GEOTECHNICAL FIELD INVESTIGATION AND FOUNDATION RECOMMENDATION REPORT

FOR

ROOSEVELT PARK ISLAND
LIGHTHOUSE PARK

Roosevelt Island, Borough of Manhattan,
New York

Prepared for:

475 Fifth Avenue, 12th Floor
New York, NY 10017

Prepared by:

KS ENGINEERS, P.C.
494 Broad Street, 4th Floor
Newark, NJ 07102

AUGUST 08, 2020

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION

The KS Engineers, P.C. (KSE) has prepared this geotechnical engineering report to summarize the findings of our recent geotechnical field exploration for the proposed structures within Roosevelt Park Lighthouse area, located in Roosevelt Island of Borough of Manhattan, New York, herein after referred to as the "site."

2.0 SITE DESCRIPTION

The proposed site is within and near the Roosevelt Park Lighthouse Park, and is located on the northern tip of Roosevelt Island in New York City.

3.0 REVIEW OF AVAILABLE INFORMATION

3.1 General Geology

New York City lies on the three major physiographic provinces: the New England Upland to the northwest, the Triassic Lowland to the southwest and the Coastal Plain to the southeast. Several rock types and numerous soil deposits represent geologic history spanning over a billion years. The Bronx, Manhattan and parts of Brooklyn, Queens, and Staten Island lie in a region of the New England Uplands locally known as the Manhattan Prong, a northeast trending deeