									

Legend

▲ SPT N Value
● MC (%)
— PL & LL (%)
⊠ Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-110.0

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1728458.86 E 775712.37
START DATE	02/22/2022	**DRILLER/RIG**	Joel / Sonic Drill Rig	**GROUND ELEV.**	101.8 ft
FINISH DATE	02/28/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
			ROCK FILL, dark bluish gray, 3 to 6 inches						
35									
40									
45									
50									
55	46.8		ROCK FILL with FAT CLAY (CH), dark gray, wet						
						100%			
60									

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-110.0

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1728458.86 E 775712.37
START DATE	02/22/2022	**DRILLER/RIG**	Joel / Sonic Drill Rig	**GROUND ELEV.**	101.8 ft
FINISH DATE	02/28/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
65			ROCK FILL with FAT CLAY (CH), dark gray, wet						
70						100%			
75									
80						100%			
85									
90						100%			
						100%			

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-110.0

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1728458.86 E 775712.37
START DATE	02/22/2022	**DRILLER/RIG**	Joel / Sonic Drill Rig	**GROUND ELEV.**	101.8 ft
FINISH DATE	02/28/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
95			ROCK FILL with FAT CLAY (CH), dark gray, wet						
	3.8		LEAN CLAY (CL), firm to soft, dark gray, semi-moist to moist - with roots (organics) at 98 ft depth			100% 100%			
100									
105						100% 100%			
110	-8.2		End of Boring at 110 ft						
115									
120									

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-110.1

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1728114.61 E 776424.81
START DATE	02/17/2022	**DRILLER/RIG**	Ian / Diedrich D-90	**GROUND ELEV.**	109.3 ft
FINISH DATE	02/17/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
0		LEAN CLAY (CL), stiff, brown, semi-moist, with gravel, medium coarse to coarse, subangular, ice present in first 2 ft			75%		7-5-6-4 (11)	Boring advanced with 3.5" ID HSA
	107.3	FAT CLAY (CH), very stiff to firm, brown with orange and gray seams, semi-moist to moist			75%		9-10-7-7 (17)	
5					75%		3-3-2-2 (5)	
					38%		1-2-2-3 (4)	
					100%		2-2-4-5 (6)	
10								
					100%		2-3-4-6 (7)	
15								
					100%		4-4-4-4 (8)	
20								
					100%		2-3-4-4 (7)	
25								
					100%		2-3-4-6 (7)	
30								

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-110.1

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1728114.61 E 776424.81
START DATE	02/17/2022	**DRILLER/RIG**	Ian / Diedrich D-90	**GROUND ELEV.**	109.3 ft
FINISH DATE	02/17/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
		FAT CLAY (CH), very stiff to firm, brown with orange and gray seams, semi-moist to moist						
	76.3	LEAN CLAY (CL), firm to soft, brown with orange and gray seams, semi-moist to moist			100%		2-4-4-7 (8)	
35					100%		7-8-12-18	3-inch ring sampler
					100%		3-3-3-5 (6)	
40		- color change to dark gray						
					100%		2-2-2-4 (4)	
45		- Modified California Spoon rebounded about 1" every hit of the hammer			100%		3-8-13-19	3-inch ring sampler
		- split spoon sunk down 1 ft with the weight of the hammer			100%		1-1-2-3 (3)	
50								
		- split spoon sunk down 1 ft with the weight of the hammer			100%		1-1-2-5 (3)	
55		- Modified California Spoon rebounded about 1" after every hit of the hammer			100%		5-8-17-25	3-inch ring sampler
					100%		2-3-4-4 (7)	
60								

Legend

SPT N Value
MC (%)
PL & LL (%)
Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-110.1

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1728114.61 E 776424.81
START DATE	02/17/2022	**DRILLER/RIG**	Ian / Diedrich D-90	**GROUND ELEV.**	109.3 ft
FINISH DATE	02/17/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
65	44.3		- split spoon sunk down 1 ft with the weight of the hammer			100%		1-1-3-6 (4)	
			Boring Terminated at 65 ft						

Legend

▲ SPT N Value
● MC (%)
— PL & LL (%)
⊠ Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-110.3

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1727858.44 E 777043.41
START DATE	02/16/2022	**DRILLER/RIG**	Ian / Diedrich D-90	**GROUND ELEV.**	124.8 ft
FINISH DATE	02/16/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
0		LEAN CLAY (CL), firm, dark brown, semi-moist, ice present in first 2 ft			84%		11-5-1-2 (6)	Boring advanced with 3.5" ID HSA
	122.8	FAT CLAY (CH), firm to soft, dark brown, semi-moist to moist			100%		4-3-5-3 (8)	
5					100%		6-4-2-4 (6)	
					100%		4-4-4-6 (8)	
		- color change to dark gray			100%		1-3-2-2 (5)	
10								
					100%		1-2-3-3 (5)	
15								
					100%		1-2-2-3 (4)	
20								
					100%		1-1-1-3 (2)	
25								
					100%		1-1-1-3 (2)	
30								

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-110.3

PROJECT NUMBER	20001480	**LOGGED BY**	Rafael Salas Jr	**COORDINATES**	N 1727858.44 E 777043.41
START DATE	02/16/2022	**DRILLER/RIG**	Ian / Diedrich D-90	**GROUND ELEV.**	124.8 ft
FINISH DATE	02/16/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
35			- split spoon sunk down 1 ft with the weight of the hammer			100%		1-1-2-2 (3)	
40			- split spoon sunk down 1 ft with the weight of the hammer			100%		1-1-2-3 (3)	
45	79.8		Boring Terminated at 45 ft			100%		1-1-2-4 (3)	
50									
55									
60									

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

SOIL LEGEND

Explanation of Symbols and Terms Used on Boring and Test Pit Logs for Sampling and Description of Soils

SAMPLE AND DRILL METHODS

☒	Standard Penetration Split-Spoon Sample
■	Undisturbed Sample
⊞	Piston Sampler
✋	Grab Sample
◇	Bulk Sample
▙	Auger Cuttings
▮	Rock Core
⧓	Modified California Sample

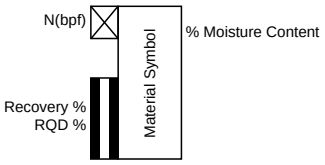
WATER LEVEL SYMBOLS

▽	Observation at time of drilling
▽	Observation after drilling
▼	Delayed observation
▽	Perched water observed at drilling
≋	Observed Seepage
▽	Cave-in Depth

COMMON ABBREVIATIONS AND ACRONYMS

MR	Mud Rotary
HSA	Hollow Stem Auger
SSA	Solid Stem Auger
SS	Split Spoon Sampler
UD	Undisturbed Sample
WOR	Weight of Rods
WOH	Weight of Hammer
SPT	Standard Penetration Test
REC	Recovery
RQD	Rock Quality Designation
MC	Moisture Content
PI	Plasticity Index
PL	Plastic Limit
LL	Liquid Limit
CPT	Cone Penetration Test
PP	Pocket Penetrometer
Bulk	Bulk Sample
EOB	End of Boring
AR	Auger Refusal
N-Value	Sum of blows for last two 6-in. increments of SPT
USCS	Unified Soil Classification System

CROSS SECTION LEGEND



RELATIVE DENSITY / CONSISTENCY

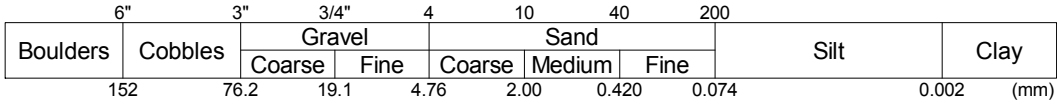
Coarse-grained Soils		Fine-grained Soils		
N-Value	Density	N-Value	Consistency	Pocket Pen (TSF)
0 - 4	Very Loose	0 - 1	Very Soft	0.0 - 0.25
5 - 10	Loose	2 - 4	Soft	0.25 - 0.50
11 - 30	Medium	5 - 8	Firm	0.51 - 1.00
31 - 50	Dense	9 - 15	Stiff	1.01 - 2.00
> 50	Very Dense	16 - 30	Very Stiff	2.01-4.00
		> 30	Hard	> 4.00

RELATIVE PROPORTIONS OF GRAVEL, SAND, AND FINES

Trace	> 5 %
Few	5 to 10 %
Little	15 to 25 %
Some	30 - 45 %
Mostly	50 to 100 %

SOIL GRAIN SIZE

U.S. Standard Sieve



CRITERIA FOR DESCRIBING MOISTURE CONDITION

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible free water
Wet	Visible free water, typically soil is below water table

CRITERIA FOR DESCRIBING CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

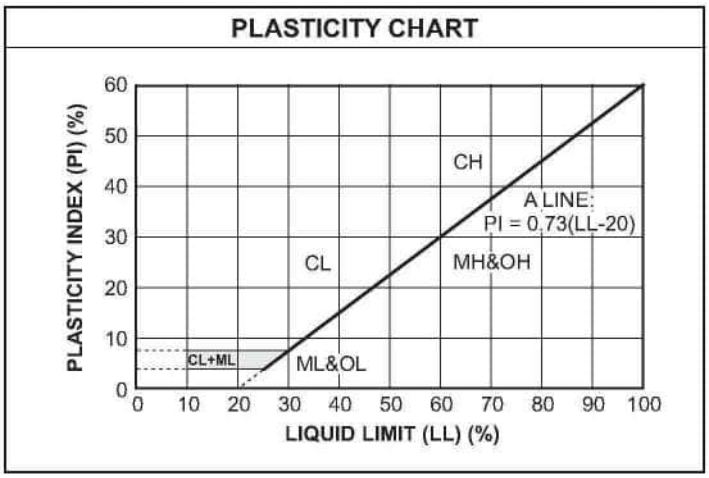
CRITERIA FOR DESCRIBING STRUCTURE

Description	Criteria
Stratified	Alternating layers of varying material or color with layers at least 1/4 in. thick; note thickness
Laminated	Alternating layers of varying material or color with the layers less than 1/4 in. thick; note thickness
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided	Fracture planes appear polished or glossy, sometimes striated
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed	Inclusion of small pockets of different soils, such as lenses of sand scattered through a mass of clay; note thickness
Homogeneous	Same color and appearance throughout

SOIL SYMBOLS

USCS SOIL TYPES		
Symbol	Group	Description
	GW	Well-graded gravels, gravel sand mixtures with trace or no fines
	GP	Poorly-graded gravels, gravel-sand mixtures with trace or no fines
	GW-GM	Well-graded gravels, gravel-sand mixtures with silt fines
	GW-GC	Well-graded gravels, gravel-sand mixtures with clay fines
	GP-GM	Poorly-graded gravels, gravel-sand mixtures with silt fines
	GP-GC	Poorly-graded gravels, gravel-sand mixtures with clay fines
	GM	Silty gravels, gravel-silt-sand mixtures
	GC	Clayey gravels, gravel-sand-clay mixtures
	GC-GM	Clayey gravels, gravel-sand-clay-silt mixtures
	SW	Well-graded sands, sand-gravel mixtures with trace or no fines
	SP	Poorly-graded sands, sand-gravel mixtures with trace or no fines
	SW-SM	Well-graded sands, sand-gravel mixtures with silt fines
	SW-SC	Well-graded sands, sand-gravel mixtures with clayfines
	SP-SM	Poorly-graded sands, sand-gravel mixtures with silt fines
	SP-SC	Poorly-graded sands, sand-gravel mixtures with clay fines
	SM	Silty sands, sand-gravel-silt mixtures
	SC	Clayey sands, sand-gravel-clay mixtures
	SC-SM	Clayey sands, sand-gravel-clay-silt mixtures
	ML	Inorganic silts with low plasticity
	CL	Inorganic clays of low plasticity, gravelly or sandy clays, silty clays, lean clays
	CL-ML	Inorganic clay-silts of low plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
	MH	Inorganic silts of high plasticity, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays and organic silts of high plasticity
	PT	Peat, humus, swamp soils with high organic contents

OTHER MATERIALS	
Symbol	Description
	Asphalt
	Concrete
	Crushed Stone/Aggregate Base
	Fill



ROCK LEGEND

Explanation of Symbols and Terms Used on Boring and Test Pit Logs for Sampling and Description of Rock

TERMS AND ABBREVIATIONS	
Fracture	Collective term for any seperation in a geologic formation
Joint (JT)	Natural break in a layer or body of rock that lacks visible offset
Bedding	Layers of sedimentary rocks that are distinctly different from overlying and underlying beds
Mechanical Break (MB)	Breaks due to drilling or handling in rock or sediment cores
RQD	Rock Quality Designation
REC	Percent Recovery
Shear (SH)	Surface of differential movement evident by presence of slickensides, striations, or polishing
Shear Zone (SZ)	Zone of gouge and rock fragments bounded by planar shear surfaces
Fault (FT)	Planar fracture with significant displacement

ROCK HARDNESS	
Very Soft	Can be deformed by hand (has a rock-like character but can be broken easily by hand)
Soft	Can be scratched by fingernail (cannot be crumbled between fingers but can be easily pitted with light blows of a geology hammer)
Moderately Hard	Can be scratched easily with a knife; cannot be scratched with a fingernail (can be pitted with moderate blows of a geology hammer)
Hard	Difficult to scratch with a knife (cannot be pitted with a geology hammer but can be chipped with moderate blows of the hammer)
Very Hard	Cannot be scratched with a knife (chips can be broken off only with heavy blows of the geology hammer)

BEDDING THICKNESS		
Laminated	< 0.04 in.	< 1 mm
Parting	0.04 - 1/4 in.	1 - 6 mm
Banded	1/4 - 1 in.	6 mm - 3 cm
Thin	1 - 4 in.	3 - 9.1 cm
Medium	4 in. - 1 ft.	9.1 - 30.5 cm
Thick	1 - 3 ft.	30.5 cm - 1 m
Massive	> 3 ft.	> 1 m

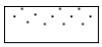
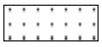
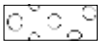
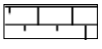
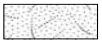
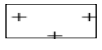
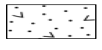
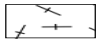
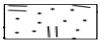
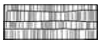
JOINT AND FRACTURE DENSITY		
Very Tight	< 2 in.	< 5.1 cm
Tight	2 in. - 1 ft.	5.1 - 30.5 cm
Moderately tight	1 - 3 ft.	30.5 - 91.4 cm
Wide	3 - 10 ft.	91.4 cm - 3 m

VOIDS	
Porous	Smaller than a pinhead. Their presence is indicated by the degree of absorbency.
Pitted	Pinhead size to a 1/4 in. If only thin walls separate the individual pits, the core may be described as honeycombed.
Vug	1/4 in. to the diameter of the core. The upper limit will vary with core size.
Cavity	Larger than the diameter of the core.

TEXTURE	
Aphanitic	Individual grains or crystals are too small to be seen with the naked eye.
Fine-grained, finely crystalline	Grain diameters between 0.1 and 1 mm; grains or crystals can be seen with naked eye.
Medium-grained, crystalline	Grain diameters between 1 and 5 mm.
Coarse-grained, coarsely crystalline	Grain diameters greater than 5 mm.

WEATHERING	
Unweathered	No evidence of any mechanical or chemical alteration.
Slightly	Superficial discoloration, alteration, and/or discoloration along discontinuities; less than 10% of the rock volume is altered; strength is essentially unaffected.
Moderately	Discoloration is evident; surface is pitted and altered, with alterations penetrating well below rock surfaces; 10 to 50% of the rock is altered; strength is noticeably less than unweathered rock.
Highly	Entire section is discolored; alteration is greater than 50%; some areas of slightly weathered rock are present; some minerals are leached away; retains only a fraction of its original strength (wet strength is usually lower than dry strength).
Decomposed	Saprolite; rock is essentially reduced to a soil with a relic rock texture; can be molded or crumbled by hand.

ROCK SYMBOLS

ROCK TYPES		
Sedimentary Rocks		Shale
		Siltstone
		Sandstone
		Conglomerate
		Breccia
		Limestone
		Dolomite
		Gypsum
		Coal
		Coral
		Chalk
Metamorphic Rocks		Slate
		Schist
		Gneiss
		Quartzite
		Serpentinite
		Greenstone
Igneous Rocks		Granite
		Tuff
		Rhyolite
		Dacite
		Andesite
		Basalt

OTHER MATERIALS		
Other		Asphalt
		Concrete
		Bedrock

ROCK QUALITY DESIGNATION (RQD) AND RECOVERY

% RQD	Quality
< 25	Very Poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

$$\text{Recovery (\%)} = \frac{\text{Length of Core Sample Recovered}}{\text{Length of the Core Run}} \times 100$$

$$\text{RQD (\%)} = \frac{\text{Sum of Lengths of Intact Rock Pieces of 4 in. and Longer}}{\text{Length of the Core Run}} \times 100$$

ATLANTIC TESTING LABORATORIES

WBE certified company

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOILS
ASTM D 2216

PROJECT INFORMATION

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-06-03-22
Report Date: March 9, 2022
Date Received: February 23, 2022

TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-109.6	SS-4/5	2-4	42.3
	SS-16/17	23-25	42.0
	SS-20/21	33-35	42.0
K-109.7	SS-5/6	4-6	35.5
	SS-9/10	8-10	38.0
	SS-17/18	28-30	42.2
	MC-25/26	40-42	45.7
	MC-29/30	50-52	41.9
K-110.3	SS-3/4	2-4	45.4
	SS-7/8	6-8	45.9
	SS-11/12	13-15	44.6
	SS-19/20	33-35	47.3

Reviewed By: _____ Date: 03/09/22

ATLANTIC TESTING LABORATORIES

WBE certified company

AMOUNT OF MATERIAL IN SOILS FINER THAN THE NO. 200 SIEVE
ASTM D 1140

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-06-03-22
Project:	Champlain Hudson Power Express	**Report Date:**	March 9, 2022
	United Cable Installation	**Test Date:**	February 23, 2022
	Various Locations, New York	**Performed By:**	A. River

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-109.6	SS-4/5	2-4	A	10	94.86	99.3
K-109.6	SS-16/17	23-25	A	10	89.49	99.8
K-109.7	SS-5/6	4-6	A	10	80.61	97.3
K-109.7	SS-17/18	28-30	A	10	84.29	99.4
K-109.7	MC-29/30	50-52	A	10	138.97	99.9
K-110.3	SS-3/4	2-4	A	10	55.26	98.3
K-110.3	SS-11/12	13-15	A	10	62.78	99.7

Reviewed By: _____ Date: 03/09/22

ATLANTIC TESTING LABORATORIES

WBE certified company

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOIL
ASTM D 4318

PROJECT INFORMATION

Client: Kiewit Instrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-06-03-22
Report Date: March 9, 2022
Date Received: February 23, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-109.6	SS-4/5	76	25	51
K-109.6	SS-16/17	65	21	44
K-109.7	SS-5/6	69	24	4S
K-109.7	SS-17/18	70	22	48
K109.7	MC-29/30	36	18	18
K-110.3	SS-3/4	85	27	58
K-110.3	SS-11/12	66	25	41

SAMPLE INFORMATION

Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-109.6	SS-4/5	0.074	0	42.3
K-109.6	SS-16/17	0.002	0	42.0
K-109.7	SS-5/6	0.42	1	3S.5
K-109.7	SS-17/18	0.074	0	42.2
K109.7	MC-29/30	0.002	0	41.9
K-110.3	SS-3/4	0.074	0	4S.4
K-110.3	SS-11/12	0.002	0	44.6

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-109.6	SS-4/5	Air Dry	Not Necessary
K-109.6	SS-16/17	Air Dry	Not Necessary
K-109.7	SS-5/6	Air Dry	Pulverizing and Screening
K-109.7	SS-17/18	Air Dry	Not Necessary
K109.7	MC-29/30	Air Dry	Not Necessary
K-110.3	SS-3/4	Air Dry	Not Necessary
K-110.3	SS-11/12	Air Dry	Not Necessary

EQUIPMENT INFORMATION

Liquid Limit Procedure:	Multipoint - Method A	X	Single Point - Method B	
Liquid Limit Apparatus:	Manual	X	Motor Driven	
Liquid Limit Grooving Tool Material:	Plastic	X	Metal	
Liquid Limit Grooving Tool Shape:	Flat	X	Curved (AASHTO Only)	
Plastic Limit:	Hand Rolled	X	Mechanical Rolling Device	

Reviewed By: _____ Date: 03/09/22

ATLANTIC TESTING LABORATORIES

CORROSION ANALYSIS SUITE

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Location: Various Locations, New York

ATL Report No. CD10279E-06-03-22
Report Date: March 9, 2022
Date Received: February 23, 2022

Sample: K-109.6, SS-8/9 **Depth (ft):** 6-8

MEASURING pH OF SOIL FOR USE IN CORROSION TESTING
ASTM G 51

Type of Test	Soil Temperature (°C)	pH Readings			Average
Laboratory	20.0	7.77	7.78	7.75	7.77

pH of calibration standards used: 7.00

MEASUREMENT OF SOIL RESISITIVITY USING THE TWO-ELECTRODE SOIL BOX METHOD
ASTM G 187 (LABORATORY)

Test Date: 03/02/22 Performed by: E. Hannon
Meter Used: Miller 400A Soil Box Factor: 1.29

Date Collected	Temperature at Collection (°C)	Measured Resistance (Ω)	Calculated Resistivity (Ω/cm)
10/19/2021	Not Provided	430	555

WATER-SOLUBLE CHLORIDE ION CONTENT IN SOIL
AASHTO T 291, Method A

Chloride by Mass of Soil (mg/kg)
165

WATER-SOLUBLE SULFATE IN SOIL
ASTM C 1580

Sulfate by Mass of Sample (%)	Sulfate by Mass of Sample (mg/kg)
0.33	3300

Reviewed By: Date: 03/09/22

ATLANTIC TESTING LABORATORIES

WBE certified company

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOILS

ASTM D 2216

PROJECT INFORMATION

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-07-03-22
Report Date: March 22, 2022
Date Received: March 15, 2022

TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-109.9	S-1/2	58-60	32.8
	S-3/4	68-70	49.6
	S-5/6	78-80	55.1
	S-7/8	88-90	53.6
K-110.0	S-8/9	108-110	49.5
K-110.1	S-7/8	6-8	34.0
	S-13/14	18-20	40.9
	S-21/22	35-37	39.7
	S-27/28	45-47	40.4
	S-31/32	55-57	38.6

Reviewed By: _____ Date: 03/22/22

ATLANTIC TESTING LABORATORIES

WBE certified company

AMOUNT OF MATERIAL IN SOILS FINER THAN THE NO. 200 SIEVE
ASTM D 1140

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-07-03-22
Project:	Champlain Hudson Power Express	**Report Date:**	March 22, 2022
	United Cable Installation	**Test Date:**	March 18, 2022
	Various Locations, New York	**Performed By:**	E. Hannon

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-109.9	S-3/4	68-70	A	10	141.64	100.0
K-109.9	S-7/8	88-90	A	10	123.26	99.8
K-110.0	S-8/9	108-110	A	10	92.14	99.9
K-110.1	S-13/14	18-20	A	10	95.33	99.9
K-110.1	S-21/22	35-37	A	10	121.17	100.0
K-110.1	S-31/32	55-57	A	10	192.31	99.8

Reviewed By: _____ Date: 03/22/22

ATLANTIC TESTING LABORATORIES

WBE certified company

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOIL
ASTM D 4318

PROJECT INFORMATION

Client: Kiewit Instrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-07-03-22
Report Date: March 22, 2022
Date Received: March 15, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-109.9	S-1/2	48	23	25
K-109.9	S-3/4	52	22	30
K-109.9	S-5/6	54	23	31
K-109.9	S-7/8	39	19	20
K-110.0	S-8/9	47	18	29
K-110.1	S-13/14	65	23	42
K-110.1	S-21/22	39	19	20
K-110.1	S-31/32	33	17	16

SAMPLE INFORMATION

Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-109.9	S-1/2	0.074	0	32.8
K-109.9	S-3/4	0.05	0	49.6
K-109.9	S-5/6	0.074	0	55.1
K-109.9	S-7/8	0.05	0	53.6
K-110.0	S-8/9	0.05	0	49.5
K-110.1	S-13/14	0.05	0	40.9
K-110.1	S-21/22	0.05	0	39.7
K-110.1	S-31/32	0.05	0	38.6

PREPARATION INFORMATION

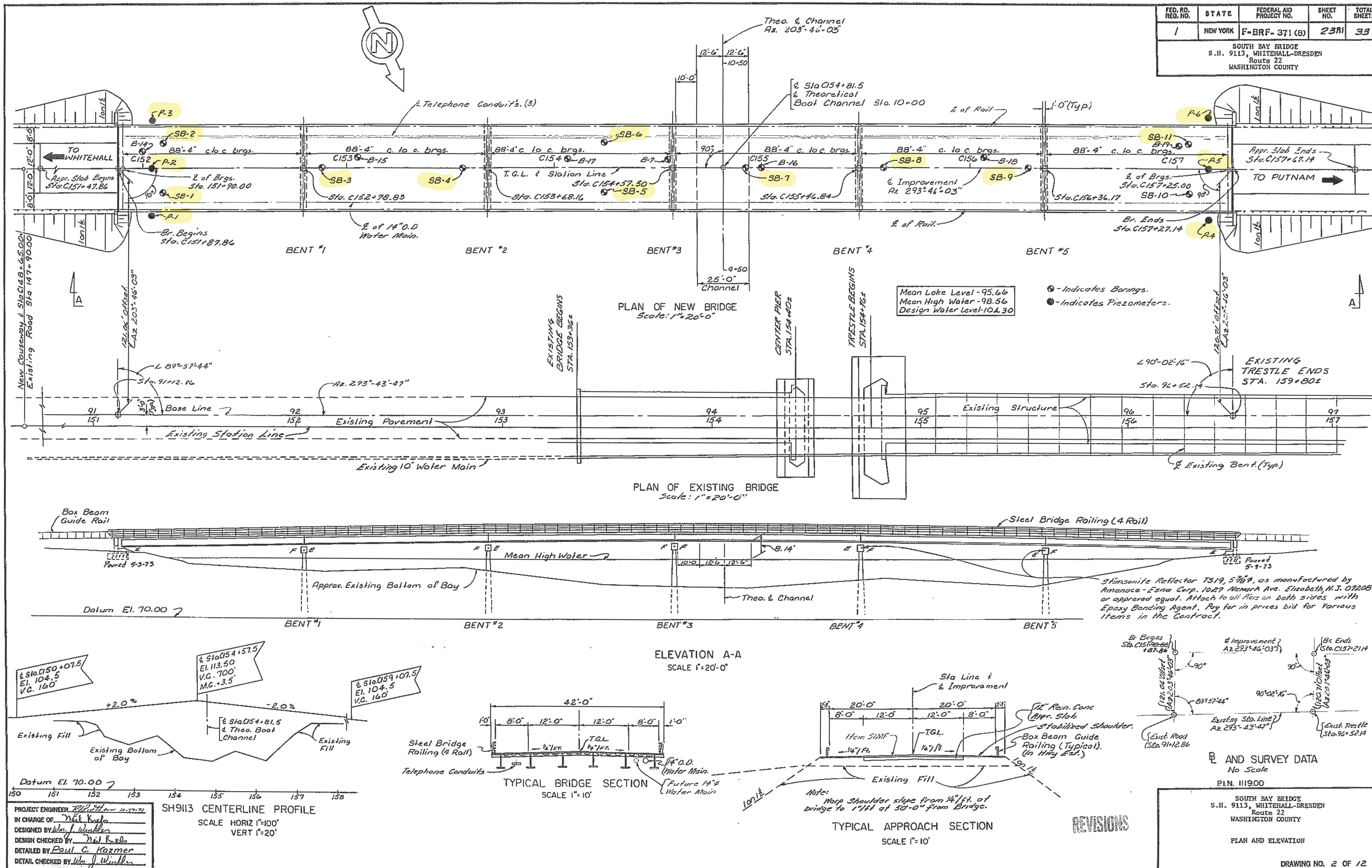
Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-109.9	S-1/2	Air Dry	Not Necessary
K-109.9	S-3/4	Air Dry	Not Necessary
K-109.9	S-5/6	Air Dry	Not Necessary
K-109.9	S-7/8	Air Dry	Not Necessary
K-110.0	S-8/9	Air Dry	Not Necessary
K-110.1	S-13/14	Air Dry	Not Necessary
K-110.1	S-21/22	Air Dry	Not Necessary
K-110.1	S-31/32	Air Dry	Not Necessary

EQUIPMENT INFORMATION

Liquid Limit Procedure:	Multipoint - Method A	X	Single Point - Method B	
Liquid Limit Apparatus:	Manual	X	Motor Driven	
Liquid Limit Grooving Tool Material:	Plastic	X	Metal	
Liquid Limit Grooving Tool Shape:	Flat	X	Curved (AASHTO Only)	
Plastic Limit:	Hand Rolled	X	Mechanical Rolling Device	

Reviewed By: _____ Date: 03/22/22

F.A.R.C. 72-1



FED. RD. REG. NO. 1
STATE NEW YORK
FEDERAL AID PROJECT NO. F-BRF-371 (8)
SHEET NO. 23RI
TOTAL SHEETS 33
SOUTH BAY BRIDGE
S.H. 9113, WHITEHALL-DRESDEN
Route 22
WASHINGTON COUNTY
Theo. ℄ Channel Az. 203°-46'-03"
℄ Sta C154+81.5 ℄ Theoretical Boat Channel Sta. 10+00
℄ Telephone Conduit's. (3)
℄ of Rail
1'-0" (Typ.)
P-3
SB-2
B-14
88'-4" c. to c. brgs.
C152
P-2
TO WHITEHALL
Appr. Slab Begins Sta. C151+47.86
℄ of Brgs. Sta. 151+90.00
SB-1
P-1
Br. Begins Sta. C151+87.86
C153
B-15
SB-3
SB-4
Sta. C152+78.83
℄ of 14" O.D Water Main.
BENT #1
C154
B-17
SB-6
T.G.L. ℄ Station Line
Sta. C154+57.50
SB-5
Sta. C153+68.16
BENT #2
B-7
12'-6" 12'-6" 10+50
10'-0"
90°
C155
B-16
SB-7
Sta. C155+46.84
BENT #3
9+50
25'-0" Channel
SB-8
C156
B-18
SB-9
℄ Improvement Az 293°-46'-03"
BENT #4
Sta. C156+36.17
BENT #5
SB-11
B-19
C157
P-6
P-5
℄ of Brgs. Sta. C157+25.00
SB-10
Br. Ends Sta. C157+27.14
P-4
Appr. Slab Ends Sta. C157+67.14
TO PUTNAM
1 on 1½
PLAN OF NEW BRIDGE
Scale: 1"=20'-0"
Mean Lake Level - 95.66
Mean High Water - 98.56
Design Water Level - 102.30
- Indicates Borings.
- Indicates Piezometers.
New Causeway ℄ Sta C148+65.00 Existing Road Sta 147+90.00
121.06' Offset Az 203°-46'-03"
120.71' Offset Az 203°-46'-03"
∠ 89°-57'-44"
Sta. 91+12.86
Az. 293°-43'-47"
Base Line
Existing Pavement
Existing Station Line
Existing 10" Water Main
EXISTING BRIDGE BEGINS STA. 153+36±
CENTER PIER STA. 154+40±
TRESTLE BEGINS STA. 154+76±
Existing Structure
∠ 90°-02'-16"
Sta. 96+52.14
EXISTING TRESTLE ENDS STA. 159+80±
℄ Existing Bent. (Typ.)
PLAN OF EXISTING BRIDGE
Scale: 1"=20'-0"
Box Beam Guide Rail
Steel Bridge Railing (4 Rail)
Poured 5-3-73
Mean High Water
8.14'
Approx. Existing Bottom of Bay
Theo. ℄ Channel
Datum El. 70.00
Poured 5-9-73
Stimsonite Reflector T519, 5⅜"φ, as manufactured by Amerace-Esna Corp. 1027 Newark Ave. Elizabeth, N.J. 07208. or approved equal. Attach to all Piers on both sides with Epoxy Bonding Agent. Pay for in prices bid for Various Items in the Contract.
ELEVATION A-A
SCALE 1"=20'-0"
℄ Sta. C150+07.5 El. 104.5 V.C. 160'
℄ Sta. C154+57.5 El. 113.50 V.C. 700' M.C. +3.5'
℄ Sta. C159+07.5 El. 104.5 V.C. 160'
+2.0%
-2.0%
℄ Sta. C154+81.5 ℄ Theo. Boat Channel
Existing Fill
Existing Bottom of Bay
SH9113 CENTERLINE PROFILE
SCALE HORIZ 1"=100' VERT 1"=20'
42'-0"
Telephone Conduits
14" O.D. Water Main.
Future 14"φ Water Main
TYPICAL BRIDGE SECTION
SCALE 1"=10'
Sta Line & ℄ Improvement
Item 51MF
T.G.L.
12" Rein. Conc Appr. Slab
Stabilized Shoulder.
Box Beam Guide Railing (Typical). (In Hwy Est.)
Note: Warp Shoulder slope from ¼"/ft. at bridge to 1"/ft at 50'-0" from Bridge.
TYPICAL APPROACH SECTION
SCALE 1"=10'
REVISIONS
Exist. Road Sta. 91+12.86
Existing Sta. Line Az 293°-43'-47"
Exist. Trestle Sta. 96+52.14
℄ AND SURVEY DATA
No Scale
P.I.N. 1119.00
PROJECT ENGINEER
IN CHARGE OF Neil Koelz
DESIGNED BY Wm. J. Winkler
DESIGN CHECKED BY Neil Koelz
DETAILED BY Paul C. Kazmer
DETAIL CHECKED BY Wm. J. Winkler
SOUTH BAY BRIDGE
S.H. 9113, WHITEHALL-DRESDEN
Route 22
WASHINGTON COUNTY
PLAN AND ELEVATION
DRAWING NO. 2 OF 12

66 sheets

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-1 (U.D.H.)
LINE & STA. CL 152+10
OFFSET 12' Rt.

DATE, START 3/10/66
DATE, FINISH 3/25/66
SURF. ELEV. 103.1
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.5" I.D. 3.75"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
0	95										Used "AW" Rods
	76									LAND FILL	
	41										
	30									Sand and Gravel and Boulders	
5'	26										
	32										6" casing to 38'
	40										4" casing to 55'
	45										
	48										
10'	44										
	52										
	40										
	31										
	35										
15'	38										
	40										
	53										
	41										
	43										
20'	50										
	48										
	60										
	55										
	63										
25'	63										
	62										
	61										
	75										
	70										
30'	70										
	93										
	78										
	94										
	170										
35'	330										
	630										End of 6" Pipe
	410										
	919										
	1200										
40'	2750										Drilled & Cored 2' boulder at 41' to 43.5'
	710										
	22										
	17										
43.5'	19										
45'	34	J1	2	2				M	Gr.	CLAY Trace of Silt	
	80				3						
	103										
	82										
	78	T2(48.5-50)R 1.3						M	Gr.	Soft	100# hyd. Press. used to push sampler-T2
50'	61										

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR.

SHEET 1 OF 4. HOLE NO. SB-1

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22

HOLE NO. SB-1 (U.D.H.)
LINE & STA. CL152+10
OFFSET 12' Rt.

QUAD. LOCATION
SOIL SERIES
DATE, START 3/10/66
DATE, FINISH 3/25/66
SURF. ELEV. 103.1
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.5" I.D. 3.75"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
50'	85										
	110										
	65										End of 4" pipe 55'
	72										
55'	63										
		J3	1	2				M	Gr.	CLAY Trace of Silt.	
					1						
											60 lbs. Hyd, Press. used to push sampler T-4
60'		T4(60-61.5)R				1.3		M	Gr.	Very soft	
65'		J5	0	0				M	Gr.		
					1						
70'		T6(70-71.5)R				1.3		M	Gr.		50# hyd. Press. used to push Sampler-T6
75'		J7	0	0				M	Gr.		
					0						
80'		T8 (80-81.5)R				1.3		M	Gr.		50# hyd. Press. used to push Sampler-T8
85'		J9	0	0				M	Gr.		
					0						
90'		T10(90-91.5)R				1.3		M	Gr.		15# hyd. Press. used to push Sampler-T10
95'		J11	0	0				M	Gr.		
					0						
100'		T12(100-101.5)R				1.1		M	Gr.		50# hyd. Press. used to push Sampler-T12

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. J. T. Kennedy

FORM SM-287 - (12/64)

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Rte. 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-1 (UDH)
LINE & STA. CL 152+10
OFFSET 12' Rt.

DATE, START 3/10/66
DATE, FINISH 3/25/66
SURF. ELEV. 103.1
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.5" I.D. 3.75"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
100'											
105'		J13	0	1		0		M	Gr.	CLAY Some Silt	
110'		T14	(110-111.5)			Rl.4		M	Gr.	Soft	100# hyd. Press. used to push Sampler-T14
115'		J15	1	1		0		M	Gr.		
120'		T16	(120-121.5)			Rl.4		M	Gr.		100# hyd. Press. used to push sampler-T16
125'		J17	0	0		0		M	Gr.	Very soft	
130'		T18	(130-131.5)			Rl.4		M	Gr.		100# hyd. Press. used to push Sampler-T18
135'		J19	0	0		0		M	Gr.		
140'		T20	(140-141.5)			Rl.5		M	Gr.		50# hyd. Press. used to push Sampler-T20
145'		J21	0	1		2		M	Gr.	Soft	250# hyd. Press. used to push sampler-T22 13" to refusal
150'		T22	(150-151.5)			Rl.1		M	Gr.		

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILLING CONTRACTOR Sprague & Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John T. Kennedy

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossingof Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-1 (UDH)
LINE & STA. CL 152+10
OFFSET 12' Rt.

DATE, START 3/10/66
DATE, FINISH 3/25/66
SURF. ELEV. 103.1
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.5" I.D. 3.75"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
150'										CLAY AND SILT	
										Stiff	
155'		J23	3	4				M	Gr.		
					4						
160'											
											200# hyd. Press. used to push sampler-T24
165'		T24 (165-166.5)				R1.2		M	Gr.		
										SILT	
										Some Clay	
170'											
175'		J25	6	12				M	Gr.	HARD	
					14						
180'											End of Hole 180.8'
		J26	P	P				M	Gr.		
											Sample J26 from Shelby tube: used 500# hyd. Press. to push tube 9" to refusal at 180.8'
											DRILLER: John Uporsky

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John T. Kennedy

SHEET 4 OF 4. HOLE NO. SB-1

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-2
LINE & STA. CL 152+10
OFFSET 12' Left

DATE, START 2/28/66
DATE, FINISH 3/9/66
SURF. ELEV. 103.0
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
0	627										Used "B" rods 0'-35' 6" pipe
	840										
	240										
	130									LAND fill	
5'	69										
	88									SAND-GRAVEL AND BOULDERS	
	80										
	65										
	65										
10'	61										
	63										
	68										
	55										
	45										
15'	48										
	42										
	65										
	63										
	55										
20'	60										
	66										
	80										
	81										
	70										
25'	76										
	80										
	90										
	92										
	88										
30'	85										
	90										
	92										
	106										Reduced to 2½" pipe at 35'
	132										
35'	215										
	217										
	80										
	27									Very soft CLAY Trace of silt	
	6										
40'	5										
	5										
	7	1	0	0				M	Gr.		
	20				1						
	20										
45'	19										
	12	2	2	2				W	Gr.	Soft	
	13				2						
	16										
	18										
50'	13	No Rec.		1	1	1					

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John T. Richards

SHEET 1 OF 6. HOLE NO. SB-2

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-2
LINE & STA. CL 152+10
OFFSET 12' Lt.
DATE, START 2/28/66
DATE, FINISH 3/ 9/66
SURF. ELEV. 103.0
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
50'	14										
	14	3	2	1				M	Gr.	Soft	
	15				1						
	17										
55'	17									CLAY	
	18	4	0	0				M	Gr.		
	14				0					Trace of silt	
	16										
	16										
60'	17										
	15	5	0	0				Mx	Gr.		
	16				0						
	17										
	21										
65'	17										
	25	6	0	0				M	Gr.		
	26				0						
	22										
	21										
70'	18										
	24	7	0	0				M	Gr.		
	21				0						
	22										
	23										
75'	23										
	21	8	0	0				M	Gr.	Very soft	
	20				0						
	23										
	23										
80'	24										
	44	9	0	0				W	Gr.		
	38				0						
	40										
	37										
85'	36										
	34	10	0	0				W	Gr.		
	38				0						
	39										
	38										
90'	32										
	35										
	31	11	0	0				W	Gr.		
	35				0						
	34										
95'	39										
	36										
	36	12	0	0				W	Gr.		
	38				0						
	40										
100'	38										

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John T. Kennedy

SHEET 2 OF 6. HOLE NO. SB-2

FORM SM 383 - (12/64)

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-2
LINE & STA. CL 152+10
OFFSET 12' Lt.

DATE, START 2/28/66
DATE, FINISH 3/9/66
SURF. ELEV. 103.0
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75 I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL
CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
100'	37										
	37	13	0	0				W	Gr.		
	38				0						
	37										
105'	33										
	35										
	35	14	0	0				W	Gr.		
	40				0					CLAY	
	37										
110'	39									Trace of Silt	
	38										
	40	15	0	0				W	Gr.		
	41				0					Very soft	
	43										
115'	40										
	35										
	32	16	0	0				W	Gr.		
	35				0						
	44										
120'	45										
	40										
	44										
	42	17	0	0				W	Gr.		
	51				0						
125'	47										
	44										
	42										
	43	18	0	0				W	Gr.		
	54				0						
130'	46										
	45										
	45										
	45										
	44	19	0	0				M	Gr.		
135'	48				0						
	47										
	50										
	54										
	48	20	0	0				M	Gr.		
140'	52				0						
	66										
	74										
	77										
	68	21	0	0				M	Gr.		
145'	58				0						
	57										
	57										
	62										
	60	22	0	0				M	Gr.		
150'	78				0						

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. Jos. T. Kennedy

SHEET 3 OF 6. HOLE NO. SB-2

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-2
LINE & STA. CL 152+10
OFFSET 12' Lt.

DATE, START 2/28/66
DATE, FINISH 3/9/66
SURF. ELEV. 103.0
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL
CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
150'	65										
	64										
	68										
	78										
155'	97										
	93										
	89										
	76										
	66										
160'	50	23	0	0				M	Gr.	CLAY	
	64				0					Trace of Silt	
	56										
	56									Very soft	
	59										
165'	72										
	79										
	66										
	60										
	68										
170'	78										
	54	24	0	0				M	Gr.		
	82				0						
	71										
	66										
175'	100										
	150										
	163										
	159										
	125										
180'	133										
	92	25	0	0				W	Gr.		
	89				0					CLAY	
	86										
	82									Some silt	
185'	80										
	90									Very soft	
	78										
	75										
	72										
190'	66										
	68	26	0	0				W	Gr.		
	65				0						
	60										
	52										
195'	50										
	67										
	59										
	60										
	55										
200'	51	27	0	0	0			W	Gr.		

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DRILLING CONTRACTOR Sprague & Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. J. W. Kennedy

SHEET 4 OF 6. HOLE NO. SB-2

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234

HOLE NO. SB-2
LINE & STA. 152/10
OFFSET 12' Left

PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION ______ DATE, START 2/28/66 SURF. ELEV. 103.0
SOIL SERIES ______ DATE, FINISH 3/9/66 DEPTH TO WATER ______
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5" | WEIGHT OF HAMMER 300# | HAMMER FALL
SAMPLER O.D. 2.0" I.D. 1.375" | INSIDE LENGTH OF SAMPLER 18" | CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
200'	71										
	61										
	80									CLAY	
	79									Some Silt	
205'	69										
	89									Very soft	
	72										
	72										
	91										
210'	68										
	68	28	0	0				W	Gr.	Trace of Silt	
	69				0						
	64									Very soft	
	61										
215'	63										
	66										
	61										
	62										
	58										
220'	58										
	69	29	0	0				W	Gr.	CLAY	
	61				0						
	64									Trace Silt	
	62										
225'	59										
	61										
	57										
	58										
	54										
230'	60										
	70	30	0	0				W	Gr.		
	65				0						
	65										
	57										
235'	59										
	55										
	58									Very Soft	
	69										
	64										
240'	65										
	61	31	0	0				W	Gr.		
	60				0						
	63										
	58										
245'	60										
	54										
	56										
	53										
	50										
250'	48										

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. [signature]
SHEET 5 OF 6. HOLE NO. SB-2

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-2
LINE & STA. CL 152/10
OFFSET 12' Lt.

DATE, START 2/28/66
DATE, FINISH 3/ 9/66
SURF. ELEV. 103.0
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL
CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
250'		32	3	14						CLAY	End of
252'					9					Some Silt	Hole 252'

Driller:

Roger Reeves

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR.

SHEET 6 OF 6. HOLE NO. SB-2

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-3
LINE & STA. CL 152+88
OFFSET 0'

DATE, START 2/ 2/66
DATE, FINISH 2/25/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
400'											
405'											
410'		49	36	68				M	Gr.	SAND Trace of Silt	
411.5'					115					Very Compact	
											End of Hole 411.5' Driller: Wayne Rice

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John T. Kenney

SHEET 9 OF 9. HOLE NO. SB-3

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-3
LINE & STA. CL 152/88
OFFSET 0'

DATE, START 2/ 2/66
DATE, FINISH 2/25/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
350'											
355'											
360'		47	22	56	110			M	Gr.	SAND Some Silt	
365'											
370'											
375'										Very compact	
380'											
385'		48	22	56	110			M	Gr.		
390'											
395'											
400'											

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John V. Ramsey

SHEET 8 OF 9. HOLE NO. SB-3

FORM CM-287 - 4/2/64

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-3
LINE & STA. CL 152+88
OFFSET 0'

DATE, START 2/ 2/66
DATE, FINISH 2/25/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
300'											
										SILT	
305'										Trace of Sand	
310'		42	10	20				M	Gr.		
					35						
										Hard	
315'											
320'		43	8	14				M	Gr.		
					17					SILT	
										Some Sand	
325'											
										Stiff	
330'		44	20	12				M	Gr.		
					18						
										SAND	
335'											
										Some silt	
340'		45	17	20				M	Gr.		
					24						
345'										Compact	
350'		46	15	21	22			M	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John T. Ramsey

SHEET 7 OF 9. HOLE NO. SB-3

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-3
LINE & STA. CL 152/88
OFFSET 0'

DATE, START 2/ 2/66
DATE, FINISH 2/25/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
250'	152										
	80										
	70									CLAY	
	75										
255'	75										
	95										
	165										
	185										
	150										
	110									Some Silt	
260'	92	37	4	3				M	Gr.		
	88				4						
	98										
	110										
	170										
265'	315									Soft	
	185										
	146										
	226										
270'	234										
	218	38	20	32				M	Gr.		
	135				24					CLAY AND SILT	
	112										
	85										
	236										
275'	203									Hard	
	206										
	403										
	551										
280'	308										
	314	39	5	6				M	Gr.		
	185				13						
	143									SILT	
	198										
	163									Trace of clay	
285'	185										
	200										
	250										
	370										
	570										
290'	303	40	4	8				M	Gr.		
	427				9						
	360										
	300										
	410									Firm	End of Pipe 296'
295'	255										
300'		41	10	10	12			M	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John P. Ramsey

SHEET 6 OF 9. HOLE NO. SB-3

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-3
LINE & STA. CL 152+88
OFFSET 0'

DATE, START 2/ 2/66
DATE, FINISH 2/25/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
200'	32										
	35										
	45										
	50										
205'	60										
	50										
	42										
	50										
	60										
210'	45										
	65	32	1	2				W	Gr.	CLAY	
	63				2						
	60									Trace of Silt	
	63										
215'	55										
	70										
	60										
	63										
	55										
220'	60										
	65	33	1	1				w	Gr.	Soft	
	62				2						
	53										
	60										
225'	65										
	75										
	63										
	56										
	101										
230'	62										
	80	34	3	4				W	Gr.	Firm	
	75				5						
	67										
	69										
235'	80										
	75										
	60										
	120										
	85										
240'	63										
	80	35	3	5							
	75				8			W	Gr.		
	70										
	75										
245'	122										
	85										
	75										
	95										
	100										
250'	67	36	4	2	4			W	Gr.		

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DRILLING CONTRACTOR Sprague &Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. James T. Kennedy

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-3
LINE & STA. CL 152+88
OFFSET 0'

DATE, START 2/ 2/66
DATE, FINISH 2/25/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
150'	20										
	38										
	43										
	50										
	62										
155'	43										
	32									CLAY	
	49										
	48										
	40										
160'	38	27	0	0				W	Gr.	Soft	
	38				0						
	39										
	36										
165'	37										
	48										
	82										
	99										
	63										
170'	55										
	60	28	0	3				W	Gr.		
	97				5						
	120										
	135										
	138										
175'	135									CLAY Trace of Silt	
	150										
	105										
	105										
	87										
180'	83	29	4	5				W	Gr.		
	80				7						
	76										
	70										
	69									Soft	
185'	62										
	90										
	62										
	58										
	50										
190'	40	30	3	4				W	Gr.		
	35				4						
	33									CLAY	
	30										
	35										
195'	42										
	52										
	35									Soft	
	40										
200'	37	31	2	2	3			W	Gr.		

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DRILLING CONTRACTOR Sprague & Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John P. Kennedy

SHEET 4 OF 9. HOLE NO. SB-3

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-3
LINE & STA. CL 152/88
OFFSET 0'

DATE, START 2/ 2/66
DATE, FINISH 2/25/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
100'	0										
	0										
	0										
	0										
	0										
105'	0										
	0	20	0	0				W	Gr.	CLAY	
	0				0						
	0										
	0										
110'	0										
	0	21	0	0				W	Gr.		
	0				0						
	5										
	7										
115'	10										
	0	22	0	0				W	Gr.		
	1				0						
	5										
	8									Very soft	
120'	9										
	5	23	0	0				W	Gr.		
	15				0						
	23										
	28										
125'	32										
	22										
	20										
	19										
	15										
130'	16										
	20	24	0	0				W	Gr.		
	22				0						
	32										
	35										
135'	32										
	33										
	38										
	35										
	28										
140'	27										
	28	25	0	0				W	Gr.		
	25				0						
	32										
	25										
145'	23										
	20										
	25										
	32										
	38										
150'	35	26	0	0	0			W	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John T. Russell

SHEET 3 OF 9. HOLE NO. SB-3

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-3
LINE & STA. CL 152/88
OFFSET 0'

DATE, START 2/2/66
DATE, FINISH 2/25/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
50'	42										
	72									CLAY	
	105										
	72										Reduced to 2½" pipe at 55'
	87										
55'	0	10	5	4				W	Gr.		
	0				3						
	10										
	12										
	15										
60'	10	11	2	1				W	Gr.	Soft	
	10				1						
	9										
	12										
	14										
65'	15	12	1	1				W	Gr.	CLAY	
	15				1					Trace of Silt	
	15										
	14									Very soft	
	16										
70'	0	13	0	0				W	Gr.		
	2				0						
	3										
	8										
	14										
75'	15	14	1	1				W	Gr.	CLAY	
	22				2						
	18										
	12										
80'	9										
	10	15	0	0				W	Gr.		
	13				1						
	13										
	12										
85'	8										
	8	16	0	0						Very soft	
	10				0			W	Gr.		
	12										
	10										
	8										
90'	5	17	0	1				W	Gr.		
	8				1						
	8										
	10										
	0										
95'	0	18	0	0				W	Gr.		
	0				0						
	8										
	3										
100'	2	19	0	0	0			W	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John T. Kennedy

FORM SM 227-5 (12/64)

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-3
LINE & STA. CL 152/88
OFFSET 0'

DATE, START 2/ 2/66
DATE, FINISH 2/25/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
0										WATER	Lake Bottom Elevation 92.3
4.5'											
5'	W	1	0	0				W	Gr.	SILT Trace of clay	
	e				0						
	i										
	g									Very soft	
10'	h										Used "B" rods 0'-55'- 4" pipe 55'-296.5'- 2½" pipe
	t	2	0	0				W	Gr.	SILT Some clay	
					0						
	o										
	f										
15'											
	c	3	0	0				W	Gr.		
	a				0						
	s										
	i									Very soft	
20'	n										
	g	4	0	0				W	Gr.	SILT AND CLAY	
					0						
										Very soft	
25'											
		5	0	0				W	Gr.	SAND AND GRAVEL	
					0						
	7										
	4										
30'	3										
	28	No Rec.	6	5				W	Gr.	Soft	
	12				7						
	11										
	7										
35'	4										
	12	6	1	1				W	Gr.		
	22				3						
	28										
	20										
40'	24										
	30	7	6	6				W	Gr.		
	31				6						
	30										
	40										
	42										
45'	32	No Rec.	6	7				W	Gr.		
47'	42				7						
	48	No Rec.	3	3				W	Gr.		
49'	44	8	2	2	4			W	Gr.		
50'	48	9	4	7	2	6		W	Gr.	CLAY-SOME GRAVEL FIRM	

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John T. Kennedy

SHEET 1 OF 9. HOLE NO. SB-3

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-4
LINE & STA. CL 153+56
OFFSET 0'

DATE, START 3/2/66
DATE, FINISH 3/9/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
0										WATER	Lake Bottom
.6		1	0	0							
					0			W	Gr.	ORGANIC SILT	Elevation 96.2
										Trace of clay	Used "B" Rods
5'											
	W	2	0	0							
	e				0			W	Gr.	Very soft	2½" pipe to 186'
	i										
	g										
	h										
10'	t	3	0	0							
					0			W	Gr.	CLAY	Surface Elev.
	o										changed from 96.8'
	f									Some silt	to 98.6' during
15'											course of the hole
	C	4	0	0						Very soft	
	a				0			W	Gr.		
	s										
	i										
	n										
20'	g	5	0	0							
					0			W	Gr.	CLAY	
										Trace silt	
25'											
		6	0	0							
					0			W	Gr.	Very soft	
29'											
30'	2										
	4	7	0	0							
	8				0			W	Gr.		
	9									CLAY	
	10										
	10									Some organic matter	
35'	10	8	0	0							
	14				0			W	Gr.		
	13										
	13										
	13										
40'	12	9	0	0						Very soft	
	18				0			W	Gr.		
	17										
	16										
45'	16										
	16	10	0	0							
	22				0			W	Gr.		
	23										
	19										
50'	18	11	0	0	0			W	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John T. Kennedy

SHEET 1 OF 5. HOLE NO. SB-4

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-4
LINE & STA. CL 153+56
OFFSET 0'

DATE, START 3/2/66
DATE, FINISH 3/9/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
50'	11										
	20										
	21									CLAY	
	19										
	20									Trace of Silt	
55'	18	12	0	0				W	Gr.		
	22				0						
	21										
	18									Very soft	
	18										
60'	24	13	0	0				W	Gr.		
	20				0						
	20										
	22										
	20										
65'	22	14	0	0				W	Gr.	CLAY	
	27				0					Trace of silt	
	27									some organic matter	
	38									and fibers	
	46									Very soft	
70'	58	15	1	3				M	Gr.		
	62				3					CLAY	
	68										
	59									Trace of Silt	
	63										
75'	67	16	3	5				M	Gr.		
	61				6					Firm	
	69										
	76										
	65										
80'	68	17	0	0				W	Gr.		
	45				0					CLAY	
	53										
	55									Very soft	
	56										
85'	53	18	0	0				W	Gr.		
	45				0					CLAY	
	51										
	55									Trace of Silt	
	53										
90'	52	19	0	0				W	Gr.		
	43				0					Very soft	
	56										
	54										
	46										
95'	48	20	0	0				W	Gr.		
	38				0						
	43										
	45										
100'	49	21	0	0	0			W	Gr.		

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John P. Ramsey

FORM SM 287 - (12-64)

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-4
LINE & STA. CL 153/56
OFFSET 0'

DATE, START 3/2/66
DATE, FINISH 3/9/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
100'	40	21	0	0				M	Gr.		
	46				0						
	54										
	56										
105'	52										
	51	22	0	0				M	Gr.	CLAY	
	56				0						
	74									Trace of Silt	
	72										
110'	67										
	72	23	0	0				M	Gr.		
	74				0						
	60										
	62										
	65										
115'	62	24	0	0				M	Gr.	Very soft	
	60				0						
	65										
	58										
	66										
120'	55	25	0	0				M	Gr.		
	58				0						
	59										
	55										
	60										
125'	52	26	0	0				M	Gr.		
	55				0						
	53										
	54										
130'	50										
	52	27	0	0				M	Gr.		
	58				0						
	68										
	80										
	75										
135'	60	28	0	0				M	Gr.		
	58				0						
	75										
	78										
140'	65										
	72	29	0	0				M	Gr.	CLAY	
	78				0						
	72									some silt	
	73										
	70										
145'	74	30	0	0				M	Gr.	very soft	
	78				0						
	78										
	86										
150'	111	31	0	0	0			M	Gr.		

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. James T. Ramsey

SHEET 3 OF 5. HOLE NO. SB-4

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-4
LINE & STA. CL 153+56
OFFSET 0'

DATE, START 3/2/66
DATE, FINISH 3/9/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1/375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
150'	75										
	89										
	92										
	82										
155'	91										
	90										
	93										
	88									CLAY	
	98										
160'	110									Some Silt	
	76	32	0	0				W	Gr.		
	80				0						
	85										
	94										
165'	91										
	115										
	145									Very soft	
	173										
	183										
170'	192										
	186	33	0	1				W	Gr.		
	165				1						
	167										
	245										
175'	250										
	318										
	250										
	260										
	244										
180'	212										
	161	34	6	7				M	Gr.		
	155				7						
	152									CLAY AND SILT	
	157										End of 2½" pipe 186'
185'	155									Stiff	
	160										
190'		35	10	9				M	Gr.		
					11						
195'											
200'											

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. J. W. Reasley

SHEET 4 OF 5. HOLE NO. SB-4

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-4
LINE & STA. CL 153+56
OFFSET 0'

DATE, START 3/2/66
DATE, FINISH 3/9/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL
CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
200'		36	9	9							
202'					12			M	Gr.	CLAY AND SILT	End of Hole 202'

Driller:
Wayne Rice

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John T. Kennedy

SHEET 5 OF 5. HOLE NO. SB-4

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-5
LINE & STA. CL 154/24
OFFSET 12' Rt.

DATE, START 3/10/66
DATE, FINISH 3/17/66
SURF. ELEV. 98.6
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
0											Used "AW" Rods
										WATER	
5'											
	W										
10'	e										Lake Bottom Elevation 86.1
	i										
	g										
12.5'	h t	1	0	0				W	Br.	ORGANIC SILT	
					0					some fibers	
15'	o										
	f										
	C										
20'	a										
	s	2	0	0				W	Br.	Very soft	
	i				0						
	n										
	g										
25'		3	0	0				W	Br.		
					0						
30'											
		4	0	0				W	Br.		
					0					ORGANIC SILT	
										Trace of clay	
35'											
	12	5	0	0				W	Br.		
	13				0						
	15										
	13										
40'	13										
	12	6	0	0				W	Br.	Very soft	
	10				0						
	12										
	14										
45'	13										
	11	7	0	0				W	Br.		
	11				0						
	12										
	15										
50'	19	8	0	0	0			W	Br.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR
DISTRICT SOILS ENGR. John T. Russell

SHEET 1 OF 6. HOLE NO. SB-5

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-5
LINE & STA. CL 154/24
OFFSET 12' Rt.
DATE, START 3/10/66
DATE, FINISH 3/17/66
SURF. ELEV. 98.6
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 8" SAMPLER 8"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
50'	19										
	20										
	21									SILT	
	21									some clay	
	18										
55'	15	9	0	0				M	Br.		
	18				0						
	20										
	21										
60'	20										
	20	10	0	0				M	Gr.	Trace of fibers	
	16				0					Very soft	
	21										
	24										
65'	23										
	19	11	0	0				M	Gr.		
	25				0						
	24										
	21										
	21									CLAY	
70'	21	12	0	0							
	29				0			M	Gr.	Trace of silt	
	25										
	29										
	29										
75'	24	13	0	0				M	Gr.	Very soft	
	28				0						
	29										
	29										
80'	32										
	35	14	0	0				M	Gr.		
	36				0						
	32										
	40										
85'	42										
	35	15	0	0				M	Gr.	CLAY	
	42				0					Trace of silt	
	50									Some gravel,	
	49									very soft	
90'	50										
	50	16	0	0				M	Gr.		
	46				0						
	50										
	53										
95'	54										
	48	17	0	0				M	Gr.		
	50				0					CLAY	
	55									Trace of silt,	
	66									very soft	
100'	56	18	0	0	0			M	Gr.		

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR
DISTRICT SOILS ENGR. John P. Rennie

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-5
LINE & STA. CL 154+24
OFFSET 12' Rt.

DATE, START 3/10/66
DATE, FINISH 3/17/66
SURF. ELEV. 98.6
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
100'	40										
	41										
	44										
	40										
	34										
105'	26	19	0	0				M	Gr.		
	40				0						
	41										
	38										
110'	36									CLAY	
	30	20	0	0				M	Gr.	some silt	
	40				0						
	45										
	44										
	42										
115'	38	21	0	0				M	Gr.		
	42				0						
	44										
	46									Very soft	
120'	51										
	38	22	0	0				M	Gr.		
	42				0						
	50										
	52										
	45										
125'	35	23	0	0				M	Gr.		
	50				0						
	46										
	40										
130'	41										
	45	24	0	0				M	Gr.		
	43				0						
	42										
	45										
135'	40										
	45	25	0	0				M	Gr.		
	60				0						
	60										
	62										
140'	55										
	40	26	0	0				M	Gr.		
	45				0						
	49										
	49										
	45										
145'	40	27	0	0				M	Gr.		
	60				0						
	66										
	77										
150'	92	28	0	0	0			M	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR
DISTRICT SOILS ENGR. J. W. F. Ramsey

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-5
LINE & STA. CL 154+24
OFFSET 12' Rt.

DATE, START 3/10/66
DATE, FINISH 3/17/66
SURF. ELEV. 98.6
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
150'	44										
	45										
	63										
	68										
155'	52										
	53										
	68										
	101									CLAY	
	90									some silt	
160'	93										
	104	29	0	0				M	Gr.	Very soft	
	54				0						
	58										
	61										
165'	65										
	63										
	65										
	60										
	70										
170'	80										
	81	30	0	0				M	Gr.		
	82				0						
	92										
	100										
175'	130										
	128										
	132										
	127										
	122										
180	123										
	100	31	0	0				M	Gr.		
	110				0						
	88										
	116										
185'	82										
	84										
	66										
	75										
	75										
	85										
190'	90	32	0	1				M	Gr.		
	80				3						
	82										
	85										
195'	90										
	83										
	82										
	85										
	88										
200'	83	33	0	0	0			M	Gr.		

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR
DISTRICT SOILS ENGR. John P. Rumsey

SHEET 4 OF 6. HOLE NO. SB-5

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-5
LINE & STA. CL 154+24
OFFSET 12' Rt.
DATE, START 3/10/66
DATE, FINISH 3/7/66
SURF. ELEV. 98.6
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
200'	78										
	67										
	52										
	55										
205'	52										
	55										
	56										
	65										
	70										
210'	65										
	57	33	0	0				W	Gr.	CLAY	
	93				0					some silt	
	85										
	112										
215'	95										
	90										
	89									Very soft	
	95										
	84										
220'	82										
	78	34	0	0				W	Gr.		
	70				0						
	75										
	67										
225'	70										
	70										
	75										
	70										
	71										
	67										
230'	65	35	0	1				W	Gr.		
	68				1						
	78										
	80										
	82										
235'	78										
	67										
	69										
	70										
	72										
240'	67	36	0	2				W	Gr.		
	73				3						
	72										
	103										
	81										
245'	75										
	82										
	81										
	80										
250'	73										

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR
DISTRICT SOILS ENGR. John T. Ramsey

SHEET 5 OF 6. HOLE NO. SB-5

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22

HOLE NO. SB-5
LINE & STA. CL 154+24
OFFSET 12' Rt.

QUAD. LOCATION ______ DATE, START 3/10/66 SURF. ELEV. 98.6
SOIL SERIES ______ DATE, FINISH 3/1?/66 DEPTH TO WATER ______ (ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5" WEIGHT OF HAMMER 300# HAMMER FALL
SAMPLER O.D. 2.0" I.D. 1.375" INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
250'		37	0	0				W	Gr.	CLAY some silt, very soft	End of Hole 252'
252'					0						Driller: Wayne Rice

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR
DISTRICT SOILS ENGR. John P. Ramsey

SHEET 6 OF 6. HOLE NO. SB-5

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-6 (UDH)
LINE & STA. CL 154+24
OFFSET 12' Lt.

DATE, START 3/15/66
DATE, FINISH 3/25/66
SURF. ELEV. 98.6
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.5" I.D. 3.75"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
0										WATER	Used "B" Rods
5'											
10'											
13.5'		J1	0	0				W	Br.		Lake Bottom Elev. 85.1
15'	W				0					ORGANIC SILT Trace of clay	
	e										
	i										
	g										
	h										
	t										
20'											
	o	J2	0	0				W	Br.	Very soft	
	f				0						
	C										
	a										
25'	s										
26'	ing	J3	0	0				W	Br.		
	1				0					SILT Some clay	
	2										
	1										
30'	2										20 lbs. hyd.Press. used to push sampler-T4
	5	T4 (30-31.5)R				1.5		W	Br.	Very soft	
	7										
	11										
	12										
35'	13										
	4	J5	0	0				W	Gr.		
	6				0					CLAY AND SILT	
	7										15 lbs. hyd. Press. Used to push sampler-T6
	9									Very soft	
40'	11										
	7	T6 (40-41.5)R				1.5		W	Gr.		
	5										
	6										
	8										
	7										
45'	7	J7	0	0				W	Gr.		
	9				0						
	11										15 lbs. hyd. Press. used to push sampler-T8
	10										
50'	12	T8 (50-51.5)R				1.3		W	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John T. Kennedy

SHEET 1 OF 4. HOLE NO. SB-6

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-6 (UDH)
LINE & STA. CL 154/24
OFFSET 12' Lt.

DATE, START 3/15/66 SURF. ELEV. 98.6
DATE, FINISH 3/25/66 DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.5" I.D. 3.75"
SAMPLER O.D. 2.0" I.D. 1.375"

WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"

HAMMER FALL
CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
50'	8										
	7										
	9										
	11										
	9										
55'	11	J9	0	0				M	Gr.	CLAY Trace of Silt	
	21				0						
	19										
	20										
60'	23										No Hyd. Press. used to push sampler-T10
	18	T10	(60-61.5)R 1.5					M	Gr.	Very soft	
	19										
	21										
	23										
	25										
65'	26	J11	0	0				M	Gr.		
	27				0						
	26										
	31										
	34										
70'	32	T12	(70-71.5)R 1.5					M	Gr.		15# hyd. press. used to push sampler-T12
	30										
	33										
	34										
	36										
75'	32	J13	0	0				M	Gr.		
	30				0						
	34										End of 4" pipe 80'
	37										
80'	39										
		T14	(80-81.5)R 1.4					M	Gr.		No hyd. Press. used to push sampler T14
85'											
		J15	2	8				M	Gr.	CLAY Some silt some gravel firm	
					5						
90'											
		T16	(90-91.5)R 1.5					M	Gr.		15# hyd. Press. used to push sampler-T16
95'											
		J17	1	1				M	Gr.	CLAY Some Silt Soft	
					2						
100'		(No Rec.)						M			

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John L. Kennedy

SHEET 2 OF 4. HOLE NO. SB-6

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Rte. 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-6 (UDH)
LINE & STA. CL 154+24
OFFSET 12' Lt.

DATE, START 3/15/66
DATE, FINISH 3/25/66
SURF. ELEV. 98.6
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.5" I.D 3.75"
SAMPLER O.D. 2.0" I.D 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
100'											
102'		T18 (102-103.5)				R 1.2		M	Gr.	CLAY Some Silt	15# hyd. Press. used to push sampler-T18
105'		J19	2	2				M	Gr.		
					2					Soft	
110'		T20 (110-111.5)				R1.5		M	Gr.		20# hyd. Press. used to push sampler-T20
115'		J21	0	0				M	Gr.	Very soft	
					0						
120'		T22 (120-121.5)				R1.5		M	Gr.		25# hyd. Press. used to push sampler-T22
125'		J23	8	6				M	Gr.	Stiff CLAY AND SILT	
					5						
130'		T24 (130-131.5)				R1.2		M	Gr.		25# hyd. Press. used to push sampler-T24
135'		J25	7	6				M	Gr.	Stiff	
					6						
140'		T26 (140-141.5)				R1.4		M	Gr.		35# hyd. Press. used to push sampler-T26
145'		J27	4	4				M	Gr.	Firm	
					3						65# hyd. Press. used to push sampler-T28
150'		T28 (150-151.5)				R1.4		M	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John P. Rennison

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Rte. 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-6 (UDH)
LINE & STA. CL 154+24
OFFSET 12' Lt.

DATE, START 3/15/66
DATE, FINISH 3/25/66
SURF. ELEV. 98.6
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.5" I.D. 3.75"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
150'										CLAY AND SILT	
155'											
160'		J29	11	8		6		M	Gr.	Stiff	
165'		T30(165-166.5)Rl.4						M	Gr.		
170'											
175'		J31	11	10		11		M	Gr.	Hard	End of Hole 177'
177'											Driller: Lee Werley

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. J. J. Kennedy

SHEET 4 OF 4. HOLE NO. SB-6

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-7
LINE & STA. CL 154+92
OFFSET 0'

DATE, START 3/ 8/66
DATE, FINISH 3/14/66
SURF. ELEV. 98.6
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
0											Used "B'" Rods
5'	W									WATER	
	e										
	i										
	g										
10'	h										
	t										
											Lake Bottom Elevation 84.6
	o										
15'	f	1	0	0				W	Gr.	SILT	
					0					Trace of Clay	
	C										
	a										
	s										
20'	i										
	n	2	0	0				W	Gr.		
	g				0						
										Very soft	
25'											
		3	0	0				W	Gr.		
					0						
30'											
		4	0	0				W	Gr.	SILT	
					0					Some clay	
										Very soft	
35'											
	2	5	0	0				W	Gr.	CLAY	
	5				0						
	5										
	4										
40'	4									Some Silt	
	5	6	0	0				W	Gr.		
	5				0						
	4										
	6										
45'	8										
	7	7	0	0				W	Gr.	Very Soft	
	9				0						
	10										
	9										
50'	10	8	0	0	0			W	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John J. Kennedy

SHEET 1 OF 6. HOLE NO. SB-7

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234

HOLE NO. SB-7
LINE & STA. CL 154+92
OFFSET 0'

PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION | DATE, START 3/6/66 | SURF. ELEV. 98.6
SOIL SERIES | DATE, FINISH 3/14/66 | DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5" | WEIGHT OF HAMMER 300# | HAMMER FALL
SAMPLER O.D. 2.0" I.D. 1.375" | INSIDE LENGTH OF SAMPLER 18" | CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
50'	8										
	10										
	12										
	11										
55'	8										
	9	9	1	0				M	Gr.	Very soft	
	10				0						
	10										
	7										
60'	9										
	12	10	1	1				M	Gr.	CLAY	
	11				1						
	14										
	13										
65'	14										
	24	11	3	3				M	Gr.	Trace of Silt	
	28				3						
	27										
	30										
70'	35										
	35	12	3	4				M	Gr.	firm	
	36				3						
	34										
	37										
75'	29										
	35	13	3	4				M	Gr.		
	39				4						
	45										
	47										
80'	48										
	43	14	4	3				M	Gr.		
	47				4						
	39										
	40										
85'	38										
	44	15	1	1				M	Gr.	Soft	
	51				2						
	50										
	50										
90'	47										
	49	16	1	2				M	Gr.		
	53				2						
	50										
	50										
95'	48										
	47	17	2	1				M	Gr.		
	51				1						
	48										
	44										
100'	48	18	1	1	0			M	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John P. Ramsey

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-7
LINE & STA. CL 154+92
OFFSET 0'

DATE, START 3/ 8/66
DATE, FINISH 3/14/66
SURF. ELEV. 98.6
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
100'	51									CLAY	
	55										
	54										
	45										
105'	46										
	44	19	0	0				M	Gr.	Trace of Silt	
	46				0						
	41									Very soft	
	43										
110'	40										
	41	20	0	0				M	Gr.	very soft	
	40				0						
	39									SILT	
	43										
115'	41									some clay	
	40	21	0	1				M	Gr.		
	39				0						
	39										
	40										
120'	35										
	33	22	0	0				M	Gr.		
	35				0						
	34										
	32										
125'	30										
	40	23	0	0				M	Gr.	SILT AND CLAY	
	39				0						
	40										
	36										
130'	30										
	45	24	0	0				M	Gr.	Very soft	
	37				0						
	39										
	44										
135'	43										
	45	25	0	1				M	Gr.		
	54				0						
	49										
	51										
140'	50										
	49	26	3	4				M	Gr.	firm	
	47				3						
	45										
	49										
145'	50										
	59	27	2	3				M	Gr.		
	64				3						
	64									soft	
	72										
150'	65	28	2	1	0			M	Gr.		

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John P. Reeves

SHEET 3 OF 6. HOLE NO. SB-7

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-7
LINE & STA. CL 154+92
OFFSET 0'

DATE, START 3/ 8/66
DATE, FINISH 3/14/66
SURF. ELEV. 98.6
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
150'	46										
	48										
	51										
	45									CLAY	
155'	49										
	54										
	66									Trace of silt	
	65										
	80										
160'	99										
	122	29	5	8				Gr.	M		
	81				8						
	64										
	73										
165'	66										
	65										
	65										
	92										
	100										
170'	101										
	103	30	6	6						firm	
	88				8			GR.	M		
	65										
	59										
175'	57										
	70										
	85										
	88										
	94										
180'	98										
	124	31	6	5							
	130				6			GR.	M		
	145										
	155										
185'	178										
	198										
	180										
	165										
	164										
	169										
190'	115	32	5	7							
	92				8			GR.	M		
	97										
	93										
	94										
195'	140										
	129										
	128										
	119										
200'	130	33	6	7	7			GR.	M		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John V. Reynolds

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-7
LINE & STA. CL 154+92
OFFSET 0'

DATE, START 3/ 8/66
DATE, FINISH 3/14/66
SURF. ELEV. 98.6
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
200'	123										
	120										
	119										
	100										
205'	97										
	93										
	106										
	117									CLAY	
	103										
210'	119										
	121	34	7	8				M	Gr.	Trace of Silt	
	90				7						
	89										
	88										
215'	91										
	97										
	101										
	97										
	92										
220'	96										
	96	35	7	7				M	Gr.		
	87				8					Stiff	
	99										
	100										
225'	106										
	100										
	95										
	88										
	83										
230'	86										
	113	36	6	7				W	Gr.		
	104				7						
	103										
	98										
235'	108										
	109										
	105										
	116										
	121										
240'	120										
	119	37	9	11				W	Gr.		
	122				13						
	125										
	124										
245'	127										
	131										
	137										
	144										
	141										
250'	146										

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santoro
DISTRICT SOILS ENGR. John P. Ramsey

SHEET 5 OF 6. HOLE NO. SB-7

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-7
LINE & STA. CL 154+
OFFSET 0'

DATE, START 3/ 8/66
DATE, FINISH 3/14/66
SURF. ELEV. 98.6
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
250'		38	13	14						CLAY	
					14			W	Gr.	Trace of Silt-Hard	End of Hole 252'
											Driller: Lee Werley

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John T. Ramsey

SHEET 6 OF 6. HOLE NO. SB-7

FORM SM 283 - (12/64)

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-8
LINE & STA. CL 155+58
OFFSET 0'

DATE, START 2/24/66
DATE, FINISH 3/ 7/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL
CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
0										WATER	Lake Bottom Elevation 89.3
7.5'		1	0	0				W	Gr.	ORGANIC SILT some fiberous materials	
					0						Used "B" Rods
10'	W										
	e										
	i										
	g										
	h										
	t									Very soft	Surface Elev. changed from 96.8' to 98.6' during course of hole.
15'		2	0	0				W	Gr.	SILT	
	o				0						
	f									Trace of Clay	
20'	C										
	a	3	0	0							
	s				0			W	Gr.		
	i										
	n										
	g									Very soft	
25'		4	0	0				W	Gr.	SILT	
					0						
										some clay	
										very soft	
30'	1	5	0	0							
	1				0			W	Gr.		
	1									CLAY	
	2										
	2									some silt	
	3										
35'	3	6	1	1				W	Gr.	very soft	
	4				0						
	5										
	5										
	4										
40'	5	7	1	0				W	Gr.	CLAY	
	7				0						
	6									Trace of silt	
	6										
	5										
45'	6	8	1	1						Very soft	
	6				0			W	Gr.		
	6										
	7										
50'	8	9	2	3	5			W	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John T. Ramsey

SHEET 1 OF 6. HOLE NO. SB-8

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-8
LINE & STA. CL 155+58
OFFSET 0'

DATE, START 2/24/66
DATE, FINISH 3/ 7/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D 2.75" I.D. 2.5"
SAMPLER O.D 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
50'	23										
	30										
	29										
	32										
	33										
55'	35	10	2	1						Soft	
	23				2						
	25									CLAY	
	21										
	20										
60'	20	11	2	2						Trace of silt	
	23				2						
	21										
	20										
	19										
65'	28	12	1	0							
	26				0						
	27										
	24									Very soft	
	23										
70'	21	13	1	1							
	23				0						
	24										
	21										
	22										
75'	20	14	0	1							
	21				0						
	19										
	22										
	21										
80'	22	15	1	1							
	29				0						
	16										
	15										
	16										
85'	18	16	1	1							
	16				1						
	17										
	17										
	19										
90'	29	17	0	0							
	35				0						
	30										
	27										
	24										
95'	30	18	0	0							
	28				0						
	26										
	26										
100'	25	19	0	1	0						

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. J. W. T. Rumsey

SHEET 2 OF 6. HOLE NO. SB-8

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-8
LINE & STA. CL 155+58
OFFSET 0'

DATE, START 2/24/66
DATE, FINISH 3/7/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
100'	41										
	39										
	34										
	36										
105'	34									CLAY	
	32	20	1	1				W	Gr.		
	32				1					Trace of Silt	
	27										
	26										
110'	25										
	24	21	1	2				W	Gr.	Very soft	
	31				1						
	26										
	28										
115'	32										
	31	22	1	1				W	Gr.		
	30				2						
	30										
	32										
120'	31										
	37	23	0	0				W	Gr.		
	33				0						
	31										
	30										
125'	31										
	32	24	1	1				W	Gr.		
	34				1						
	36										
	36										
130'	30										
	39	25	1	2				W	Gr.		
	46				1						
	44										
	45										
135'	45										
	46	26	0	0				W	Gr.		
	44				0						
	46										
	40										
140'	41										
	54	27	2	2				W	Gr.	Soft	
	65				2						
	60										
	67										
145'	69										
	59	28	2	1				W	Gr.		
	49				2						
	51										
	50										
150'	54	29	1	2	2			W	Gr.		

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DRILLING CONTRACTOR Sprague & Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. [signature]

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-8
LINE & STA. CL 155+58
OFFSET 0'

DATE, START 2/24/66
DATE, FINISH 3/7/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
150'	74										
	71										
	65										
	69										
	64										
155'	49	30	2	3				M	Gr.	CLAY	
	43				2					Trace of Silt	
	47										
	44										
160'	38										
	53										
	48										
	52										
	53										
	49										
165'	31	31	3	3				M	Gr.		
	30				2					Soft	
	37										
	32										
	39										
170'	44										
	65										
	64										
	73										
	80										
175'	76	32	3	2				M	Gr.		
	85				3						
	83										
	70										
	67										
180'	75										
	79										
	81										
	83										
	85										
185'	70	33	5	5				M	Gr.	CLAY	
	72				6					some silt	
	61										
	58										
	59										
190'	65									firm	
	78										
	96										
	66										
	67										
195'	100	34	12	14				M	Gr.	CLAY AND SILT	
	101				12						
	102									stiff	
	100										
200'	102										

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John T. Ramsey

SHEET 4 OF 6 HOLE NO. SB-8

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-8
LINE & STA. CL 155+58
OFFSET 0'

DATE, START 2/24/66
DATE, FINISH 3/7/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
200'	85										
	83										
	93										
	73										
205'	69										
	71									SILT	
	85										
	63										
	64	35	5	5				M	Gr.	some clay	
210'	65				4						
	60									firm	
	57										
	53										
	49										
215'	43										
	76	36	8	7				M	Gr.		
	95				8						
	97										
	94										
220'	96										
	107										
	94										
	100										
	97										
225'	85										
	78	37	7	7				M	Gr.	Stiff	
	90				5						
	79										
	96										
230'	85										
	100										
	82										
	84										
	77										
235'	85										
	90	38	7	6				M	Gr.		
	95				7						
	76										
	68										
240'	69										
	75										
	78										
	65										
	64										
245'	60										
	61	39	7	8				M	Gr.		
	64				7						
	75										
	77										
250'	81										

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DRILLING CONTRACTOR Sprague &Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John T. Ramsey

SHEET 5 OF 6. HOLE NO. SB-8

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22

HOLE NO. SB-8
LINE & STA CL 155+58
OFFSET 0'

QUAD. LOCATION
SOIL SERIES
DATE, START 2/24/66
DATE, FINISH 3/ 7/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL
CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
250'		40	4	6						SILT	
252'					8			W	Gr.	Some clay-firm	
											End of Hole 252'
											Driller:
											Lee Werley

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Sanfore
DISTRICT SOILS ENGR. John T. Ramsey

SHEET 6 OF 6. HOLE NO. SB-8

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-9
LINE & STA. CL 156+28
OFFSET 0'

DATE, START 2/ 1/66
DATE, FINISH 2/22/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
0										WATER	0'-70'- 4" Pipe 70'-295'- 2½" pipe Used "B" Rods
11.5'	W H e o a i f m	1	0	0				W	Gr.	SAND AND SILT	Lake Bottom Elevation 85.3'
15'	g m h e t r	2	5	7	0			M	Gr.	Soft	
20'	3 20 40 22	3	6	4	8			M	Gr.	SILT AND SAND some gravel	
25'	27 31 28 20 27	4	6	8	5			M	Gr.		
30'	30 29 30 33 36	No	Rec.		13					Firm	
35'	47 40 24 23 32	5	1	0				M	Gr.	CLAY Trace of fine Sand	
40'	49 52 55 39 81	6	1	0	0			M	Gr.	Very soft CLAY	
45'	110 95 105 116 135	7	7	8	0			M	Gr.	Trace of Silt Soft	
50'	158 160 156 135	8	5	4	8 4			M	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John A. Santore
DISTRICT SOILS ENGR. John F. Ruesser

SHEET 1 OF 7. HOLE NO. SB-9

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22

HOLE NO. SB-9
LINE & STA. CL 156+28
OFFSET 0'

QUAD. LOCATION
SOIL SERIES
DATE, START 2/ 1/66
DATE, FINISH 2/22/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
50'	120										
	163										
	161										
	175									CLAY	
	165										
55'	162	9	5	4				W	Gr.	Trace of Silt	
	191				6						
	199										
	163										
60'	149									Soft	
	159	10	3	4				W	Gr.		
	181				3						
	220										
	217										
	180										
65'	183	11	3	2				W	Gr.		
	208				3						Reduced to $2\frac{1}{2}$" pipe
	241										
	227										
	246										
70'	8	12	2	2				W	Gr.	CLAY	
	9				3						
	8										
	10										
	12										
75'	13	13	1	2				W	Gr.		
	11				2						
	14										
	12									Very soft	
	13										
80'	9	14	0	0				W	Gr.		
	11				0						
	8										
	12										
	11										
85'	13	15	1	0				W	Gr.		
	12				0						
	14										
	11										
	11										
90'	13	16	1	0				W	Gr.		
	15				0						
	16										
	14										
	19										
95'	25	17	1	1				W	Gr.		
	21				0						
	24										
	23										
100'	19	18	1	1	1			W	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John A. Santore
DISTRICT SOILS ENGR. John P. Ramsey

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-9
LINE & STA. CL 156+28
OFFSET 0'

DATE, START 2/ 1/66
DATE, FINISH 2/22/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18'
HAMMER FALL CASING 18' SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
100'	21										
	27										
	28										
	25										
105'	26										
	29	19	1	1				W	Gr.		
	31				0						
	28										
	28										
110'	31										
	25	20	1	1				W	Gr.		
	28				1						
	26										
	24										
115'	25										
	31	21	0	1				W	Gr.		
	36				2						
	34										
	31										
120'	30										
	29	22	1	1				W	Gr.	CLAY	
	37				2					soft	
	40										
	38										
125'	40										
	41										
	45										
	40										
	44										
130'	41										
	41	23	2	3				W	Gr.		
	31				2						
	29										
	34										
135'	31										
	40										
	40										
	40										
	41										
140'	43										
	42	24	1	1				W	Gr.		
	41				2						
	38										
	40										
	42										
145'	49										
	65										
	66										
	58										
150'	55	25	3	4	4			W	Gr.		

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John A. Santore
DISTRICT SOILS ENGR. John P. Kennedy

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-9
LINE & STA. CL 156+28
OFFSET 0'

DATE, START 2/ 1/66
DATE, FINISH 2/22/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18'
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
150'	55										
	56									CLAY	
	65										
	63										
155'	58										
	60									Soft	
	62										
	59										
	57										
160'	58										
	52	26	3	5				M	Gr.		
	48				5					CLAY	
	49										
	49									Trace of Silt	
165'	51										
	48										
	55									Soft	
	56										
	62										
170'	91										
	71	27	3	4				W	Gr.		
	69				4					CLAY	
	64										
	77										
175'	85										
	89										
	100										
	92										
	103										
180'	101										
	120	28	14	15				W	Gr.		
	120				14					Hard	
	129										
	99										
185'	103										
	131										
	145										
	135										
	119										
190'	99										
	102	29	7	6				W	Gr.		
	73				7					Firm	
	68										
	59										
195'	75										
	86										
	110										
	127										
	135										
200'	115	30	7	9	10			W	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John A. Santore
DISTRICT SOILS ENGR. John T. Kinney

SHEET 4 OF 7. HOLE NO. SB-9

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-9
LINE & STA. CL 156+28
OFFSET 0'

DATE, START 2/ 1/66
DATE, FINISH 2/22/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
200'	110										
	112										
	121										
	123										
	128										
205'	143										
	127									CLAY	
	113										
	97										
	76										
210'	82	31	5	6				W	Gr.	Trace of Silt	
	75				7						
	73										
	70										
	72										
215'	70										
	72										
	62										
	63										
	67										
220'	64	32	6	7				W	Gr.	Firm	
	72				10						
	83										
	107										
225'	103										
	123										
	150										
	151										
	156										
230'	165										
	163	33	8	9				W	Gr.		
	90				8						
	126										
	105										
235'	96										
	117										
	106										
	112										
	126										
240'	105										
	97	34	8	9				W	Gr.		
	92				9						
	100										
	104										
245'	88										
	96										
	147										
	166										
	172										
250'	185	35	6	8	10			W	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John A. Santore
DISTRICT SOILS ENGR. John P. Remsen

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-9
LINE & STA. CL 156+28
OFFSET 0'

DATE, START 2/1/66
DATE, FINISH 2/22/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
250'	192										
	154										
	163										
	130										
255'	126										
	132										
	155										
	145										
	143										
	147										
260'	148	36	12	12							
	200				13						
	298										
	167										
	150										
265'	144										
	174										
	185										
	183										
	163										
270'	165	37	10	11							
	174				14						
	243										
	202										
275'	200										
	236										
	355										
	296										
	287										
	291										
280'	295	38	19	20							
	220				33						
	217										
	340										
	316										
285'	237										
	239										
	279										
	240										
	292										
290'	220	39	10	10							
	171				26						
	140										
	104										
	103										
295'											
300'		40	18	14	26						

End of Pipe

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John A. Santore
DISTRICT SOILS ENGR. John T. Kennedy

SHEET 6 OF 7. HOLE NO. SB-9

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-9
LINE & STA. CL 156+28
OFFSET 0'

DATE, START 2/1/66
DATE, FINISH 2/22/66
SURF. ELEV. 96.8
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.0"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
300'											
										SILT	
305'										Trace of Clay	
310'		41	15	19		24		M	Gr.		
										Hard	
315'											
320'		42	23	36		37		M	Gr.	SILT	
										Trace of Sand	
325'										Hard	
330'		43	27	35		56		M	Gr.	SILT	
										Some Sand	
335'										Hard	
340'		44	75	165		185		M	Gr.	SAND	End of Hole 351'1"
										Some Silt	Driller: Lee Werley
345'										Very compact	
350'		45	80	420	500/1"			M	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John A. Santore
DISTRICT SOILS ENGR. John T. Kennedy

SHEET 7 OF 7. HOLE NO. SB-9

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22

HOLE NO. SB-10
LINE & STA. CL 157+06
OFFSET 12' Rt.

QUAD. LOCATION
SOIL SERIES
DATE, START 3/ 3/66
DATE, FINISH 3/16/66
SURF. ELEV. 101.5
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.5 I.D. 3.75
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
0	185										Used "B" Rods
	296										Used Piston for
	180									LAND FILL	all Shelby Tubes
	92										6" pipe to 34'
5'	73									SAND AND GRAVEL	
	84									AND BOULDERS	
	54										
	49										
	25										
10'	26										
	41										
	36										
	35										
	38										
15'	39										
	50										
	58										
	41										
	40										
20'	31										
	44										
	56										
	55										
	61										
25'	69										
	72										
	93										
	112										
	350										
30'	530										
	245										
	280										Reduced to 4"
	370										pipe at 34'
33.5'	160										
35'	23	No Rec.	1	1	0						
	44	J1	1	0				BR.	M		
	26				0					CLAY	
	42									Trace of Silt	End of Pipe
	84										at 40'
40'	101										
		J2	1	3				BR.	M		
					5					Soft	
45'											
		T3	(45-46.5)R 1.5'					BR.	M		100 lbs. hyd.pressure
											used to push shelby
											tube T3
50'		J4	1	2	3			BR.	M		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John P. Rumsey

SHEET 1 OF 4. HOLE NO. SB-10

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO (UDH) SB-10
LINE & STA. CL 157+06
OFFSET 12' Rt.
DATE, START 3/3/66
DATE, FINISH 3/16/66
SURF. ELEV. 101.5
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.5" I.D. 3.75"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
50'											
55'		T5	(55-56.5)R 1.3'					M	Br.	CLAY Trace of Silt	400 lbs. Hyd. Pressure used to push sampler - T5
60'		J6	1	2				M	Br.	Soft	
					2						
65'		T7	(65-66.5)R 1.3'					M	Br.		100 lbs. Hyd. Pressure used to push sampler- T7
70'		J8	5	0				M	Br.		
					1						
75'		T9	(75-76.5)R 1.3					M	Br.		100 lbs. hyd. pressure used to push sampler- T9
80'		J10	1	0				M	Gr.		
					1						
85'		T11	(85-86.5)R1.4					M	Gr.		150 lbs. Hyd. pressure used to push sampler- T11
90'		J12	0	1				M	Gr.		
					0						
95'		T13	(95-96.5)R1.3					M	Gr.		100 lbs. Hyd. press. used to push sampler- T13
100'		J14	0	0	1			M	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. [signature]

FORM SM 287 c (12/64)

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. (UDH) SB-10
LINE & STA. CL 157+66
OFFSET 12' Rt.
DATE, START 3/3/66
DATE, FINISH 3/16/66
SURF. ELEV. 101.5
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.5" I.D. 3.75"
SAMPLER O.D. 2.0 I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 8" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
100'											
105'		T15	(105-106.5)R				1.3	M	Gr.	CLAY Trace of Silt	100 lbs. Hyd. Press. used to push sampler- T15
110'		J16	0	1		0		M	Gr.		
115'		T17	(115-116.5)R				1.3	M	Gr.	Very soft	75 lbs. Hyd. Press. used to push sampler- T17
120'		J18	0	1		1		M	Gr.		
125'		J19	(125-126.5)R				1.3	M	Gr.		150 lbs. Hyd. Press. used to push sampler- T19
130'		J20	0	0		1		M	Gr.		
135'		T21	(135-136.5)R				1.5	M	Gr.		50 lbs. Hyd. Press. used to push sampler- T21
140'		J22	0	0		0		M	Gr.		
145'		T23	(145-146.5)R				1.2	M	Gr.		50 lbs. hyd. press. used to push sampler- T23
150'											

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILLING CONTRACTOR Sprague & Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. John T. Rasmussen

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234

HOLE NO. (UDH) SB-10
LINE & STA. CL 157/06
OFFSET 12' Rt.

PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION ______ DATE, START 3/3/66 SURF. ELEV. 101.5
SOIL SERIES ______ DATE, FINISH 3/16/66 DEPTH TO WATER ______
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.5" I.D. 3.75" WEIGHT OF HAMMER 300# HAMMER FALL
SAMPLER O.D. 2.0" I.D. 1.375" INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
150'		J24	0	0						Clay, trace of	End of Hole
152'					1			M	Gr.	silt-Very soft	152'
											Driller: John Uporsky

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR J. Santore
DISTRICT SOILS ENGR. [signature]
SHEET 4 OF 4. HOLE NO. SB-10

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS

SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-11
LINE & STA. CL 157+06
OFFSET 12' Left

DATE, START 1/31/66
DATE, FINISH 2/28/66
SURF. ELEV. 101.5
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
350'										SILT	
355'		42	42	67	129			M	Gr.	Some sand	
360'										Hard	
365'		43	83	154	290			M	Gr.	SAND some silt	
370'											
375'											
380'		44	117	213	258			M	Gr.	Very compact	
385'											
390'											
395'											
400'											

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR.

SHEET 8 OF 9. HOLE NO. SB-11

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-11
LINE & STA CL 157+06
OFFSET 12' Left

DATE, START 1/31/66
DATE, FINISH 2/28/66
SURF. ELEV. 101.5
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
0										Fill Material from 0' to 35' No samples taken in fill No blows on 6" pipe from 0' to 21'	Used "B" rods 0'-21'- 6" pipe 21'-60'- 4" pipe 60'-250'- 2½" pipe
21'	42										Reduced to 4" pipe at 21'
	28										
	31										
25'	46										
	52										
	48										
	50										
	62										
30'	53										
	186										
	178										
	186										
	172										
35'	169										
	243	1	5	7				M	Gr.	CLAY Some gravel, trace of silt- firm	
	345				4						
	515										
	565										
40'	630										
	260	2	1	3				M	Gr.	CLAY Trace of silt	
	238				3						
	175										
	270										
	380										
45'	220	3	4	3				M	Gr.	Firm	
	385				3						
	490										
	520										
50'	625	4	3	4	4			M	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John T. Ramsay

SHEET 1 OF 9. HOLE NO. SB-11

FORM SM 383 c (12/64)

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-11
LINE & STA. CL 157+06
OFFSET 12' Left

DATE, START 1/31/66
DATE, FINISH 2/28/66
SURF. ELEV. 101.5
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
50'	460										
	330									CLAY	
	455										
	510									Trace of Silt	
	685										
55'	495	5	5	4				M	Gr.		
	630				5					Firm	
	675										
	590										
60'	710										
	9	6	3	4				M	Gr.		
	10				4						Reduced to $2\frac{1}{2}$" pipe at 60'
	11									CLAY	
	13										
	20										
65'	21	7	2	2				M	Gr.		
	26				3						
	26									Very soft	
	25										
	26										
70'	27	8	1	2				M	Gr.		
	25				4						
	34										
	29										
	27										
75'	21	9	0	0				M	Gr.		
	22				1						
	31										
	34										
	24										
80'	38	10	0	1				M	Gr.		
	37				1						
	46										
	36										
	38										
85'	76	11	2	1				W	Gr.		
	54				1						
	63										
	62										
	54										
90'	61	12	1	1				W	Gr.		
	42				1						
	51										
	48										
	57										
95'	53	13	1	2				W	Gr.		
	45				1						
	56										
	62										
100'	61	14	2	1	2			W	Gr.		

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John T. Ramsey

SHEET 2 OF 9. HOLE NO. SB-11

FORM SM 287-C (12/64)

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing or Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-11
LINE & STA. CL 157+06
OFFSET 12' Left

DATE, START 1/31/66
DATE, FINISH 2/28/66
SURF. ELEV. 101.5
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
100	53										
	58										
	62									CLAY	
	60										
	58										
105'	49	15	0	0				M	Gr.	Very soft	
	48				1						
	54										
	45										
	53										
110'	48	16	1	0				M	Gr.	CLAY	
	53				1						
	58									Trace of silt-	
	47									very soft	
	49										
115'	52	17	1	0				M	Gr.		
	60				0						
	54										
	69										
	70										
120'	60	18	1	0				W	Gr.	CLAY	
	61				1						
	71										
	73										
	67										
125'	74										
	81										
	78										
	85										
	86										
130'	83	19	0	0				M	Gr.	Very soft	
	90				1						
	95										
	103										
	96										
135'	98										
	87										
	93										
	84										
	85										
140'	90	20	1	4				M	Gr.	Soft	
	76				5						
	81										
	83										
	84										
145'	80										
	92										
	86										
	87										
150'	81	21	0	1	1			M	Gr.	Very soft	

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague & Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John P. Ramsey

SHEET 3 OF 9. HOLE NO. SB-11

FORM CM-287-c (12/64)

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22

HOLE NO. SB-11
LINE & STA. CL 157+06
OFFSET 12' Left

QUAD. LOCATION
SOIL SERIES
DATE, START 1/31/66
DATE, FINISH 2/28/66
SURF. ELEV. 101.5
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
150'	83										
	97										
	84										
	92										
155'	91										
	86										
	92										
	98										
	106										
160'	92										
	104	22	0	0				W	Gr.		
	96				1						
	113									CLAY	
	126										
165'	110										
	103										
	99										
	126									Very soft	
	112										
170'	140										
	147	23	0	0				W	Gr.		
	93				2						
	141										
	153										
175'	128										
	135										
	104										
	116										
	114										
180'	116										
	125	24	0	0				W	Gr.		
	145				1						
	139										
	165										
185'	177										
	189										
	147										
	163										
	171										
190'	167										
	164	25	0	1				W	Gr.		
	132				0						
	155										
	137										
195'	164										
	153										
	172										
	187										
	185										
200'	196	26	0	3	4			W	Gr.		

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John T. Kennedy

SHEET 4 OF 9. HOLE NO. SB-11

FORM SM 287 c (12/64)

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-11
LINE & STA. CL 157+06
OFFSET 12' Left

DATE, START 1/31/66
DATE, FINISH 2/28/66
SURF. ELEV. 101.5
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
200'	141										
	182										
	215										
	203										
205'	211										
	192										
	433										
	405										
	215										
210'	206										
	245	27	8	11				M	Gr.		
	251				16						
	242									CLAY	
	305									Some silt	
215'	312										
	287										
	262										
	280										
	320										
220'	305										
	204	28	4	7				M	Gr.		
	213				8						
	234										
	265										
225'	271										
	337										
	295										
	307										
	352										
230'	372									Firm	
	435	29	7	17				M	Gr.		
	420				16						
	398										
	395										
235'	408										
	415	30	4	8				M	Gr.		
	413				7						
	445										
	417										
240'	365										
	385										
	423										
	441										
	395										
	435										
245'	355	31	5	7				M	Gr.		
	440				8						
	495										
	410										
250'	390										

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John T. Ramsey

SHEET 5 OF 9. HOLE NO. SB-11

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-11
LINE & STA. CL 157/06
OFFSET 12' Left

DATE, START 1/31/66
DATE, FINISH 2/28/66
SURF. ELEV. 101.5
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
250'										CLAY	End of Casing 250'
										Trace of Silt	
255'											
256'		32	7	6				M	Gr.		
					7						
260'											
265'		33	5	7				M	Gr.	Firm	
					7						
270'											
275'		34	13	16				M	Gr.	CLAY	
					25					some silt	
280'										Stiff	
285'		35	5	14				M	Gr.		
					32					CLAY AND SILT	
290'											
295'		36	32	28				M	Gr.	Hard	
					36						
300'											

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

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DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John V. Reynolds

SHEET 6 OF 9. HOLE NO. SB-11

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-11
LINE & STA. CL 157+06
OFFSET 12' Left

DATE, START 1/31/66
DATE, FINISH 2/28/66
SURF. ELEV. 101.5
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
300'										CLAY	
305'		37	15	23		37		M	Gr.	Trace of Silt	
310'										Hard	
315'		38	27	41		83		M	Gr.	SILT Trace of clay	
320'										Hard	
325'		39	9	14		26		M	Gr.	SILT Trace of sand	
330'										Hard	
335'		40	25	53		102		M	Gr.	SILT Some sand	
340'										Hard	
345'		41	51	73		186		M	Gr.		
350'											

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John P. Reinsel

SHEET 7 OF 9. HOLE NO. SB-11

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(CONTRACT)

DISTRICT NO. 1
COUNTY Washington
B.S.M. PROJ. NO.
CONTRACT SM 234
PROJECT South Bay Bridge Crossing of Route 22
QUAD. LOCATION
SOIL SERIES

HOLE NO. SB-11
LINE & STA. CL 157+06
OFFSET 12' Left

DATE, START 1/31/66
DATE, FINISH 2/28/66
SURF. ELEV. 101.5
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75" I.D. 2.5"
SAMPLER O.D. 2.0" I.D. 1.375"
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 18"
HAMMER FALL CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	FIELD DESCRIPTION OF SOIL AND ROCK	REMARKS
400'											
405'		45	55	252						SAND	
					320			M	Gr.	some silt	
410'											
415'											
420'										Very compact	
425'											
430'											
431'		46	192	390							
					400			M	Gr.		End of Hole 431'
											Driller: John Uporsky

ALL CONDITIONS, MATERIALS, AND LAYERS ENCOUNTERED MUST BE DESCRIBED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. ALL WATER LEVEL OBSERVATIONS MUST BE DESCRIBED IN DETAIL UNDER "REMARKS".

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILLING CONTRACTOR Sprague&Henwood, Inc.
CONTR. SOILS TECH. Dennis Emmerson
D.P.W. INSPECTOR John Santore
DISTRICT SOILS ENGR. John F. Kennedy

SHEET 9 OF 9. HOLE NO. SB-11

FORM SM 287c (12/64)

org + 1

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 1
COUNTY Wash.
B.S.M. PROJ. NO.
PROJECT South Bay Bridge (1119.00-101)
QUAD. LOCATION
SOIL SERIES

HOLE NO. D.A.-P-1
LINE & STA.
OFFSET
DATE, START
DATE, FINISH
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300 #
INSIDE LENGTH OF SAMPLER 1.5
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0										Water.	Pontoon Boring
							5				
	6									Fill	
	4									Stone.	
	3										
	2										
10	3										
	5										
	6										
	3										
	7										
	3										
	2										
	5										
	6										
	7										
20	7										
	6										
	4										
	6										
	10										
	10										
	7										
	8										
	8										
	12										
30	14										
	15										
	21										
	16										
	20										
	22										
	17										
	14										
	20										
	25										
40	35										
	37										
	X0										
	134										
	XX										
	40						45				
	26							W	Gr.	Silt some clay	
	28									Soft - Plastic.	
	26										
	29										
	41										

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR Sanders.
SOIL DESCRIPTIONS Friday
ROCK DESCRIPTIONS
DISTRICT SOILS ENGR.

SHEET 1 OF 2. HOLE NO. D.A.-P-1

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 1
COUNTY Wash.
B.S.M. PROJ. NO.

HOLE NO. D.A-P-1
LINE & STA.
OFFSET

PROJECT South Bay Bridge (1119.00-101)
QUAD. LOCATION
SOIL SERIES
DATE, START
DATE, FINISH
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER
HAMMER FALL CASING SAMPLER

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
50	37	1	1	1						Silt some clay	Piezometer
	49				1		52			Soft - Plastic	set at 52'
										End 52'	

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR Sanders
SOIL DESCRIPTIONS Friday
ROCK DESCRIPTIONS "
DISTRICT SOILS ENGR.

SHEET 2 OF 2. HOLE NO. DA-P-1

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 1
COUNTY Wash.
B.S.M. PROJ. NO.
PROJECT South Bay Bridge (1119.00-101)
QUAD. LOCATION
SOIL SERIES

HOLE NO. D.A.-P-2
LINE & STA.
OFFSET
DATE, START
DATE, FINISH
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 1.5
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0										Water.	Pontoon Boring
							6				
	5									Fill	
	4										
	3									Stone	
10	5										
	5										
	4										
	3										
	5										
	10										
	11										
	10										
	5										
	6										
20	10										
	5										
	6										
	7										
	6										
	8										
	7										
	6										
	7										
	15										
30	16										
	17										
	17										
	13										
	15										
	17										
	18										
	32										
	38										
	38										
40	40										
	86										
	103									3' boulder.	Drilled and blew boulder 41'-44'
	87										
	100/0						44				
	19									Silt some clay	
	48									Soft-Plastic.	
	29										
	31										
	36										
50	29										

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DRILL RIG OPERATOR Sanders.
SOIL DESCRIPTIONS Friday
ROCK DESCRIPTIONS
DISTRICT SOILS ENGR.
SHEET 1 OF 3. HOLE NO. P-2

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 1
COUNTY Wash.
B.S.M. PROJ. NO.
PROJECT South Bay Bridge (1119.00-101)
QUAD. LOCATION
SOIL SERIES

HOLE NO. D.A.-P-2
LINE & STA.
OFFSET
DATE, START
DATE, FINISH
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300 lb
INSIDE LENGTH OF SAMPLER 1.5
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
50	32										
	30										
	28										
	29										
	30										
	33										
	29										
	36										
	37										
60	36										
	29										
	34										
	36										
	33										
	33										
	35										
	33										
	47										
	44										
70	36										
	37										
	37										
	37										
	38										
	36										
	37										
	34										
	49										
	62										
80	53										
	48										
	51										
	56										
	58										
	61										
	54										
	52										
	50										
	50										
90	60										
	55										
	60										
	47										
	58										
	62										
	60										
	59										
	61										
	60										
100	57										

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR Sanders.
SOIL DESCRIPTIONS Friday
ROCK DESCRIPTIONS
DISTRICT SOILS ENGR.
SHEET 2 OF 3. HOLE NO. P-2

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 1
COUNTY Wash.
B.S.M. PROJ. NO.

HOLE NO. D.A.-P-2
LINE & STA.
OFFSET

PROJECT South Bay Bridge (1119.00-101)
QUAD. LOCATION
SOIL SERIES
DATE, START
DATE, FINISH
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 1.5
HAMMER FALL CASING 1.5 SAMPLER 1.4

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0	63	1	1	1							Piezometer set at 10'
	70				1		10'			End 10'	

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DRILL RIG OPERATOR Sanders.
SOIL DESCRIPTIONS Friday
ROCK DESCRIPTIONS "
DISTRICT SOILS ENGR.

SHEET 3 OF 3. HOLE NO. P-2

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 1
COUNTY Wash.
B.S.M. PROJ. NO.

HOLE NO. D.A-P-2A
LINE & STA.
OFFSET

PROJECT South Bay Bridge (1119.00-101)
QUAD. LOCATION
SOIL SERIES
DATE, START 5-21-71
DATE, FINISH 5-21-71
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 1.5'
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0										Water.	Pontoon Boring
							5				
	6									FILL	
	9										
	13										
	12										
10	10									Stone.	
	9										
	9										
	7										
	7										
	13										
	21										
	17										
	23										
	26										
20	21										
	19										
	22										
	22										
	22										
	24										
	23										
	26										
	21										
	30										
30	27										
	29										
	22										
	21										
	24										
	29										
	31										
	30										
	28										
	27										
40	29										
	89										Casing refusal on
	500						42				Large boulder
										End 42'	

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR Sanders - Fridy
SOIL DESCRIPTIONS
ROCK DESCRIPTIONS
DISTRICT SOILS ENGR.

SHEET 1 OF 1. HOLE NO. P-2A

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 11
COUNTY Nassau
B.S.M. PROJ. NO.

HOLE NO. D.A-P-2B
LINE & STA.
OFFSET

PROJECT South Bay Bridge (1119.00-101)
QUAD. LOCATION
SOIL SERIES
DATE, START 5-21-71
DATE, FINISH 5-21-71
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300 #
INSIDE LENGTH OF SAMPLER 1.5
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0										Water.	Pontoon Boring
							5				
	5									FILL	
	3										
	7									Stone	
	9										
10	12										
	13										
	10										
	6										
	9										
	8										
	13										
	14										
	17										
	26										
30	15										
	17										
	12										
	13										
	16										
	23										
	27										
	24										
	21										
	19										
30	19										
	19										
	22										
	20										
	23										
	29										
	32										
	31										
	27										
	27										
40	25										
	33										
	38										
	37										
	40										
	143										
	78										
	500						47				Casing refusal on Large boulder.
										End 47'	

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DRILL RIG OPERATOR Sanders - Friday
SOIL DESCRIPTIONS
ROCK DESCRIPTIONS
DISTRICT SOILS ENGR.
SHEET 1 OF 1. HOLE NO. P-2B

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 1
COUNTY Nass.
B.S.M. PROJ. NO.
PROJECT South Bay Bridge (1119.00-101)
QUAD. LOCATION
SOIL SERIES

HOLE NO. D.A.-P-3
LINE & STA.
OFFSET
DATE, START
DATE, FINISH
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 1.5
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0										Water	Pontoon Boring
							6				
	10									Fill	
	11										
	10										
10	13									Stone	
	7										
	7										
	5										
	6										
	5										
	6										
	8										
	7										
	13										
20	10										
	13										
	14										
	16										
	14										
	15										
	32										
	25										
	27										
	19										
30	18										
	21										
	17										
	23										
	21										
	110										
	463										
	55										
	70										
	46						39				
40	30									Silt some clay	
	32									Soft - Plastic	
	40										
	37										
	36										
	44										
	31										
	30										
	33										
	40										
50	46										

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR Sanders.
SOIL DESCRIPTIONS Friday
ROCK DESCRIPTIONS "
DISTRICT SOILS ENGR.
SHEET 1 OF 4. HOLE NO. P-3

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 11
COUNTY Wash.
B.S.M. PROJ. NO.

HOLE NO. D.A-P-3
LINE & STA.
OFFSET

PROJECT South Bay Bridge (1119.00-101)
QUAD. LOCATION
SOIL SERIES

DATE, START
DATE, FINISH

SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4

WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 1.5

HAMMER FALL
CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
50	41									Silt some clay.	
	39									soft - Plastic	
	43										
	39										
	39										
	38										
	47										
	45										
	34										
60	32										
	28										
	25										
	27										
	41										
	42										
	42										
	43										
	40										
	36										
70	41										
	40										
	37										
	40										
	41										
	44										
	43										
	41										
	40										
	37										
80	46										
	44										
	40										
	38										
	41										
	39										
	40										
	38										
	38										
	41										
90	44										
	45										
	44										
	43										
	40										
	42										
	43										
	45										
	42										
	43										
100	40										

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR Sanders.
SOIL DESCRIPTIONS Frida
ROCK DESCRIPTIONS
DISTRICT SOILS ENGR.

SHEET 2 OF 4. HOLE NO. P-3

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 1
COUNTY Wash.
B.S.M. PROJ. NO.
PROJECT South Bay Bridge C 1119.00-101
QUAD. LOCATION
SOIL SERIES
DATE, START
DATE, FINISH

HOLE NO. DL-P-3
LINE & STA.
OFFSET
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300 #
INSIDE LENGTH OF SAMPLER 1.5
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0	45									Silt some clay. Soft - Plastic.	
	47										
	51										
	52										
	50										
	53										
	57										
	54										
	55										
110	53										
	63										
	57										
	60										
	59										
	64										
	56										
	55										
	60										
	61										
120	57										
	66										
	170										
	146										
	150										
	123										
	153										
	168										
	172										
	115										
130	116										
	127										
	88										
	93										
	99										
	105										
	85										
	95										
	98										
	99										
140	101										
	113										
	108										
	99										
	104										
	124										
	116										
	118										
	121										
	120										
150	123										

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR Sanders.
SOIL DESCRIPTIONS Friday
ROCK DESCRIPTIONS
DISTRICT SOILS ENGR.

SHEET 3 OF 4. HOLE NO. P-3

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 11
COUNTY Wash.
B.S.M. PROJ. NO.

HOLE NO. D.A-P-3
LINE & STA.
OFFSET

PROJECT South Bay Bridge. (1119.00-101)
QUAD. LOCATION
SOIL SERIES
DATE, START
DATE, FINISH
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 1.5
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
150		1	1	2						Silt some clay Soft - Plastic	Piezometer set at 152'
					1		152			End 152'	Washed ahead 150' to 152

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR Sanders.
SOIL DESCRIPTIONS Fridy
ROCK DESCRIPTIONS
DISTRICT SOILS ENGR.
SHEET 4 OF 4. HOLE NO. P-3

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 1
COUNTY Wash.
B.S.M. PROJ. NO.
PROJECT South Bay Bridge (1119.60-101)
QUAD. LOCATION
SOIL SERIES

HOLE NO. D.A.-P4
LINE & STA.
OFFSET
DATE, START 6-1-71
DATE, FINISH 6-3-71
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 3.9 I.D. 3.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300 #
INSIDE LENGTH OF SAMPLER 1.5'
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0										Water.	Pontoon Boring
							7				
	19									Fill	
	18										
10	6									Stone	
	6										
	7										
	8										
	7										
	6										
	7										
	8										
	13										
	7										
20	9										
	9										
	8										
	9										
	17										
	13										
	10										
	11										
	21										
	19										
30	17										
	21										
	22										
	19										
	17										
	21										
	16										
	23										
	26										
	28										
40	28										
	27						41				
	43								Gr.	Silt some clay	
	40									Soft - Plastic.	
	55										
	56										
	45										
	49										
	66										
	58										
50	70										

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DRILL RIG OPERATOR Sanders.
SOIL DESCRIPTIONS Frida.
ROCK DESCRIPTIONS "
DISTRICT SOILS ENGR.
SHEET 1 OF 2. HOLE NO. P-4

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 1
COUNTY Wash.
B.S.M. PROJ. NO.

HOLE NO. D.A.-P-4
LINE & STA.
OFFSET

PROJECT South Bay Bridge C 11 19.00-101)
QUAD. LOCATION
SOIL SERIES
DATE, START 6-1-71
DATE, FINISH 6-3-71
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.5
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300 #
INSIDE LENGTH OF SAMPLER 1.5
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
50	67	1	1	1						Silt some clay	Piezometer set at 52.
	69				2		End			End 52	

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DRILL RIG OPERATOR Sanders
SOIL DESCRIPTIONS Friday
ROCK DESCRIPTIONS
DISTRICT SOILS ENGR.

SHEET 2 OF 2. HOLE NO. P-4

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 1
COUNTY Wash.
B.S.M. PROJ. NO.
PROJECT South Bay Bridge (1119.00-101)
QUAD. LOCATION
SOIL SERIES

HOLE NO. D.A-P-5
LINE & STA.
OFFSET
DATE, START 6-4-71
DATE, FINISH 6-8-71
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300 lb
INSIDE LENGTH OF SAMPLER 1.5
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0										Water.	Pontoon Boring
							6				
	7									Fill	
	6										
	5									Stone.	
10	2										
	5										
	6										
	3										
	4										
	5										
	9										
	10										
	8										
	7										
20	7										
	8										
	7										
	9										
	13										
	11										
	14										
	16										
	14										
	13										
30	15										
	16										
	17										
	17										
	18										
	19										
	21										
	21										
	20										
	36										
40	37										
	40						41				
	78								G.	Silt some clay	
	190									Soft- Plastic	
	80										
	97										
	110										
	136										
	121										
	119										
50	107										

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SOIL DESCRIPTIONS Friday
ROCK DESCRIPTIONS
DISTRICT SOILS ENGR.
SHEET 1 OF 2. HOLE NO. P-5

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 1
COUNTY Wash.
B.S.M. PROJ. NO.
PROJECT South Bay Bridge (11/19.00-101)
QUAD. LOCATION
SOIL SERIES

HOLE NO. D.A.-P-5
LINE & STA.
OFFSET
DATE, START 6-4-71
DATE, FINISH 6-8-71
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300 lb
INSIDE LENGTH OF SAMPLER 1.5
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
50	96									Silt some clay	
	108									Soft - Plastic.	
	112										
	117										
	121										
	119										
	130										
	127										
	101										
60	99										
	97										
	112										
	121										
	130										
	137										
	140										
	121										
	128										
	117										
70	130										
	102										
	106										
	126										
	110										
	128										
	83										
	75										
	91										
	99										
80	105										
	103										
	125										
	117										
	133										
	119										
	121										
	126										
	112										
	129										
90	126										
	134										
		1	1	2	2		92.5			End 92.5	Piezometer set at 92.5

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SOIL DESCRIPTIONS Friday
ROCK DESCRIPTIONS
DISTRICT SOILS ENGR.
SHEET 2 OF 2. HOLE NO. P5

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 11
COUNTY Wash.
B.S.M. PROJ. NO.

HOLE NO. D.A.-P-6
LINE & STA.
OFFSET

PROJECT South Bay Bridge (1119.00-101)
QUAD. LOCATION
SOIL SERIES

DATE, START 6-14-71
DATE, FINISH

SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4

WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 1.5

HAMMER FALL
CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0										Water.	Pontoon Boring
							9				
10	3									Fill	
	4									Stone	
	3										
	2										
	2										
	3										
	4										
	5										
	4										
	3										
20	4										
	5										
	7										
	9										
	10										
	12										
	11										
	17										
	16										
	11										
30	12										
	11										
	10										
	12										
	11										
	12										
	13										
	12										
	18										
	21										
40	24										
	24						41				
	28									Silt some clay	
	31									Soft - Plastic	
	36										
	34										
	34										
	35										
	33										
	44										
50	40										

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SOIL DESCRIPTIONS Friday
ROCK DESCRIPTIONS
DISTRICT SOILS ENGR.

SHEET 1 OF 3. HOLE NO. P-6

SM 282b (7/69)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

DISTRICT NO. 11
COUNTY Wash.
B.S.M. PROJ. NO.

HOLE NO. D.A.-P-6
LINE & STA.
OFFSET

PROJECT South Bay Bridge (1119.00-101)
QUAD. LOCATION
SOIL SERIES
DATE, START 6-14-71
DATE, FINISH
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300#
INSIDE LENGTH OF SAMPLER 1.5
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
50	43							W	Gr	Silt some clay	
	54									Soft - Plastic	
	46										
	46										
	56										
	58										
	60										
	71										
	70										
60	69										
	66										
	66										
	68										
	67										
	65										
	71										
	69										
	74										
	69										
70	74										
	78										
	86										
	85										
	80										
	88										
	89										
	88										
	91										
	94										
80	89										
	88										
	87										
	71										
	79										
	75										
	71										
	72										
	75										
	86										
90	91										
	94										
	96										
	95										
	97										
	101										
	107										
	111										
	113										
	146										
100	165										

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SHEET 2 OF 3. HOLE NO. P-6

SM 282b (7/69)

STATE OF NEW YORK
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QUAD. LOCATION
SOIL SERIES
DATE, START 6-14-71
DATE, FINISH
SURF. ELEV.
DEPTH TO WATER
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.9 I.D. 2.3
SAMPLER O.D. 2.0 I.D. 1.4
WEIGHT OF HAMMER 300 lb
INSIDE LENGTH OF SAMPLER 1.5
HAMMER FALL CASING 1.5 SAMPLER 1.5

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
100	173							W	Gr.	Silt some clay Soft-Plastic.	
	179										
	184										
	220										
	197										
	189										
	171										
	167										
	178										
110	180										
	191										
	200										
	202										
	189										
	232										
	189										
	174										
	179										
	190										
120	290										
	264										
	252										
	302										
	285										
	254										
	286										
	260										
	271										
	245										
130	260										
	670										
	574										
	523										
	367										
	389										
	390										
	423										
	435										
	418										
140	384										
	350						141				Piezometer set at 141'
										End 141'	

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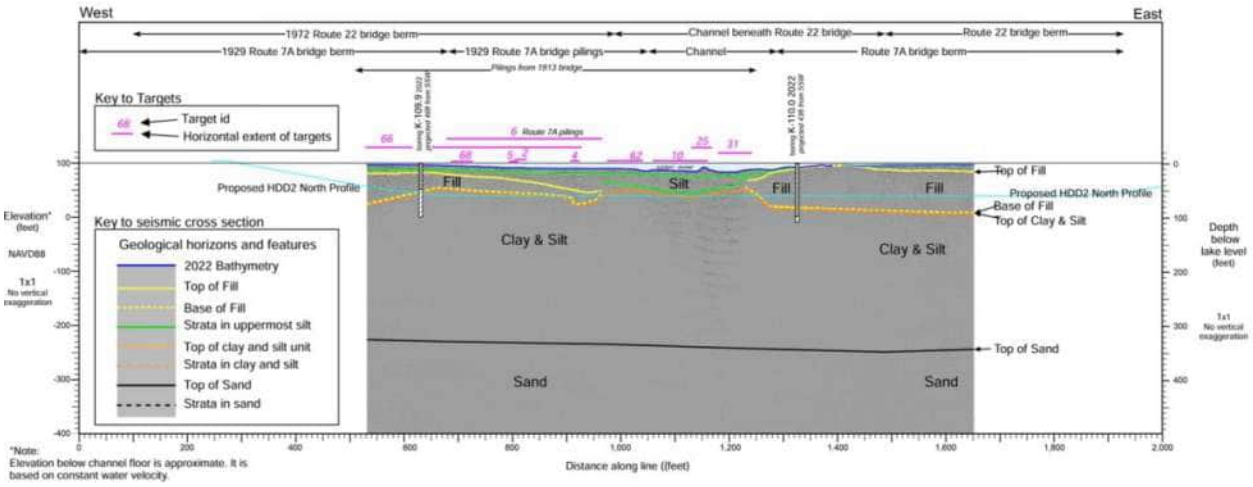
SOIL DESCRIPTIONS Friday
ROCK DESCRIPTIONS
DISTRICT SOILS ENGR.

SHEET 3 OF 3. HOLE NO. P-6

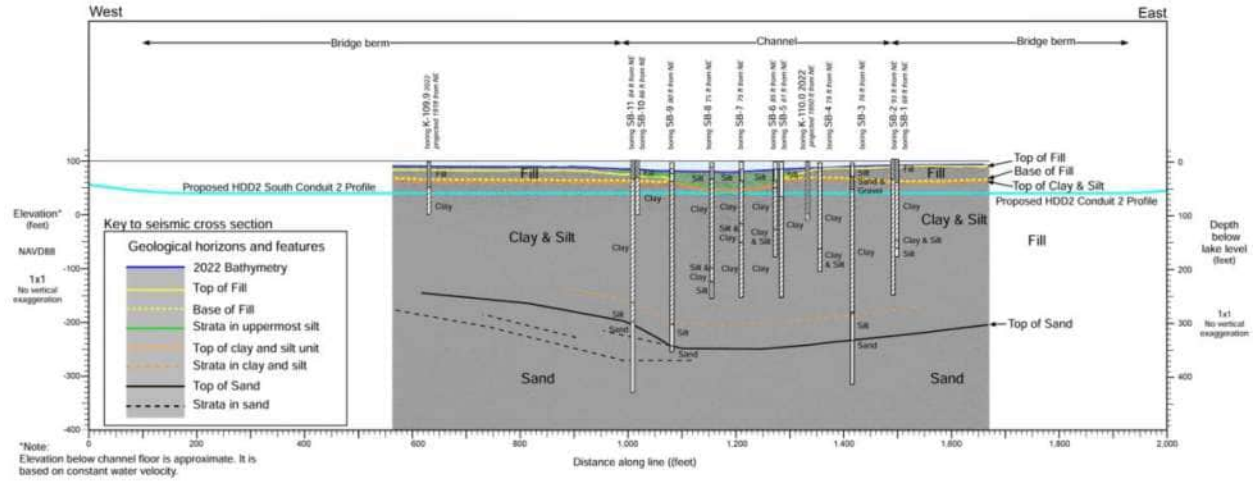
SM 282b (7/69)

Schnabel Engineering
28 Corporate Drive Suite 204
Clifton Park, NY 12065

Champlain Power Express: Rt 22-Whitehall, NY
Geophysical Survey North and South of the Rt. 22 Bridge



North HDD Profile



South HDD Profile

REPORT June10, 2022

55 POST ROAD WEST
WESTPORT, CT 06880
(203) 312-4943

inSight prepared this document for Schnabel Engineering. The outputs from this document are designated only for application to the intended purpose, as specified in the document, and should not be used for any other site or project. The material in it reflects the judgment of inSight based on the information available to inSight at the time of preparation. All interpretations are opinions based on inferences from observations and geophysical measurements. We cannot, and do not, guarantee the accuracy or correctness of any interpretation. We shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretations made by any of our officers, agents, or employees.

Executive Summary

Schnabel Engineering has contracted inSight LLC to conduct a geophysical investigation in support of horizontal directional drill (HDD) design and construction at Route 22, South Bay, in Whitehall NY. Schnabel contracted inSight, LLC (inSight) to collect multibeam bathymetry, side-scan sonar, magnetic field, and reflection seismic data in the vicinity of a horizontal directional drill for the Champlain Hudson Power Express cable installation below South Bay in the vicinity of the Route 22 bridge.

inSight's investigation includes both single and multibeam bathymetry, side-scan sonar, magnetic field, and reflection seismic measurements. Insight collected single beam bathymetry in addition to the multibeam bathymetry to QC the multibeam data. inSight also integrated historical surveys and existing geotechnical borings to aid in the interpretation of and provide context to map major stratigraphic horizons, locate the presence of existing utilities, and locate shallow obstructions to construction inside and outside the area of investigation (AOI). inSight conducted geophysical surveys, integrated data, and interpreted the results. The goal of the geophysical investigation was to support HDD planning, design and construction.

inSight conducted geophysical investigations between April 23rd and April 25th, 2022. inSight surveyed the area during a period of high water. The water level at the time of survey was approximately 3 feet above normal. The high water level allowed inSight to cover more of the area of investigation from bank to bank than previously expected. The lake level at the time of survey ranged between 98.5ft and 98.9ft NAVD88.

Top of rock was not interpreted in the seismic record. Between approximately -150ft NAVD88 and -225ft NAVD88 seismic data shows evidence of a layer of sand. The top of this sand horizon is benchmarked by borings SB-11 and SB-3. Above the sand unit are alternating layers of lacustrine clays and silts. Surrounding the current Route 22 bridge and the 1913 Route 22 bridge layers of fill were interpreted in the subsurface from the seismic data. The base of fill in the vicinity of the northern planned HDD route varies between approximately 50ft NAVD88 in the west and 0ft NAVD88 in the east. The base of fill horizon is variable along the pathway of the northern proposed HDD. Near the southern proposed HDD pathway, the base of fill ranges from approximately 40ft NAVD88 in the west to 80ft NAVD88 in the east. Recent sediments drape the top of fill at both proposed HDD pathways.

No existing discernable utilities were detected by inSight's investigation.

Upright pilings mapped by side-scan orthosonographs along the northern proposed HDD pathway may present obstacles to HDD installation. The pile-tip elevations are not measurable by the methods employed in this geophysical investigation. Upright piles cut below the waterline are visible in side-scan orthosonographs. Numerous hulls of wrecked vessels lie on the floor to the north of proposed northern HDD pathway. Six wrecks have been cataloged by the New York State Museum. These wrecks along with accumulated debris in the vicinity of the northern proposed HDD pathway limited the ability of the seismic pulses to penetrate the subsurface. There may be obstructions in the subsurface that lie below surface debris along the northern proposed HDD pathway not identified in this investigation.

To the south of the proposed southern HDD pathway on the eastern half of the crossing there are two discrete targets (Target 74 and Target 75) interpreted from the magnetic field data. inSight has interpreted these targets to be in the shallow subsurface; they are likely contained within the layer

of fill. inSight does not see evidence that the anomalies are related to components of the current Route 22 bridge.

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1.0 Introduction

Schnabel Engineering (Schnabel) is conducting a geophysical investigation in support of horizontal directional drill (HDD) design and construction in Whitehall NY. Schnabel contracted inSight, LLC (inSight) to conduct a geophysical investigation to collect single- and multibeam bathymetry, side-scan sonar, magnetic field, and reflection seismic in the vicinity of a horizontal directional drill for Hudson Power Express cable installation below Lake Champlain in the vicinity of the Route 22 bridge.

inSight's investigation includes single- and multibeam bathymetry, side-scan sonar, magnetic field, and reflection seismic. inSight also integrated historical surveys and existing geotechnical borings to aid in the interpretation of and provide context to map major stratigraphic horizons, locate the presence of existing utilities, and locate shallow obstructions to construction inside and outside the area of investigation (AOI). The area of investigation is shown in Figure 1. inSight conducted geophysical surveys, integrated data, and interpreted the results. The goal of the geophysical investigation was to support HDD design and construction.

The location of all data from the geophysical investigation are referenced to North American Datum of 1983 [NAD83 (2011)] New York State Plane East. The units are US Survey ft. All elevations are referenced to North American Vertical Datum of 1988 (NAVD 88).

Table 1. Project timeline.

Item	Tasks	Description	Completed
1	Mobilization	Mobilization of equipment & personnel to site.	2022.04.22
2	Field work	Geophysical field work completed	2022.04.25
3	Processing	Bathymetry	2022.05.15
4		Side scan	2022.05.15
5		Magnetic field	2022.05.15
6		Reflection seismology	2022.05.15
7	Integration	Processing, integration, and interpretation	2022.06.03
8	Report	Draft report	2022.06.10
9	Report	Final Report	2022.06.15

Figure 1. Location map.

2.0 Scope of Work

The following is the scope of work that defined the investigation at the beginning of the project. It is referenced in this report in the past tense. Section 3 on Methodology presents any additions or changes to the original scope of work.

The inSight team was to conduct the tasks presented below. The area of investigation, is located in the South Bay of Lake Champlain.

The following tasks will be performed:
Task 1 – Mobilization
Task 2 – Multibeam bathymetry acquisition and processing
Task 3 – Side-scan acquisition and processing
Task 4 – Magnetic field acquisition and processing
Task 5 – Seismic acquisition and processing
Task 6 – Data integration, interpretation, and mapping
Task 7 – Letter Report

2.1 Task 1 – Mobilization

Insight proposed to provide all personnel, equipment, and vessels necessary to perform the geophysical investigation.

2.2 Task 2 – Multibeam bathymetry

2.2.1 Multibeam bathymetry acquisition

inSight, LLC proposed to use an Edgetech 6205 multibeam echosounder to map the bathymetric elevations of the area of investigation. The MBES was to be paired with an RTK GNSS receiver with dual GPS antennae and an IMU. Data was to be collected and edited in Quinsy, PDS, or HYPACK software.

XYZ data output from processing software can be imported into AutoCAD, Microstation, ESRI, or other Geospatial Information System (GIS) software for presentation or integration for design purposes.

Four measurements are critical to establish elevation. These are: (1) velocity of sound in water, (2) travel time of acoustic wave from source to first break, (3) lever arm offsets and sensor calibration, and (4) water level (tide stage). inSight uses a Castaway CTD to measure the velocity of sound in water. Lever arm offsets are measured during the installation of the multibeam echo sounder (MBES), the inertial motion unit (IMU), and the GPS antennae. inSight records local water level measurements using Real Time Kinetic (RTK) Virtual Reference Station (VRS) GNSS aided GPS. inSight creates water level corrections for the waterline elevations in the area of investigation based on the RTK water levels and compares these to the water level data recorded at a local tide gauge. If no local tide gauge exists, inSight will set up a temporary gauge for the duration of survey activities.

Horizontal accuracy of the single beam bathymetry was predicted to be approximately +/- 0.2ft. Vertical accuracy was predicted to be approximately +/- 0.2ft. inSight also acquired single-beam bathymetry as a redundant supplement to multibeam bathymetry.

2.2.2 Multibeam bathymetry processing

Hypack combines position data with sensor data. Iterative patch testing was to be performed to ensure that the yaw, pitch, and roll values assigned to the sensor are accurate and that motion artifacts are minimized. Cursory analysis of the multibeam data focuses on identifying spurious data points (i.e., fish, debris, or aquatic vegetation) both manually and through statistical analysis of the dataset. Once the data are cleaned and all artifacts removed, the operator exports data as an average, median, and minimum XYZ file in a specified bin size (1ftx1ft or 3ftx3ft).

To create surface maps or contours of the XYZ point files, inSight uses Golden Software's Surfer to grid and contour the data. Surface maps are exported as geotiffs. Contours are exported as .dxf files. geotiff and .dxf files are then imported into QGIS and AutoCAD software to create maps and figures. XYZ point files were to be delivered with the final report.

2.3 Task 3 – Side-scan reflectivity mapping

2.3.1 Side-scan data acquisition

inSight planned to use an Edgetech 4205 or an Edgetech 6205 at 540kHz to produce side-scan orthosonographs™.

The side-scan sonar transmits ultrasonic waves obliquely into the water and measures the amplitude of the backscatter from the lake bottom as a function of range. The reflectivity is a function of the lake bottom roughness and the sediment acoustic properties. These reflectivity images produce a high-definition picture of the debris, structures, and sediments on the lake bottom.

inSight planned to survey the area of investigation with lines parallel to the Rt. 22 bridge. Line spacing was planned at 30ft spacing. Line spacing is designed to allow sufficient overlaps in coverage so that inSight can produce seamless orthosonographs that utilize the ideal ranges of the reflectivity data. Portions of the data where the signal attenuates beyond inSight standards are removed.

Horizontal accuracy of the side-scan measurements is approximately +/- 6ft. Side-scan measurements require at least 6ft of water to effectively measure the river floor reflectivity.

2.3.2 Side-scan reflectivity data processing

Side-scan images produce 100% coverage with 100% redundancy and 200% overlap of the lake bottom in the areas of investigation. The two independent orthosonographs insonified from two directions suffice to constitute the 200% redundancy. Orthosonographs are seamless aerial-photograph-like images that are insonified from one direction only. The resolution of inSight orthosonographs is 0.3ft per pixel.

2.4 Task 4 – Magnetic field mapping

2.4.1 Magnetic field data acquisition

To identify utilities and ferromagnetic obstructions to drilling and HDD construction, inSight measures local anomalies in the Earth's magnetic field using a Geometrics G-882 cesium magnetometer with a depth sensor and altimeter. Magnetometers are towed at least 100ft behind the vessel and between 5-15ft above the lake floor. Magnetometer lines will be parallel and perpendicular to the bridge and will be spaced to provide sufficient overlap in coverage.

Horizontal accuracy of the magnetic field measurements is approximately +/- 5ft. Magnetic field measurements require at least 4ft of water to effectively deploy and tow gear.

2.4.2 Magnetic field data processing

The data is evaluated line by line. The evaluation removes any measurement artifacts. The data is gridded using triangulation with linear interpolation. Derivatives of the magnetic field data are mapped to see greater detail in areas of large total magnetic field deviation.

2.5 Task 5 – Reflection seismology

2.5.1 Seismic reflection data acquisition

inSight proposed to employ an Edgetech SB-512i Sub Bottom Profiler. Reflection seismic works like single-beam bathymetry. The much lower frequency seismic waves, however, penetrate the mudline and reflect off the strata in the subsurface. Reflection seismology provides cross sections of the strata and when multiple lines are interpreted, seismic data yields surfaces that are interpolated between data points.

Horizontal accuracy of the reflection seismic measurements is approximately +/- 5ft. At best, accuracy in the vertical elevation of seismic results is approximately 0.5-1.0ft for every 10ft of penetration into the lake floor. Seismic measurements require at least 6ft of water to safely navigate.

2.5.2 Seismic reflection data processing

inSight processes the seismic lines using wave-equation migration. Every seismic section is migrated according to a constant velocity model using water velocities measured on site during the seismic survey.

Geological interpretation of reflection seismology requires physical confirmation by SPT boring or another subsurface sample types.

2.6 Task 6 – Data integration, interpretation, and mapping

After processing each single-tool measurement, inSight was to integrate each data type into Kingdom seismic processing software and GIS and AutoCAD spatial reference software. inSight uses redundant measurements to quantify all results. Each survey is calibrated in the local area with a proprietary test. All measurements are processed independently and integrated into a single geo-reference frame after processing. Redundant measurements (repeat lines or scans) quantify the precision and delineate uncertainty in the measurements. Repeat lines are not always delivered to the client but are available for review upon request.

Side-scan results were to be interpreted for geomorphology, sediment type, obstructions, utilities, and infrastructure. Seismic data were to be interpreted to delineate major stratigraphic units and shallow subsurface obstructions. Magnetic data were to be interpreted for indications of utilities and ferrous targets.

At each stage of the workflow inSight data retains its geo-referenced location.

inSight produces a series of surface maps, contours, and ASCII text files from the bathymetry. Orthosonographs provide detailed images beyond the bathymetry. Geotiffs are delivered to the client and can be inserted into AutoCAD, ESRI, or other GIS software. Magnetometer results are overlaid on the orthosonographs to show where the magnetic anomalies appear. Magnetic field contours can be delivered as .dxf or as geotiffs. Target maps are created that identify and categorize both geomorphic and anthropomorphic features on or above the lake floor. Targets are presented in tables, as maps, and as .dxf files.

2.7 Task 7 – Letter report

A letter report is to include PDF figures of all primary results. The report is to state the scope of work, methodology, results, and major conclusions from the investigation.

<u>Method applied</u>
Multi-beam bathymetry
Horizontal accuracy ~ ±0.2ft
Vertical accuracy~ ±0.2ft

Sub-bottom reflection seismology (10kHz)
Horizontal accuracy ~ ±1.5ft with dGPS
Vertical accuracy ~ ±1.0ft for every 10ft of penetration.
Vertical precision ~ ±0.5ft

By correlating the measurements, inSight estimates the following:
Subsurface horizontal accuracy ~ ±5ft
Subsurface vertical accuracy ~ ±1.0ft for every 10ft of penetration.
Subsurface vertical precision ~ ±0.5ft

3.0 Methodology

3.1 Task 1 – Mobilization

inSight mobilized survey equipment, a shallow-draft survey vessel and a crew of three persons to the project site without incident.

3.2 Task 2 – Multibeam bathymetry

3.2.1 Multibeam bathymetry acquisition

inSight used an Edgetech 6205 to map the bathymetric elevations of the area of investigation. The multibeam echo sounder (MBES) was paired with an RTK GNSS receiver with dual GPS antennae and an IMU. Data was collected and edited in HYPACK software. In addition to collecting bathymetry data with a MBES, inSight also used a single-beam echo sounder for quality assurance and quality control.

Four measurements are critical to establish elevation. These are: (1) velocity of sound in water, (2) travel time of acoustic wave from source to first break, (3) lever arm offsets and sensor calibration, and (4) water level (tide stage). inSight used a castaway CTD to measure the velocity of sound in water. Lever arm offsets were measured during the installation of the multibeam echo sounder (MBES), the inertial motion unit (IMU), and the GPS antennae. inSight recorded local water level measurements using Real Time Kinetic (RTK) Virtual Reference Station (VRS) GNSS aided GPS. inSight creates water level corrections for the waterline elevations in the area of investigation based on the RTK water levels and compares these to the water level data recorded at a local tide gauge.

inSight acquired the MBES bathymetric data using Hypack's Hysweep software.The MBES line spacing for the project was 30ft; inSight monitored coverage during the survey and adjusted spacing to approximately 15ft in the shallower sections of the area of investigation.

3.2.2 Multibeam data processing

Multibeam data processing was completed using Chesapeake Sonar Wiz. Data was processed in two basic steps. During the first step, the operator performs QC checks of the position, elevation, and vessel sensor attitude data from the GPS and IMU collected by Edgetech's Discover software. Sound velocity profiles and water level correction profiles were also generated and applied to the multibeam data at this stage. Once all peripheral data was acceptable, the workflow progressed to the combination of position data with sensor data. During the second step, sonar data is integrated with the multibeam sensor data. Iterative patch testing is performed to ensure that the yaw, pitch, and roll values assigned to the sensor are as accurate as possible and that motion artifacts are minimized. Cursory analysis of the multibeam data was focused on identifying spurious data points (i.e., fish, debris, or aquatic vegetation) both manually and through statistical analysis of the dataset. Once the data was cleaned and all artifacts were removed the operator exported the data as median XYZ file in a 1ft x 1ft and 3ftx3ft bin size.

Horizontal accuracy of the single beam bathymetry was approximately +/- 0.2ft. Vertical accuracy was approximately +/- 0.2ft.

The resulting XYZ ASCII text files output from Sonar Wiz software were used to create 3D contours as .dxf and surface maps that are presented in this report as figures. Additionally, geotiffs of the bathymetry surface maps are available. inSight produced 1ft contours of the average elevation per 1ftx1ft bin referenced to North American Datum of 1983 (NAD83 (2011)) New York State Plane East. The units are US Survey ft. All elevations are referenced to North American Vertical Datum of 1988 (NAVD 88).

To create surface maps or contours of the XYZ point files, inSight used Golden Software's Surfer to grid, tin, and contour the data. Surface maps were exported as geotiffs. Contours were exported as .dxf files, geotiff, and .dxf files are then imported into AutoCAD to create maps and figures. XYZ point files will be delivered with the final report.

3.3 Task 3 – Side-scan reflectivity mapping

3.3.1 Side-scan data acquisition

inSight used an Edgetech 6205 at 540kHz to produce side-scan orthosonographs™.

The side-scan sonar transmits ultrasonic waves obliquely into the water and measures the amplitude of the backscatter from the lake bottom as a function of range. The reflectivity is a function of the lake bottom roughness and the sediment acoustic properties. These reflectivity images produce a high-definition picture of the debris, structures, and sediments on the lake bottom.

inSight surveyed the area of investigation with lines parallel to the Rt. 22 Bridge. In the deeper areas of the investigation lines were spaced 30ft apart. In shallower areas, survey lines were spaced approximately 15ft apart. Line spacing is designed to allow sufficient overlaps in coverage so that inSight can produce seamless orthosonographs that utilize the ideal ranges of the reflectivity data. Portions of the data where the signal attenuates beyond inSight standards were removed.

Horizontal accuracy of the side-scan measurements is approximately +/- 6ft.

3.3.2 Side-scan reflectivity data processing

Side-scan images produce 100% coverage with 100% redundancy and 200% overlap of the lake bottom in the area of investigation. The two independent orthosonographs insonified from two directions suffice to constitute the 200% redundancy. Orthosonographs are seamless aerial-photograph-like images that are insonified from one direction only. The resolution of inSight orthosonographs is 0.3ft per pixel.

3.4 Task 4 – Magnetic field mapping

3.4.1 Magnetic field data acquisition

To identify utilities and ferromagnetic obstructions to drilling and construction, inSight measured local anomalies in the Earth's magnetic field using a Geometrics G-882 cesium magnetometer with a depth sensor and altimeter. The magnetometer was towed at least 100ft behind the vessel and between 5-15ft above the lake floor. The magnetometer lines were parallel and perpendicular to the bridge and were spaced to provide sufficient overlap in coverage.

Horizontal accuracy of the magnetic field measurements was approximately +/- 5ft.

3.4.2 Magnetic field data processing

The magnetic field data was evaluated line by line. The evaluation removes any measurement artifacts. The data was gridded using triangulation with linear interpolation. inSight determined that the mapping of derivatives of the magnetic field data did not yield information not contained in the magnetic field contours.

3.5 Task 5 – Reflection seismology

3.5.1 Seismic reflection data acquisition

inSight used an Edgetech SB-512i and implemented multiple frequencies to map the subsurface in the AOI. inSight selected the 1-10kHz pulse to image and interpret recent sediment thickness in the shallow subsurface. inSight used the 0.5-6kHz and 0.5-2.7kHz pulses to investigate the total sediment thickness.

inSight acquired a total of 85 piezoelectric seismic profiles in the AOI: 27 tracklines are along 9 survey lines perpendicular to the bridge, and 58 are along 20 survey lines parallel to the bridge. Figure 2 plots the seismic reflection tracklines where data were acquired during the investigation. Note that inSight acquired data at different frequencies on different lines. Table 2 summarizes the sub-bottom data collected.

Horizontal accuracy of the reflection seismic measurements is approximately +/- 5ft. Under ideal conditions, vertical accuracy is approximately +/- 1ft per 10ft of penetration.

3.5.2 Seismic reflection data processing

inSight processed the navigation data to produce a navigation point for every seismic trace. inSight filtered the seismic data using both frequency bandpass and derivative filters. The data were also deconvolved and processed with automatic gain control, then split between real and imaginary components. The real component seismic data were migrated using a constant velocity model that used water velocities measured on site with the CastAway CTD during the seismic survey. We used constant velocity Stolt time migration, before and after automated gain control, then converted

to depth. The seismic data were interpreted in the Kingdom Suite interpretation system. inSight used the bathymetry data result to adjust the mudline in the sub-bottom profiles.

Using processed data collected with the single channel zero offset chirp sub-bottom profiler (SB-512i), inSight was able to delineate major stratigraphic horizons up to ~300ft below the lake floor. inSight's processing techniques were critical to achieve the results presented herein.

Table 2. Summary of reflection seismic survey types.

Pulse Frequency	Line Type		Number of profiles surveyed
1.0 to 10 kHz	parallel line		18
1.0 to 10 kHz	perpendicular line		9
0.5 to 6.0 kHz	parallel line		20
0.5 to 6.0 kHz	perpendicular line		9
0.5 to 2.7 kHz	parallel line		20
0.5 to 2.7 kHz	perpendicular line		9

3.6 Task 6 – Data integration, interpretation, and mapping

After processing each single-tool measurement, inSight integrated all the data with existing borings (provided by Schnabel) into Kingdom Suite seismic processing software and GIS and AutoCAD spatial reference software. inSight used the borings provided by Schnabel to guide geological interpretation of stratigraphy in the seismic data.

The features on the floor of the South Bay of Lake Champlain were interpreted and outlined using bathymetry and side-scan orthosonographs.

The XYZ positions of the features and targets identified in the target map are based on the bathymetry data.

High-definition mapping determines the horizontal and vertical locations of features on the surface and of interfaces in the subsurface. Marine geophysics provides cross sections with repeatable accuracy of ±1ft vertically for every 10ft of penetration (below the lake floor) and ±3.0ft or better horizontally.

<u>Method applied</u>
Multi-beam bathymetry
Horizontal accuracy ~ ±0.2ft
Vertical accuracy~ ±0.2ft

Side scan orthosonography
Horizontal accuracy ~ ±5 ft
Vertical accuracy~ n.a.

Magnetic field mapping
Horizontal accuracy ~ ±5.0ft

Sub-bottom reflection seismology

Horizontal accuracy ~ ±1.5ft with dGPS
Vertical accuracy ~ ±1.0ft for every 10ft of penetration.
Vertical precision ~ ±0.5ft

By correlating the measurements, inSight estimates the following:
Subsurface horizontal accuracy ~ ±5ft
Subsurface vertical accuracy ~ ±1.0ft for every 10ft of penetration.
Subsurface vertical precision ~ ±0.5ft

3.7 Task 7 – Report

The draft report was presented to Schnabel on June 10, 2022. The final report was delivered to Schnabel on June 15, 2022.

Figure 2. Seismic tracklines.

4.0 Results

Schnabel Engineering (Schnabel) is conducting a geophysical investigation in support of horizontal directional drill (HDD) design and construction in Whitehall NY. Schnabel contracted inSight, LLC (inSight) to conduct a geophysical investigation to collect single- and multibeam bathymetry, side-scan sonar, magnetic field, and reflection seismic in the vicinity of a horizontal directional drill for Hudson Power Express cable installation below Lake Champlain in the vicinity of the Route 22 bridge.

inSight's investigation includes single- and multibeam bathymetry, side-scan sonar, magnetic field, and reflection seismic. inSight also integrated historical surveys and existing geotechnical borings to aid in the interpretation of and provide context to map major stratigraphic horizons, locate the presence of existing utilities, and locate shallow obstructions to construction inside and outside the area of investigation (AOI). inSight conducted geophysical surveys, integrated data, and interpreted the results. The goal of the geophysical investigation was to support HDD design and construction.

The location of all data from the geophysical investigation are referenced to North American Datum of 1983 [NAD83 (2011)] New York State Plane East. The units are US Survey ft. All elevations are referenced to North American Vertical Datum of 1988 (NAVD 88).

inSight used existing borings to design survey lines, define the parameters of the seismic investigation, and guide preliminary interpretation of seismic data

inSight conducted geophysical investigations between April 23rd and April 25th, 2022. inSight surveyed the area during a period of high water. The water level at the time of survey was approximately 3 feet above normal. The relatively high water level allowed inSight to cover more of the area of investigation from bank to bank than previously expected.

Top of rock was not interpreted in the seismic record. Between approximately -150ft NAVD88 and -225ft NAVD88 seismic data shows evidence of a layer of sand. The top of this sand horizon is benchmarked by borings SB-11 and SB-3. Above the sand unit are alternating layers of lacustrine clays and silts. Below the current Route 22 bridge and the 1913 Route 22 bridge layers of fill are visible in the seismic data. The base of fill in the vicinity of the northern planned HDD route varies between approximately 50ft NAVD88 and 0ft NAVD88 in the west. The base of fill horizon is variable along the pathway of the northern proposed HDD. Near the southern proposed HDD pathway, the base of fill ranges from approximately 40ft NAVD88 in the west to 80ft NAVD88 in the east. Recent sediments drape the top of fill at both proposed HDD pathways.

No existing discernable utilities were detected by inSight's investigation.

Upright pilings mapped by side-scan orthosonographs along the northern proposed HDD pathway may present obstacles to HDD installation. The pile-tip elevations are not measurable by the methods employed in this geophysical investigation. Upright piles cut below the waterline are visible in side-scan orthosonographs. Numerous hulls of wrecked vessels lie on the floor to the north of proposed northern HDD pathway. Six wrecks have been cataloged by the New York State Museum. These wrecks along with accumulated debris in the vicinity of the northern proposed HDD pathway limited the ability of the seismic pulses to penetrate into the subsurface.

To the south of the proposed southern HDD pathway on the eastern half of the crossing there are two discrete targets (Target 74 and Target 75) that were interpreted from the magnetic field data. inSight has interpreted these targets to be in the shallow subsurface; they are likely contained within

the layer of fill. inSight does not see evidence that the anomalies are related to components of the current Route 22 bridge.

4.1 Bathymetry

Multibeam bathymetry data were collected between April 23 and April 25, 2022. The bathymetry was binned and gridded in 1ftx1ft cells. The bathymetry surface map is shown in Figure 3.

4.1.1 Bathymetry data coverage

Higher than normal lake levels, between 98.5ft NAVD88 and 98.9ft NAVD88 allowed for better-than-expected coverage of the shallow areas in South Bay.

Figure 3. Bathymetry surface map.

4.2 Side-scan orthosonography

Side-scan data were collected at the same time as the MBES data on April 23rd, 2022. The survey lines were parallel to the bridge, approximately east-west, so the lake bottom was insonified, or "illuminated," from the north and from the south. The survey lines did not exceed 40ft spacing.

Figure 4 shows the orthosonograph insonified from the north. Figure 5 shows the orthosonograph insonified from the south. Figure 6 displays the targets and lake-bottom sediment types interpreted from the side-scan orthosonograph. Three lake-bottom sediment types were interpreted in the orthosonographs: rough and discontinuous surface with coarse to fine sediments including boulders and debris; smooth continuous surface, the uppermost soft fine sediments; and fill, with riprap and coarse material on slopes of bridge berms.

The orthosonographs provide detailed information on the character of the lake bottom, supplementing the multibeam bathymetry data in locating and identifying debris (e.g., old pier pilings, construction debris, shipwrecks) on the lake bottom. Numerous hulls of wrecked vessels lie on the floor to the north of proposed northern HDD pathway. Six wrecks have been cataloged by the New York State Museum.

The side-scan orthosonographs mapped upright pilings along the northern proposed HDD pathway. The pile-tip elevations are not measurable by the measurements employed in this geophysical investigation. Upright piles cut below the waterline are visible in side-scan orthosonographs.

Figure 4. Orthosonograph insonified from north.

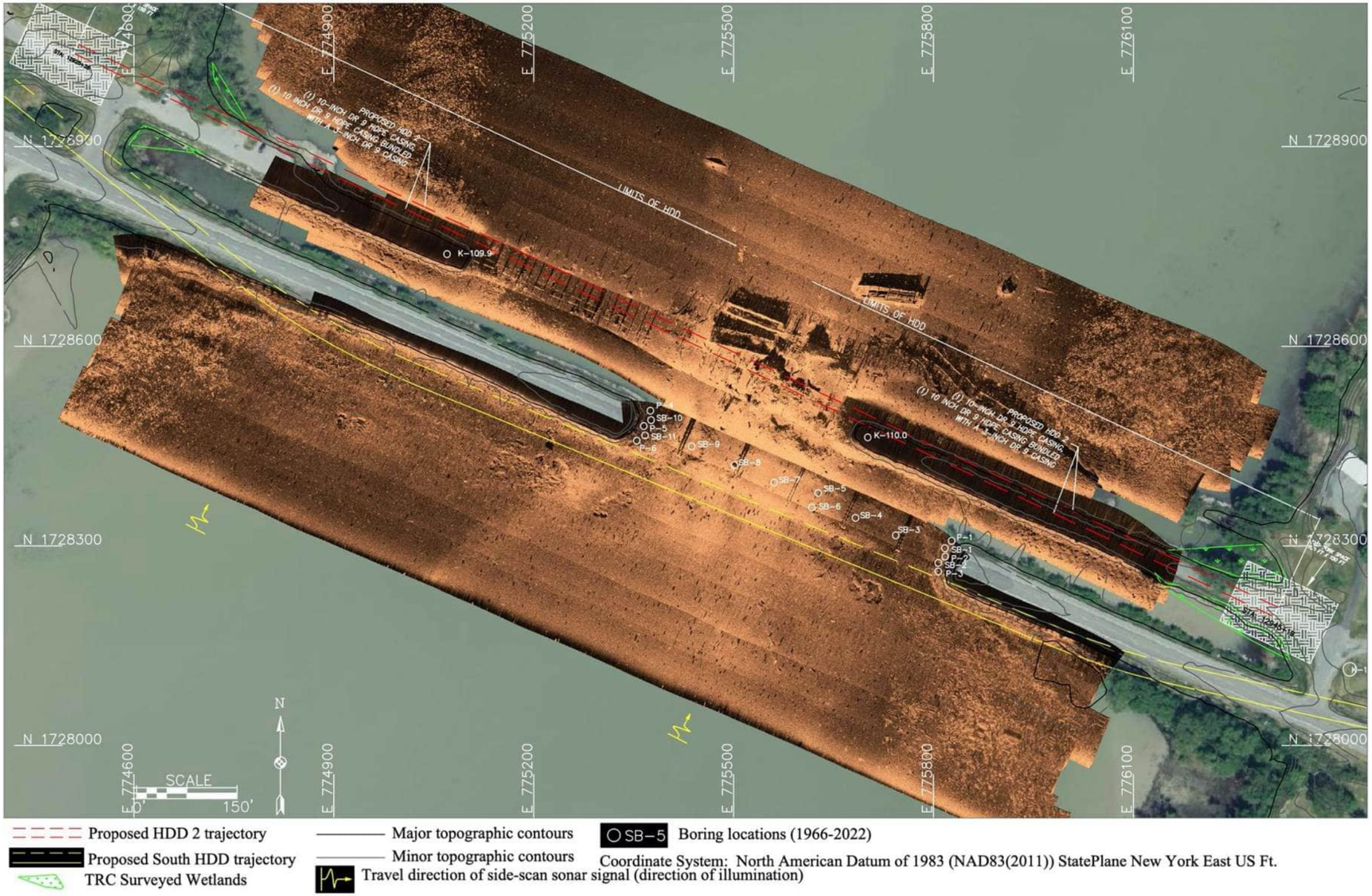


Figure 5. Orthosonograph insonified from south.

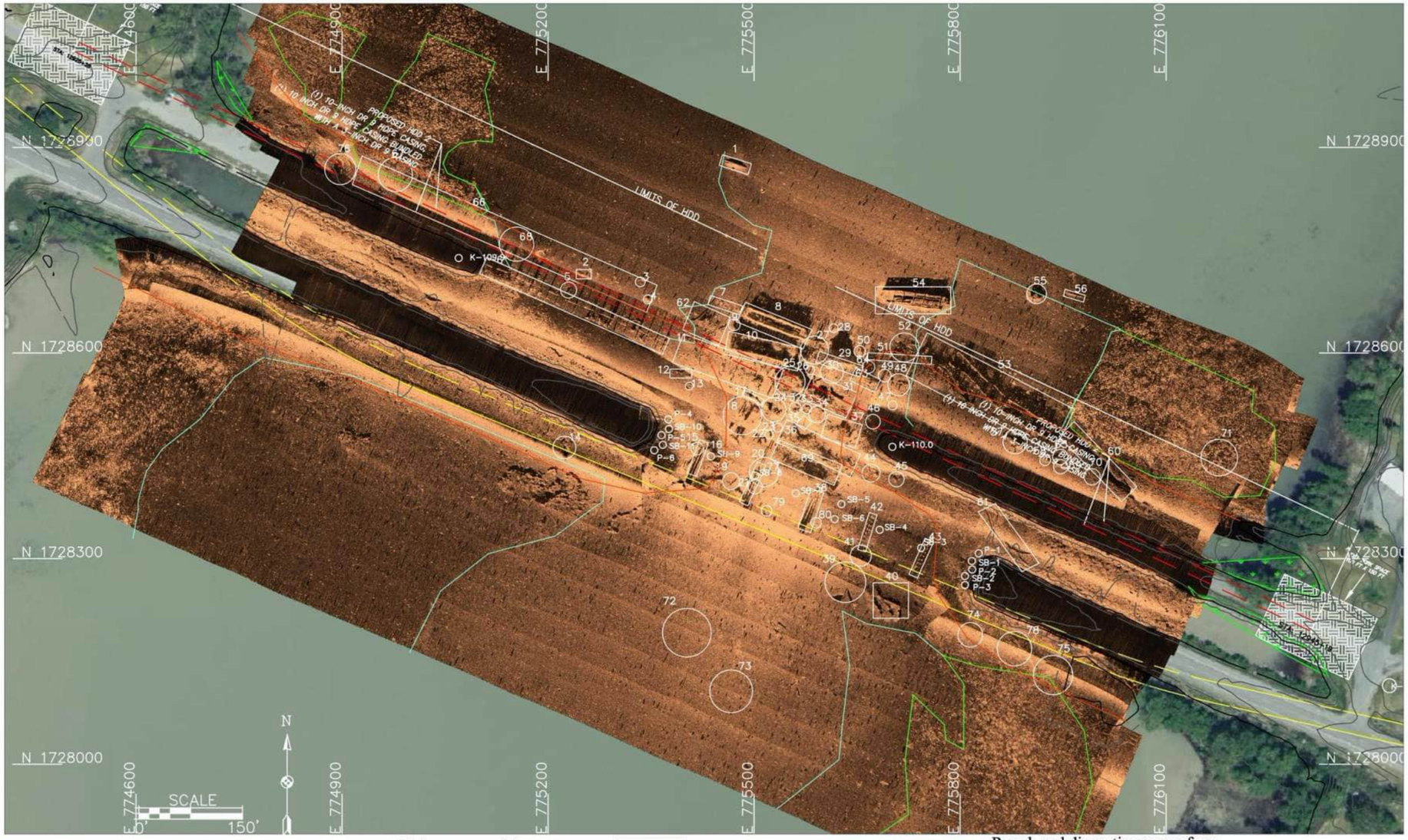


Figure 6. Sediment types and targets interpreted from reflectivity.

4.3 Magnetic field mapping

inSight interpreted the total magnetic field data. inSight determined that the mapping of derivatives of the magnetic field data did not yield information not contained in the magnetic field contours.

Figure 7 shows the total magnetic field data mapped with contours every 50nT. Figure 8 shows the magnetic field ribbon map.

Magnetic field mapping identified numerous anomalies in the vicinity of the northern proposed HDD pathway. Magnetic signatures of the submerged wrecks aligned with features interpreted in the side-scan and multibeam maps. The current Route 22 bridge has a significant magnetic signature. There are two discrete targets (Targets 74 and 75) to the south of the southern proposed HDD pathway on the east side of South Bay that inSight interprets to be in the shallow subsurface. inSight does not see evidence that the anomalies are related to components of the current Route 22 bridge.

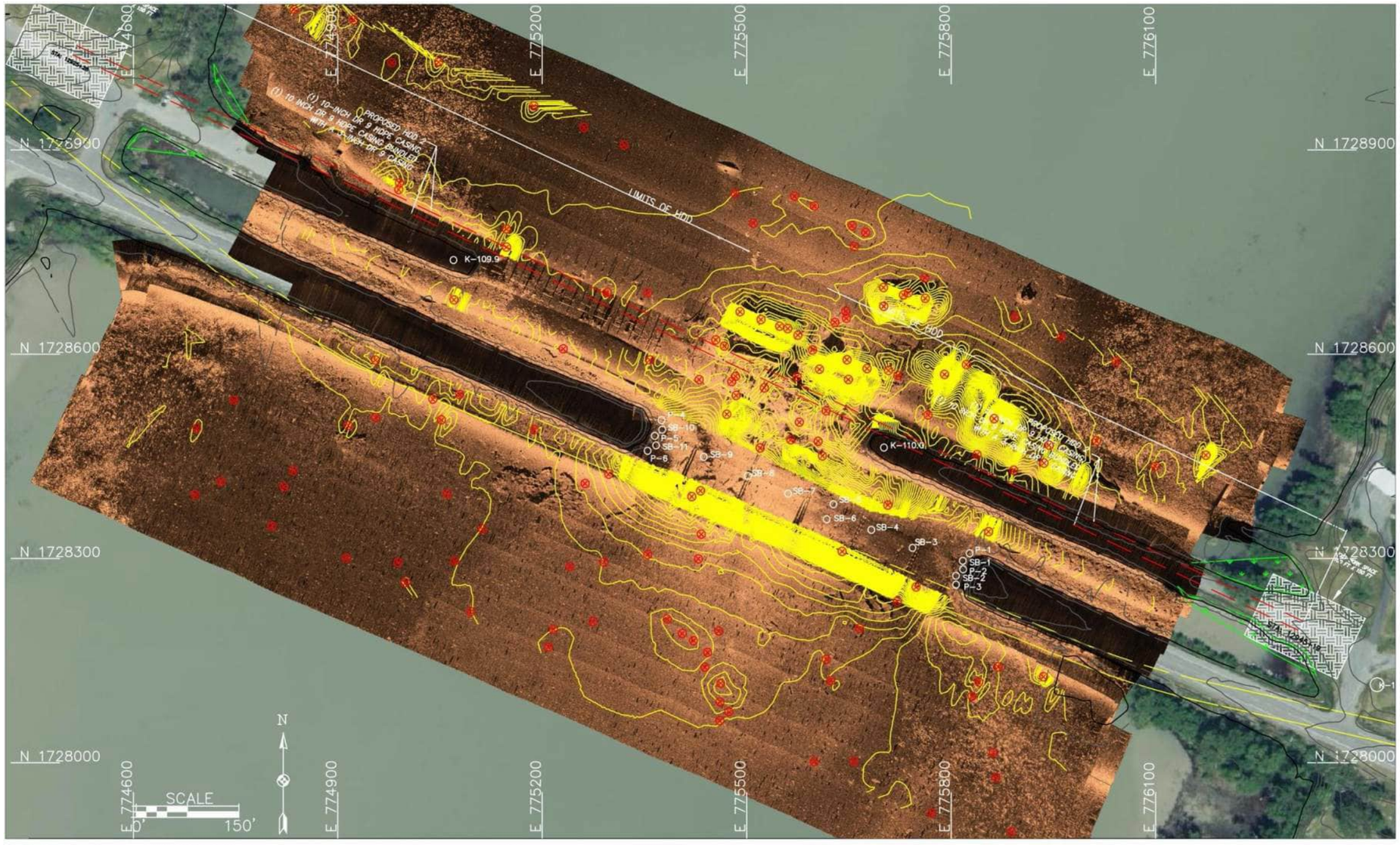


Figure 7. Magnetic field contour map and magnetometer anomaly picks on orthosonograph. Contour interval is 50nT.

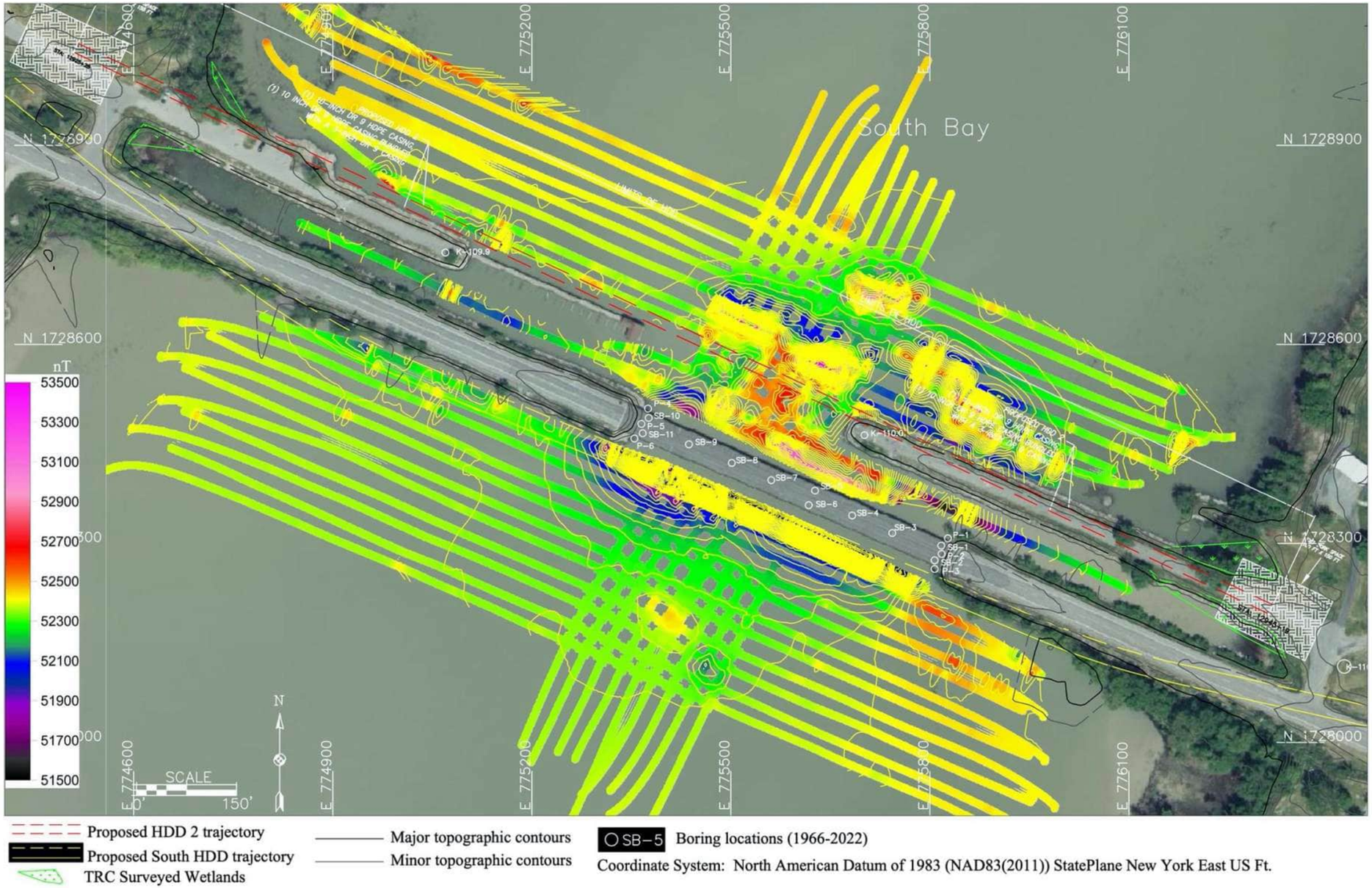


Figure 8. Magnetic field ribbon map with contours. Contour interval is 50nT.

4.4 Seismology

inSight acquired a total of 85 piezoelectric seismic data within the AOI; 27 of these lines are perpendicular to the bridge and 58 are parallel to the bridge. Figure 2 plots the piezoelectric seismic tracklines where data were acquired during the investigation. inSight acquired data at different frequencies on different lines.

Using processed data collected with the single channel zero offset chirp sub-bottom profiler (SB-512i) used for this survey, inSight was able to delineate major stratigraphic horizons, from oldest to youngest:

1. The top of sand which underlies a unit of alternating lacustrine clays and silts,
2. the top of alternating lacustrine clays and silts,
3. an approximation of the base of fill and riprap,
4. the top of fill and riprap.

Top of rock was not interpreted in the seismic record.

The seismic method has limitations: Numerous hulls of wrecked vessels lie on the floor to the north of proposed northern HDD pathway. Wrecks along with accumulated debris in the vicinity of the northern proposed HDD pathway limited the ability of the seismic pulses to penetrate into the subsurface.

Figure 9 is a map that plots the locations of the interpreted seismic profiles along the proposed northern and southern HDD pathways. Figures 10 and 11 are interpreted seismic profiles perpendicular to the length of the lake (parallel to the bridge). Figure10 plots a cross sectional stratigraphic profile in the vicinity of the proposed northern HDD. Figure 11 plots a cross sectional stratigraphic profile in the vicinity of the proposed southern HDD.

Between approximately -150ft NAVD88 and -225ft NAVD88 seismic data shows evidence of a layer of sand. The top of this sand horizon is benchmarked by borings SB-11 and SB-3. Above the sand unit are alternating layers of lacustrine clays and silts.

Surrounding the current Route 22 bridge and the 1913 Route 22 bridge layers of fill were interpreted in the subsurface from the seismic data. The base of fill in the vicinity of the northern planned HDD route varies between approximately 50ft NAVD88 in the west and 0ft NAVD88 in the east. The base of fill horizon is variable along the pathway of the northern proposed HDD.

Near the southern proposed HDD pathway, the base of fill ranges from approximately 40ft NAVD88 in the west to 80ft NAVD88 in the east. Recent sediments drape the top of fill at both proposed HDD pathways.

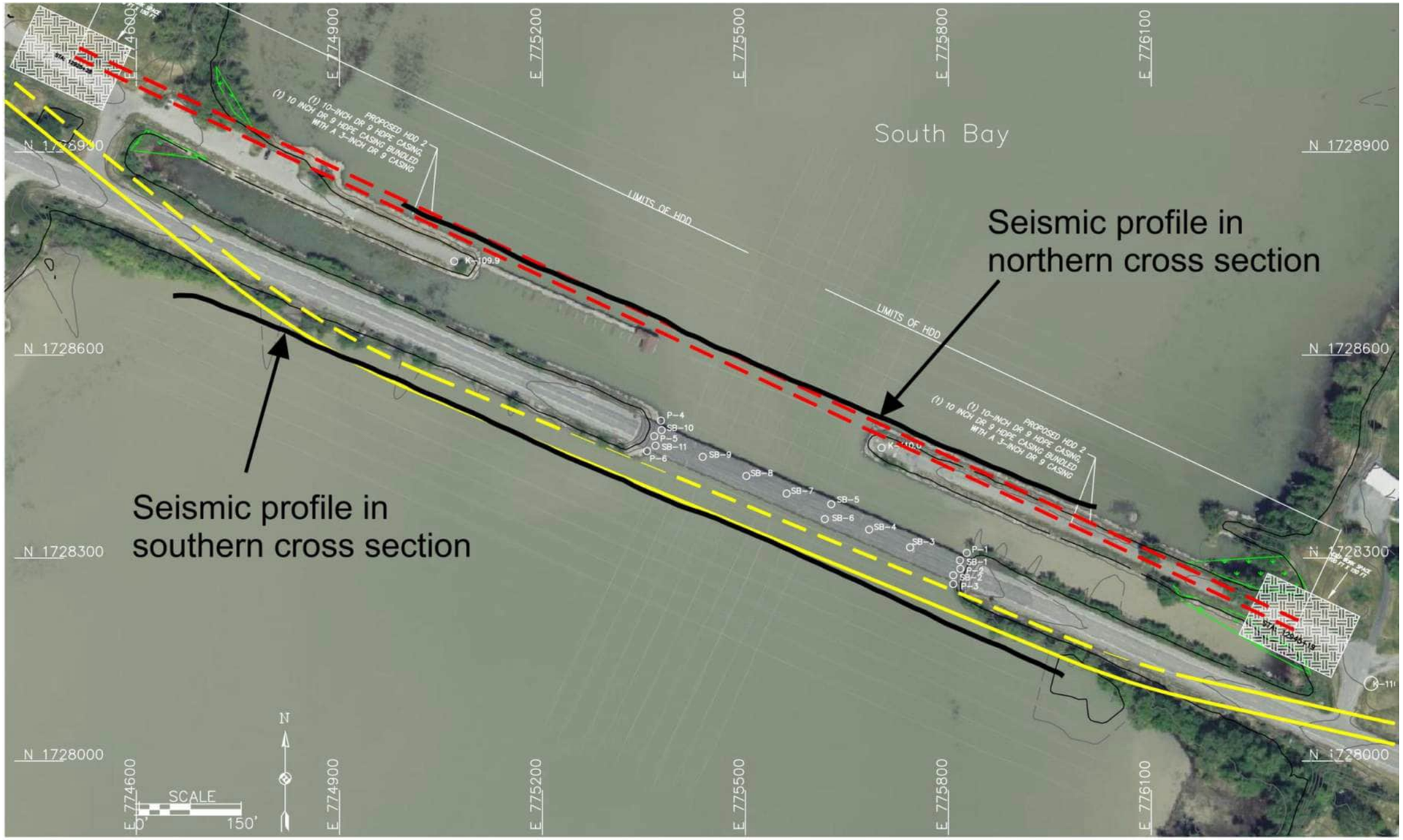


Figure 9. Location map of northern and southern interpreted cross sections.

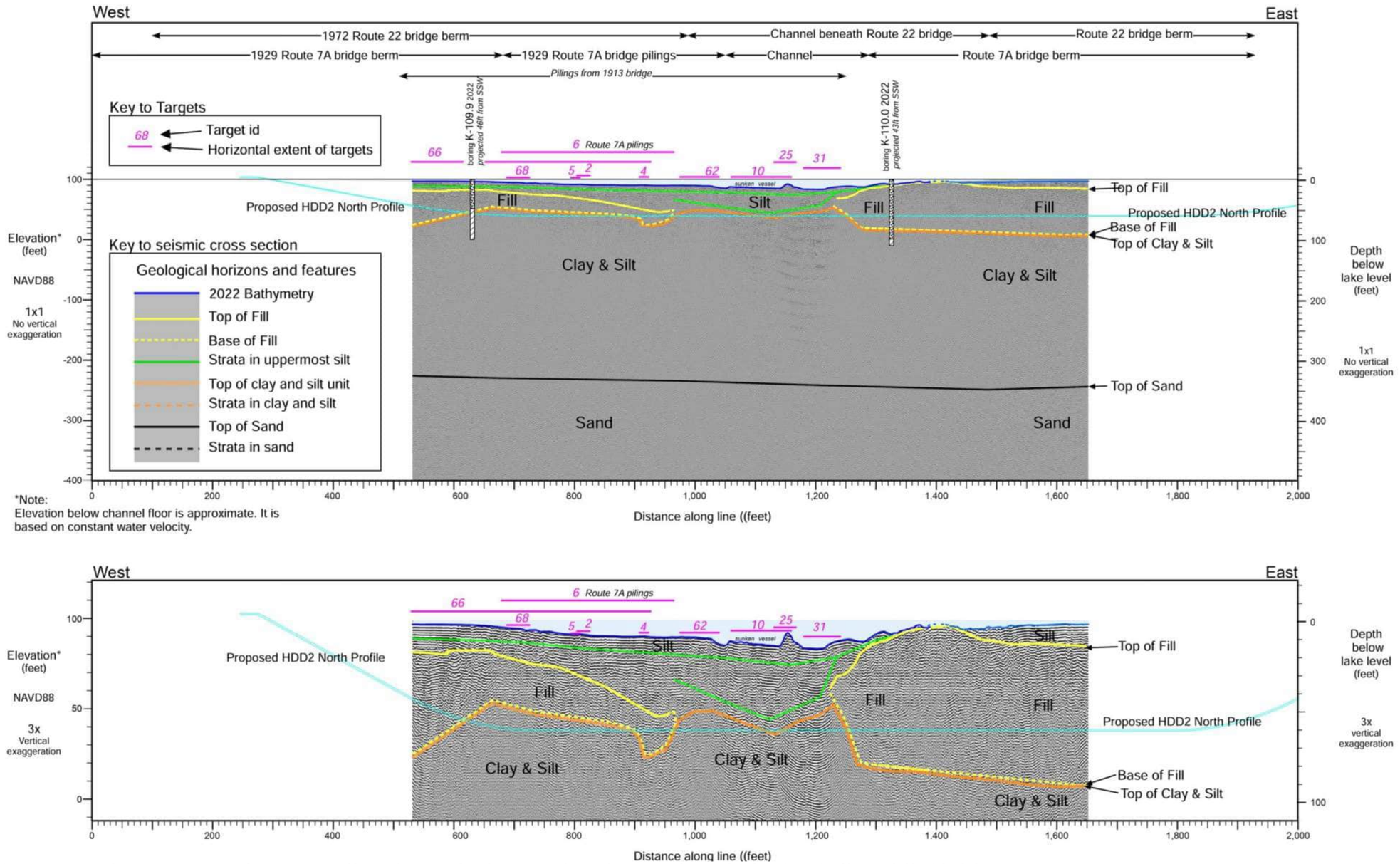


Figure 10. Interpreted west-east cross section from a seismic profile near the proposed northern HDD pathway. Planimetrics of HDD taken from AutoCAD file provided by Schanbel.

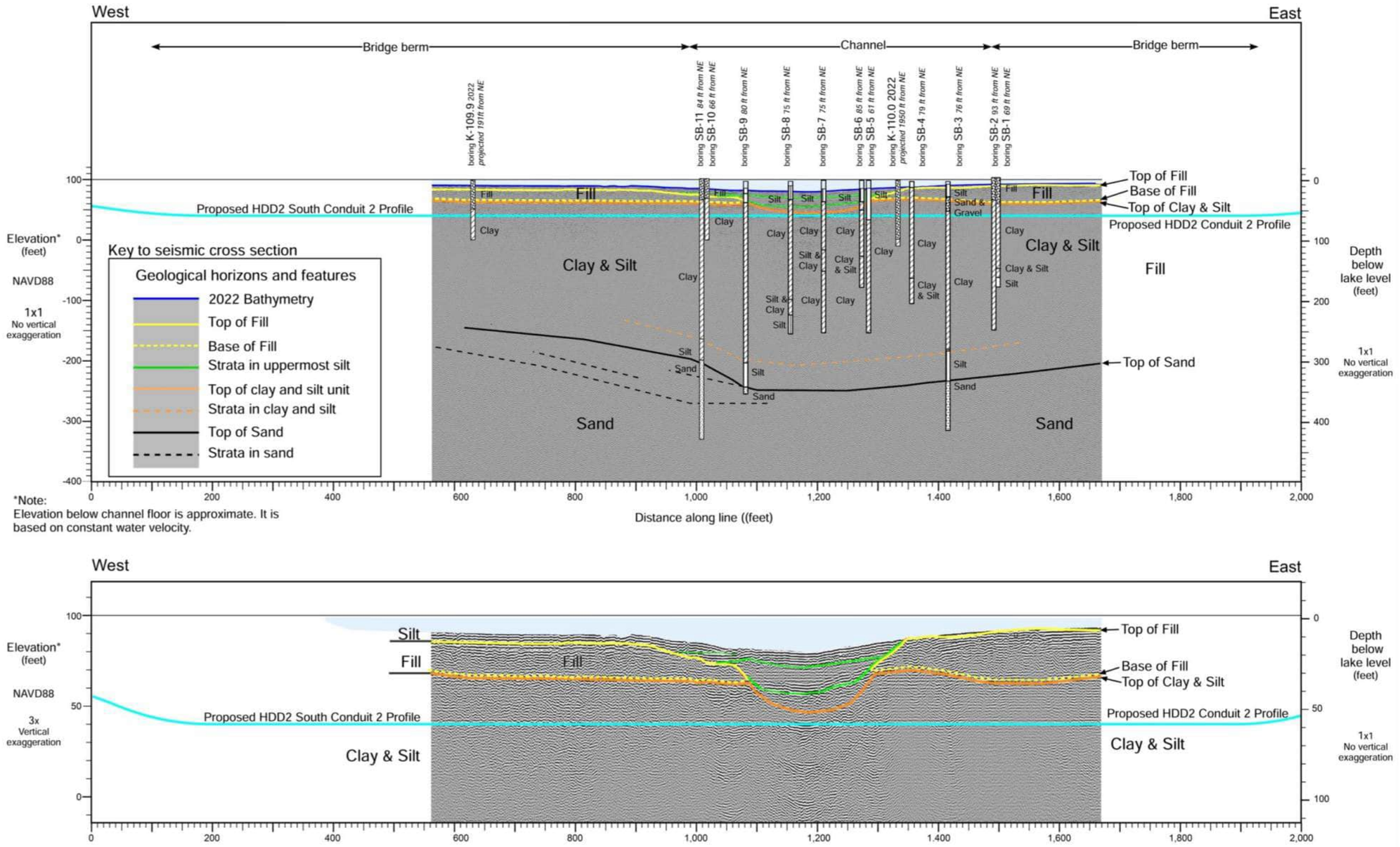


Figure 11. Interpreted west-east cross section from a seismic profile near the proposed southern HDD pathway. Planimetrics of HDD taken from AutoCAD file provided by Schanbel.

4.5 Integration of data and geologic interpretation

Top of rock was not interpreted in the seismic record. Between approximately -150ft NAVD88 and -225ft NAVD88 seismic data shows evidence of a layer of sand. The top of this sand horizon is benchmarked by borings SB-11 and SB-3. Above the sand unit are alternating layers of lacustrine clays and silts. Below the current Route 22 bridge and the 1913 Route 22 bridge layers of fill are visible in the seismic data. Recent sediments drape the top of fill at both proposed HDD pathways. Figure 12 is a surface map that plots the interpreted base of fill in the area of investigation. Figure 13 is a surface map that plots the interpreted top of fill in the area of investigation.

Lake-bottom sediment types were interpreted from the side-scan reflectivity data. Three lake-bottom sediment types were interpreted in the orthosonographs: rough and discontinuous surface with coarse to fine sediments including boulders and debris; smooth continuous surface, the uppermost soft fine sediments; and fill, with riprap and coarse material on slopes of bridge berms.

The orthosonographs provide detailed information on the character of the lake bottom, supplementing the multibeam bathymetry data in locating and identifying debris (e.g., old pier pilings, construction debris, shipwrecks) on the lake bottom.

Upright pilings mapped by side-scan orthosonographs along the northern proposed HDD pathway may present obstacles to HDD installation. The pile-tip elevations are not measurable by the methods employed in this geophysical investigation. Upright piles cut below the waterline are visible in side-scan orthosonographs.

The integrated interpretation provides the following overview of interpreted obstructions to the proposed HDD construction:

Along the northern proposed HDD route, fill is deep along the alignment. The base of fill horizon is variable along the pathway of the northern proposed HDD. The base of fill in the vicinity of the northern planned HDD route varies between approximately 50ft NAVD88 and 0ft NAVD88 in the west. Fill is deepest on the eastern half of the alignment north of the 1913 construction of the Route 22 bridge. Piles exist along the length of the northern proposed HDD pathway. Pile-tip elevations are unknown. Debris and shipwrecks compromise seismic data along the northern proposed HDD pathway.

Along the southern proposed HDD route, the elevation of the base of fill is close to the elevation of the southern proposed HDD pathway. Near the southern proposed HDD pathway, the base of fill ranges from approximately 40ft NAVD88 in the west to 80ft NAVD88 in the east. Two discrete magnetic field anomalies (Targets 74 and 75) were identified south of the southern proposed HDD pathway on the eastern side of the lake. inSight interprets these anomalies to be in the shallow subsurface within the layer of fill. inSight does not see any evidence that these anomalies are related to components of the existing Route 22 bridge.

Figure 14 plots the targets of interpreted from side-scan orthosonographs, magnetic field data, and seismic profiles. Table 3 tabulates target location and best possible description.

Table 3. Target list.

Target number	Target	bathymetry	side-scan	magnetometer	seismic	Utility	sunken vessel	Description	point number	Corner or center point Easting	Corner or center point Northing	Circle Diameter(ft)	Length	Width
		Y=yes; N=no; n.a..= not applicable; P=partial: ? = unknown								NYSP E USft	NYSP E USft			
Target										Easting	Northing			
1	Elongated debris	Y	Y	n.a.				Debris	1a	775454	1728889	n.a.	44	17
1									1b	775496	1728876	n.a.	n.a.	n.a.
1									1c	775491	1728860	n.a.	n.a.	n.a.
1									1d	775449	1728874	n.a.	n.a.	n.a.
2	Area of debris	Y	Y					Debris	2a	775263	1728722	n.a.	22	14
2									2b	775263	1728708	n.a.	n.a.	n.a.
2									2c	775241	1728708	n.a.	n.a.	n.a.
2									2d	775241	1728722	n.a.	n.a.	n.a.
3	Area of debris	Y	Y					Debris	3	775334	1728704	14	n.a.	n.a.
4		Y	Y						4	775345	1728678	13	n.a.	n.a.
5		Y	Y						5	775230	1728692	23	n.a.	n.a.
6	Piles under pier	Y	Y					Piles under pier	6a	775110	1728739	n.a.	292	25
6									6b	775377	1728621	n.a.	n.a.	n.a.
6									6c	775367	1728598	n.a.	n.a.	n.a.
6									6d	775100	1728716	n.a.	n.a.	n.a.
7	Area of debris	Y	Y					Debris	7a	775437	1728684	n.a.	48	14
7									7b	775483	1728669	n.a.	n.a.	n.a.
7									7c	775479	1728656	n.a.	n.a.	n.a.
7									7d	775433	1728671	n.a.	n.a.	n.a.
8	Sunken vessel	Y	Y	Y		N	Y	Wreck F5: Canal Boat (NYSM 11642)*	8a	775487	1728674	n.a.	105	31
8									8b	775584	1728634	n.a.	n.a.	n.a.
8									8c	775571	1728606	n.a.	n.a.	n.a.
8									8d	775474	1728645	n.a.	n.a.	n.a.
9		N	Y						9	775471	1728641	17	n.a.	n.a.
10	Sunken vessel	Y	Y	Y		N	Y	Wreck G5: Canal Boat (NYSM 11643)*	10a	775463	1728632	n.a.	110	34
10									10b	775570	1728607	n.a.	n.a.	n.a.
10									10c	775563	1728574	n.a.	n.a.	n.a.
10									10d	775457	1728598	n.a.	n.a.	n.a.
11	Area of vertical debris		Y					Debris; vertical	11a	775397	1728628	n.a.	155	45
11									11b	775543	1728576	n.a.	n.a.	n.a.

Target number	Target	bathymetry	side-scan	magnetometer	seismic	Utility	sunken vessel	Description	point number	Corner or center point Easting	Corner or center point Northing	Circle Diameter(ft)	Length	Width
11									11c	775527	1728534	n.a.	n.a.	n.a.
11									11d	775381	1728586	n.a.	n.a.	n.a.
12	Area of debris		Y					Debris	12a	775378	1728576	n.a.	31	12
12									12b	775409	1728576	n.a.	n.a.	n.a.
12									12c	775409	1728564	n.a.	n.a.	n.a.
12									12d	775378	1728564	n.a.	n.a.	n.a.
13	Area of debris		Y						13	775406	1728552	11	n.a.	n.a.
14			Y						14	775224	1728462	33	n.a.	n.a.
15			Y						15	775417	1728461	18	n.a.	n.a.
16	Bridge piers	Y	Y	Y		N	Y	Piers or piles under bridge	16a	775421	1728474	n.a.	52	14
16									16b	775434	1728469	n.a.	n.a.	n.a.
16									16c	775416	1728420	n.a.	n.a.	n.a.
16									16d	775403	1728425	n.a.	n.a.	n.a.
17	Area of debris		Y					Debris	17a	775487	1728546	n.a.	31	9
17									17b	775515	1728532	n.a.	n.a.	n.a.
17									17c	775511	1728524	n.a.	n.a.	n.a.
17									17d	775483	1728538	n.a.	n.a.	n.a.
18	Area of vertical debris		Y					Debris	18	775482	1728508	56	n.a.	n.a.
19	Elongated debris		Y					Debris	19	775466	1728413	25	n.a.	n.a.
20	Debris near pilings		Y					Debris	20	775515	1728426	43	n.a.	n.a.
21	Debris near pilings		Y					Debris	21	775501	1728405	21	n.a.	n.a.
22	Area of debris		Y					Debris	22	775522	1728481	12	n.a.	n.a.
23	Area of debris		Y					Debris	23	775535	1728491	13	n.a.	n.a.
24	Area of debris		Y					Debris	24	775528	1728517	35	n.a.	n.a.
25	Area of debris		Y					Debris	25	775552	1728558	44	n.a.	n.a.
26	Area of debris		Y					Debris	26	775581	1728575	13	n.a.	n.a.
27	Area of debris		Y					Debris	27	775588	1728604	41	n.a.	n.a.
28	Area of debris		Y					Debris	28	775616	1728636	13	n.a.	n.a.
29	Area of elongated debris		Y					Debris	29a	775595	1728602	n.a.	67	17
29									29b	775659	1728581	n.a.	n.a.	n.a.
29									29c	775654	1728565	n.a.	n.a.	n.a.
29									29d	775590	1728586	n.a.	n.a.	n.a.
30	Area of elongated debris		Y						30	775613	1728572	33	n.a.	n.a.
31	Area of elongated debris and large object		Y					Debris	31a	775586	1728569	n.a.	70	71

Target number	Target	bathymetry	side-scan	magnetometer	seismic	Utility	sunken vessel	Description	point number	Corner or center point Easting	Corner or center point Northing	Circle Diameter(ft)	Length	Width
31									31b	775651	1728542	n.a.	n.a.	n.a.
31									31c	775634	1728505	n.a.	n.a.	n.a.
31									31d	775569	1728533	n.a.	n.a.	n.a.
32	Area of debris		Y					Debris	32	775560	1728520	16	n.a.	n.a.
33	Area of debris		Y					Debris	33	775576	1728519	14	n.a.	n.a.
34	Area of debris		Y					Debris	34	775592	1728510	22	n.a.	n.a.
35	Area of elongated debris		Y						35a	775573	1728509	n.a.	16	4
35									35b	775584	1728499	n.a.	n.a.	n.a.
35									35c	775574	1728487	n.a.	n.a.	n.a.
35									35d	775562	1728496	n.a.	n.a.	n.a.
36	Area of elongated and vertical debris		Y					Debris	36a	775548	1728503	n.a.	119	36
36									36b	775655	1728452	n.a.	n.a.	n.a.
36									36c	775640	1728419	n.a.	n.a.	n.a.
36									36d	775533	1728470	n.a.	n.a.	n.a.
37	Area of elongated and vertical debris		Y					Debris	37a	775607	1728510	n.a.	53	36
37									37b	775658	1728495	n.a.	n.a.	n.a.
37									37c	775647	1728461	n.a.	n.a.	n.a.
37									37d	775597	1728477	n.a.	n.a.	n.a.
38	Bridge piers	Y	Y					Piers or piles under bridge	38a	775583	1728402	n.a.	61	24
38									38b	775601	1728396	n.a.	n.a.	n.a.
38									38c	775582	1728338	n.a.	n.a.	n.a.
38									38d	775559	1728344	n.a.	n.a.	n.a.
39	Area of elongated debris		Y					Debris	39	775633	1728266	59	n.a.	n.a.
40	Trenches		Y						40a	775673	1728265	n.a.	52	52
40									40b	775725	1728265	n.a.	n.a.	n.a.
40									40c	775725	1728213	n.a.	n.a.	n.a.
40									40d	775673	1728213	n.a.	n.a.	n.a.
41			Y						41	775655	1728304	31	n.a.	n.a.
42	Bridge piers	Y	Y					Piers or piles under bridge	42a	775651	1728313	n.a.	57	11
42									42b	775668	1728367	n.a.	n.a.	n.a.
42									42c	775679	1728364	n.a.	n.a.	n.a.
42									42d	775662	1728310	n.a.	n.a.	n.a.
43	Bridge piers	Y	Y					Piers or piles under bridge	43a	775725	1728277	n.a.	58	13

Target number	Target	bathymetry	side-scan	magnetometer	seismic	Utility	sunken vessel	Description	point number	Corner or center point Easting	Corner or center point Northing	Circle Diameter(ft)	Length	Width
43									43b	775749	1728330	n.a.	n.a.	n.a.
43									43c	775761	1728324	n.a.	n.a.	n.a.
43									43d	775738	1728272	n.a.	n.a.	n.a.
44	Area of debris		Y					Debris	44	775670	1728425	26	n.a.	n.a.
45	Area of debris		Y					Debris	45	775707	1728416	22	n.a.	n.a.
46	Area of debris		Y					Debris	46	775673	1728500	21	n.a.	n.a.
47	Area of debris		Y					Debris	47	775701	1728524	13	n.a.	n.a.
48	Area of debris		Y					Debris	48	775710	1728554	32	n.a.	n.a.
49	Area of debris		Y					Debris	49	775690	1728567	18	n.a.	n.a.
50	Area of debris		Y					Debris	50	775654	1728602	17	n.a.	n.a.
51	Area of elongated debris		Y					Debris	51a	775665	1728600	n.a.	46	9
51									51b	775721	1728600	n.a.	n.a.	n.a.
51									51c	775721	1728591	n.a.	n.a.	n.a.
51									51d	775665	1728591	n.a.	n.a.	n.a.
52	Area of elongated debris		Y					Debris	52	775719	1728608	42	n.a.	n.a.
53	Sunken vessels	Y	Y	Y		N	Y	Wreck H5: Canal Boat (NYSM 11644)*	53a	775752	1728629	n.a.	242	70
53								Wreck I5: Canal Boat (NYSM 11645)*	53b	775967	1728518	n.a.	n.a.	n.a.
53								Wreck J5: Canal Boat (NYSM 11646)*	53c	775936	1728455	n.a.	n.a.	n.a.
53									53d	775721	1728567	n.a.	n.a.	n.a.
54	Sunken vessel	Y	Y	Y		N	Y	Wreck E5: Canal Boat (NYSM 11641)*	54a	775677	1728697	n.a.	109	49
54									54b	775786	1728697	n.a.	n.a.	n.a.
54									54c	775786	1728657	n.a.	n.a.	n.a.
54									54d	775677	1728657	n.a.	n.a.	n.a.
55	Sunken vessel	Y	Y	n.a.		N	Y	Sunken vessel	55	775911	1728686	29	n.a.	n.a.
56			Y	n.a.				elongate	56a	775953	1728693	n.a.	31	10
56									56b	775982	1728684	n.a.	n.a.	n.a.
56									56c	775980	1728674	n.a.	n.a.	n.a.
56									56d	775950	1728683	n.a.	n.a.	n.a.
57			Y						57	775880	1728470	35	n.a.	n.a.
58			Y						58	775924	1728443	16	n.a.	n.a.
59			Y						59	775946	1728434	21	n.a.	n.a.
60	Trench	Y	Y						60a	775966	1728500	n.a.	132	31

Target number	Target	bathymetry	side-scan	magnetometer	seismic	Utility	sunken vessel	Description	point number	Corner or center point Easting	Corner or center point Northing	Circle Diameter(ft)	Length	Width
60									60b	776057	1728405	n.a.	n.a.	n.a.
60									60c	776035	1728383	n.a.	n.a.	n.a.
60									60d	775944	1728478	n.a.	n.a.	n.a.
61	Area of elongated debris		Y					Debris; elongated	61a	775827	1728368	n.a.	52	17
61									61b	775851	1728380	n.a.	n.a.	n.a.
61									61c	775915	1728293	n.a.	n.a.	n.a.
61									61d	775890	1728281	n.a.	n.a.	n.a.
62	Area of elongated and vertical debris		Y					Debris; elongated and vertical	62a	775413	1728675	n.a.	58	45
62									62b	775466	1728652	n.a.	n.a.	n.a.
62									62c	775448	1728611	n.a.	n.a.	n.a.
62									62d	775396	1728634	n.a.	n.a.	n.a.
63	Area of elongated and vertical debris		Y					Debris; elongated and vertical	63a	775648	1728579	n.a.	40	20
63									63b	775684	1728561	n.a.	n.a.	n.a.
63									63c	775675	1728543	n.a.	n.a.	n.a.
63									63d	775639	1728560	n.a.	n.a.	n.a.
64	Area of debris		Y					Debris	64	775667	1728579	18	n.a.	n.a.
65			Y						65	775946	1728448	22	n.a.	n.a.
66	Historic bridge	Y	Y	Y			N	Piles of historic bridge remnant	66a	774929	1728887	n.a.	470	42
66									66b	775359	1728699	n.a.	n.a.	n.a.
66									66c	775344	1728659	n.a.	n.a.	n.a.
66									66d	774915	1728846	n.a.	n.a.	n.a.
67	Magnetic anomaly			Y					67	774977	1728860	50	n.a.	n.a.
68	Magnetic anomaly			Y					68	775154	1728759	50	n.a.	n.a.
69	Magnetic anomaly			Y					69a	775537	1728473	n.a.	98	32
69				Y					69b	775628	1728437	n.a.	n.a.	n.a.
69				Y					69c	775617	1728407	n.a.	n.a.	n.a.
69				Y					69d	775524	1728445	n.a.	n.a.	n.a.
70	Magnetic anomaly			Y					70	775992	1728419	24	n.a.	n.a.
71	Magnetic anomaly			Y					71	776177	1728447	53	n.a.	n.a.
72	Magnetic anomaly			Y					72	775402	1728192	71	n.a.	n.a.
73	Magnetic anomaly			Y					73	775466	1728106	62	n.a.	n.a.
74	Buried object			Y	Y			Buried object seen in magnetometer and seismic(upper 10 feet)	74	775815	1728189	36	n.a.	n.a.

Champlain Hudson Power Express: Rt 22-Whitehall, NY
Geophysical Survey North and South of the Rt. 22 Bridge

Target number	Target	bathymetry	side-scan	magnetometer	seismic	Utility	sunken vessel	Description	point number	Corner or center point Easting	Corner or center point Northing	Circle Diameter(ft)	Length	Width
75	Object possible boat and buried debris		Y	Y				Possible boat and buried debris	75	775935	1728130	57	n.a.	n.a.
76	Debris		Y						76	774897	1728868	45	n.a.	n.a.
77	Bridge piers	Y	Y					Piers or piles under bridge	77a	775505	1728442	n.a.	64	14
77									77b	775517	1728436	n.a.	n.a.	n.a.
77									77c	775491	1728377	n.a.	n.a.	n.a.
77									77d	775479	1728383	n.a.	n.a.	n.a.
78	Buried object	Y			Y			Buried object	78	775879	1728169	50	n.a.	n.a.
79	Possible pilings	Y			Y			Possible piling	79	775518	1728370	15	n.a.	n.a.
80	Possible pilings	Y			Y			Possible piling	80	775590	1728352	15	n.a.	n.a.

* Wreck identification based on Historic South Bay Survey excerpt from 03 LSReport.docx

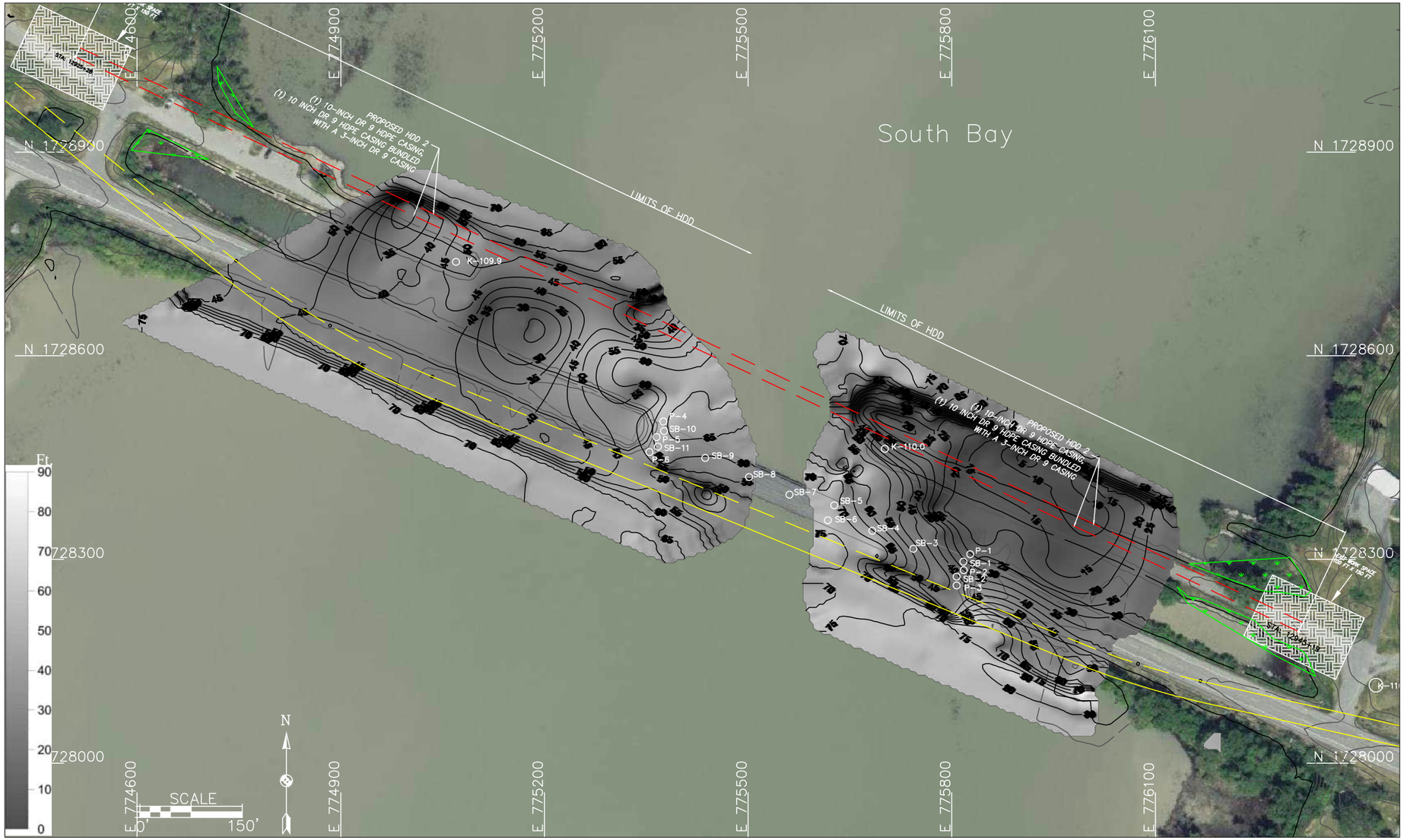


Figure 12. Interpreted and interpolated elevation of base of road fill map.

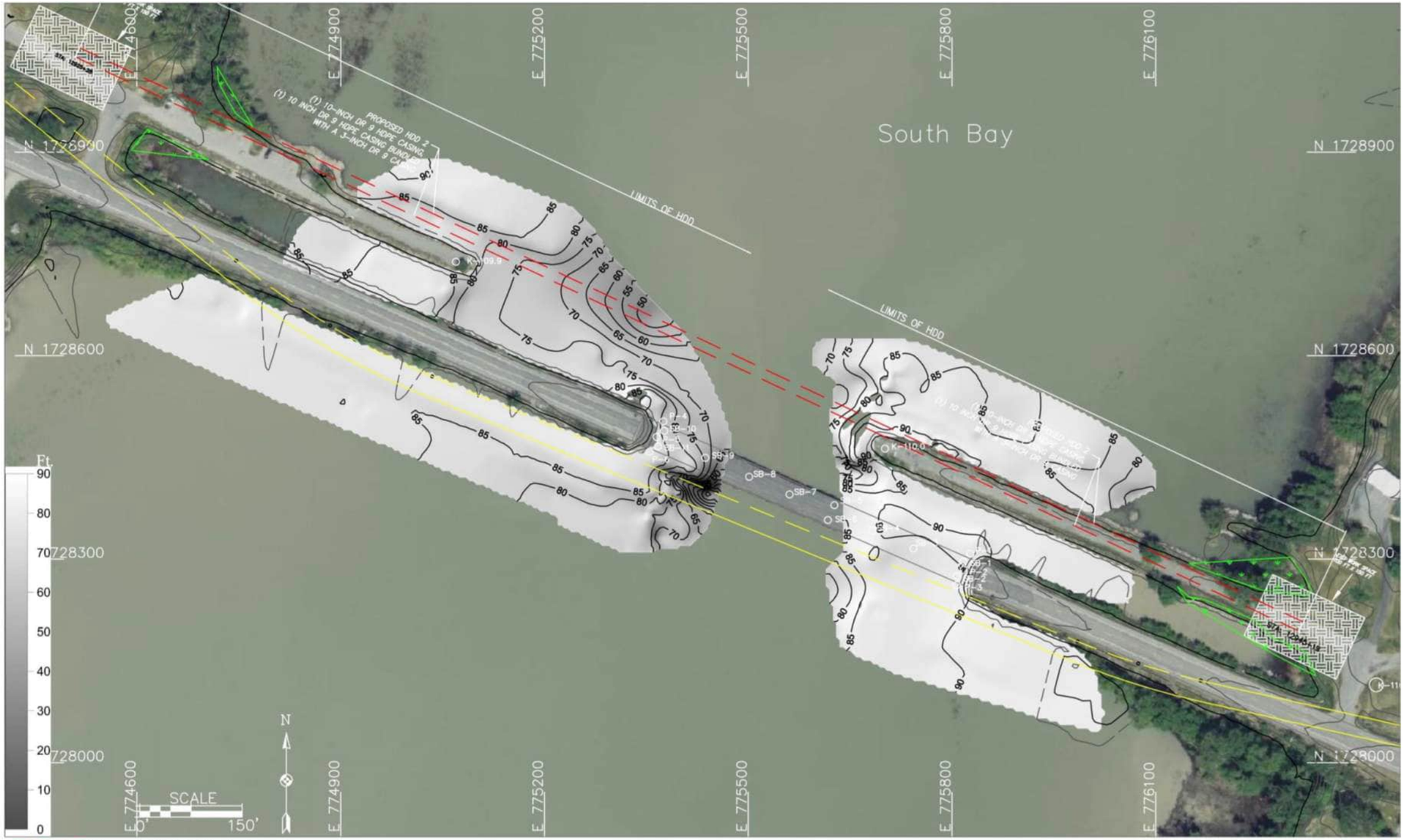


Figure 13. Interpreted and interpolated elevation of the top road fill map.

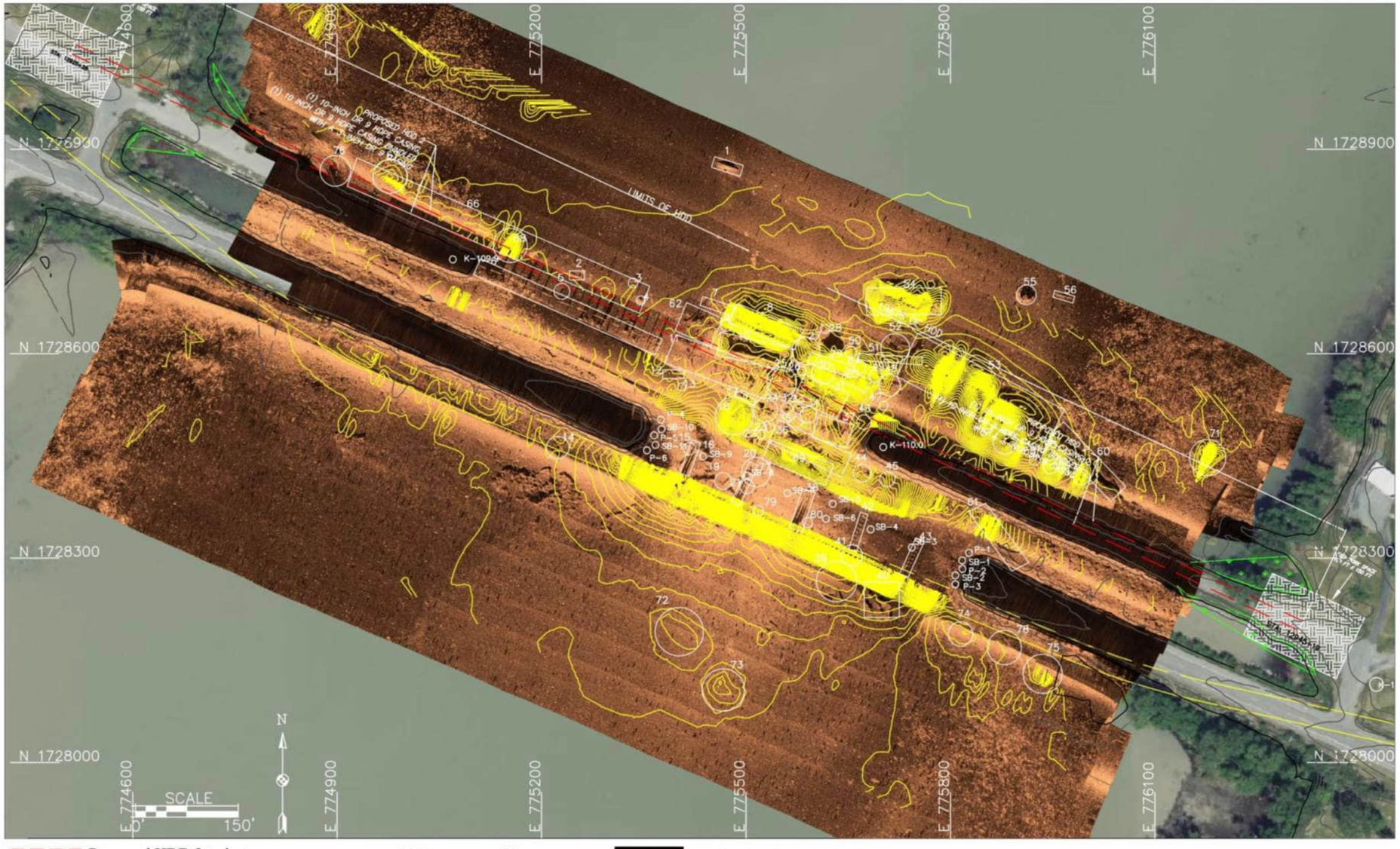


Figure 14. Integrated target and shallow subsurface obstruction map.

5.0 Conclusions

inSight's investigation includes single- and multibeam bathymetry, side-scan sonar, magnetic field, and reflection seismic. inSight also integrated historical surveys and existing geotechnical borings to aid in the interpretation of and provide context to map major stratigraphic horizons, locate the presence of existing utilities, and locate shallow obstructions to construction inside and outside the area of investigation (AOI). inSight conducted geophysical surveys, integrated data, and interpreted the results. The goal of the geophysical investigation was to support HDD design and construction.

Top of rock was not interpreted in the seismic record. Between approximately -150ft NAVD88 and -225ft NAVD88 seismic data shows evidence of a layer of sand. The top of this sand horizon is benchmarked by borings SB-11 and SB-3. Above the sand unit are alternating layers of lacustrine clays and silts. Below the current Route 22 bridge and the 1913 Route 22 bridge layers of fill are visible in the seismic data. Recent sediments drape the top of fill at both proposed HDD pathways.

No existing discernable utilities were detected by inSight's investigation.

Main conclusions pertinent to HDD construction:

1) A variable thickness of road fill exists beneath the current Route 22 bridge and the 1913 Route 22 bridge. Layers of fill are visible in the seismic data and in the existing borings provided by Schnabel. The base of fill in the vicinity of the northern planned HDD route varies between approximately 0ft NAVD88 in the west and 50ft NAVD88 in the east. Near the southern proposed HDD pathway, the base of fill ranges from approximately 40ft NAVD88 in the west to 80ft NAVD88 in the east.

2) Upright pilings mapped by side-scan orthosonographs along the northern proposed HDD pathway may present obstacles to HDD installation. The pile-tip elevations are not measurable by the methods employed in this geophysical investigation. Upright piles cut below the waterline are visible in side-scan orthosonographs. Other geophysical measurements may be able to quantify the elevations of the pile tips.

3) To the south of the proposed southern HDD pathway on the eastern half of the crossing there are two discrete targets (Target 74 and Target 75) that were interpreted from the magnetic field data. inSight has interpreted these targets to be in the shallow subsurface; they are likely contained within the layer of fill. inSight does not see evidence that the anomalies are related to components of the current Route 22 bridge.

Appendix I – Digital point files, surfaces, and maps

This Appendix includes a ShareFile link to digital data presented in this report.

Appendix D

BoreAid HDD Simulation Output

Generated Output

WARNING: The accuracy of the data obtained by the BoreAid® system is highly dependent upon accurate data gathering, data input and proper use of the software. Vermeer is not responsible for that information. BoreAid® data is not intended to replace the need for future on-site utility locating, measuring and verification procedures, which are essential for accurate placement of new underground installations and avoidance of existing utilities.

CALL YOUR ONE-CALL SYSTEM FIRST

WARNING: Always contact your local One-Call system before the start of your digging project. The BoreAid® system is intended to be used with other utility locating methods, such as the use of the One-Call system and the exposing of existing utilities by potholing.

Locate utilities before drilling. Call 811 (U.S. only) or 1-888-258-0808 (U.S. or Canada) or local utility companies or national regulating authority.

Before you start any digging project, do not forget to call the local One-Call system in your area and any utility company that does not subscribe to the One-Call system. For areas not represented by One-Call Systems International, contact the appropriate utility companies or national regulating authority to locate and mark the underground installations. If you do not call, you may have an accident or suffer injuries; cause interruption of services; damage the environment; or experience job delays.

OSHA CFR 29 1926.651 requires that the estimated location of underground utilities be determined before beginning the excavation or underground drilling operation. When the actual excavation or bore approaches an estimated utility location, the exact location of the underground installation must be determined by a safe, acceptable and dependable method. If the utility cannot be precisely located, it must be shut off by the utility company.

Project Summary

General:	HDD #1
	Ref: Lake Road - New York
	P1A
	Start Date: 12-10-2021
	End Date: 12-10-2021
Designer:	TAR
	CHA
Description:	Lake Road HDD - New York

Input Summary

Start Coordinate	(0.00, 0.00, 291.00) ft
End Coordinate	(884.00, 0.00, 289.76) ft
Project Length	884.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

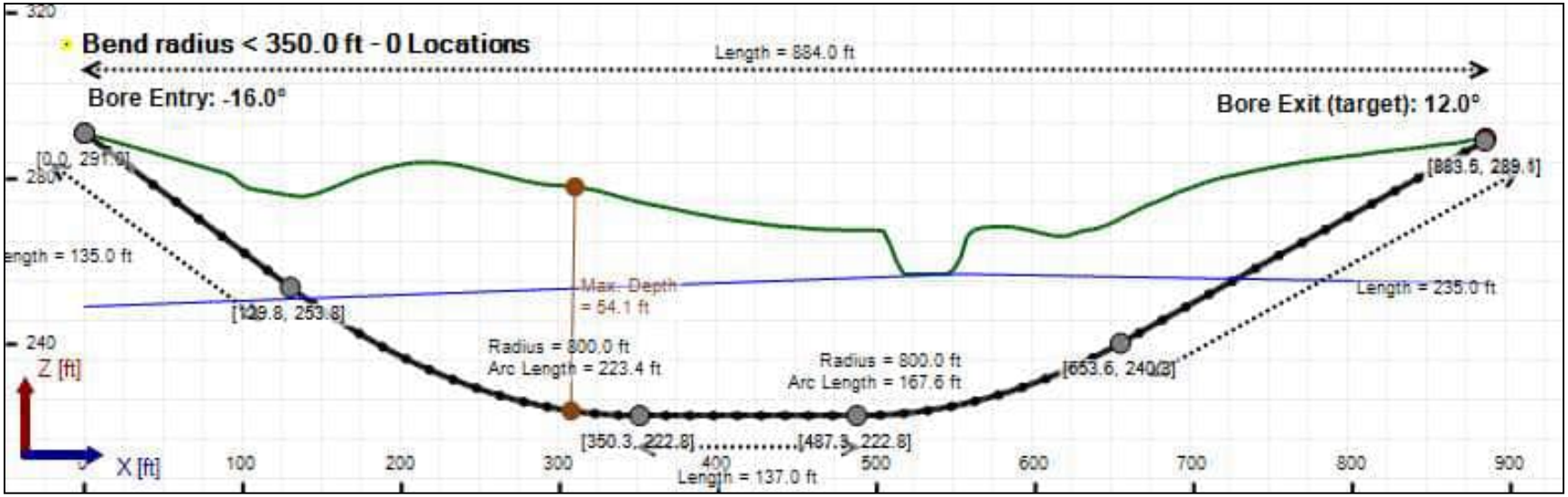
Soil Summary

Number of Layers: 2

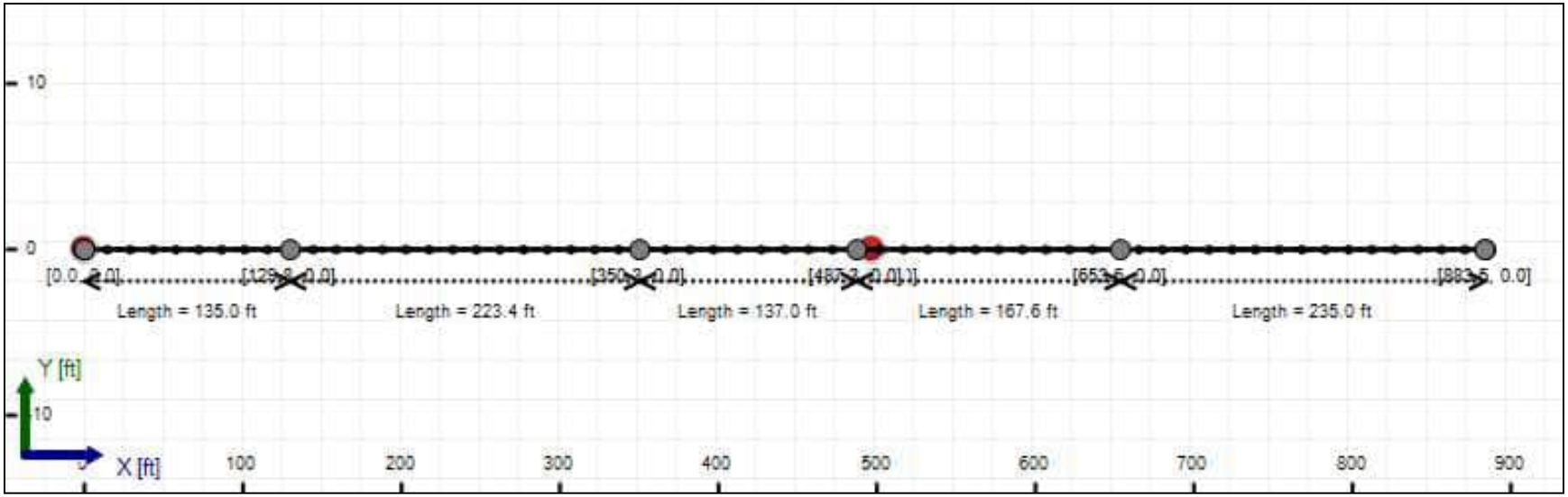
Soil Layer #1 USCS, Silt (M), ML
From Assistant
Unit Weight: 0.0521 (dry), 0.0637 (sat) [lb/in3]
Phi: 32.00, S.M.: 100.00, Coh: 0.00 [psi]

Soil Layer #2 USCS, Clay (C), CL
From Assistant
Unit Weight: 0.0405 (dry), 0.0579 (sat) [lb/in3]
Phi: 0.00, S.M.: 200.00, Coh: 3.13 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 899.99 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 0.03430 lb/in3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 0.05419 lb/in3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 0.03613 lb/in3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	4.1	23.2
Water Pressure	14.4	12.8
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	18.5	36.0
Deflection		
Earth Load Deflection	1.239	6.782
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.371	6.914
Compressive Stress [psi]		
Compressive Wall Stress	83.2	162.2

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	17030.0	17030.0
Pullback Stress [psi]	474.9	474.9
Pullback Strain	8.260E-3	8.260E-3
Bending Stress [psi]	0.0	32.2
Bending Strain	0	5.599E-4
Tensile Stress [psi]	474.9	505.4
Tensile Strain	8.260E-3	9.349E-3

Net External Pressure = 34.2 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.371	7.5	5.5	OK
Unconstrained Collapse [psi]	44.0	123.4	2.8	OK
Compressive Wall Stress [psi]	83.2	1150.0	13.8	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	54.3	227.5	4.2	OK
Tensile Stress [psi]	505.4	1200.0	2.4	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	8.00 in	79.569 psi	59.712 psi
1	8.00 in	12.00 in	79.537 psi	59.621 psi
2	12.00 in	16.13 in	79.492 psi	59.489 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 0.040 lb/in3

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 1202.0

Virtual Site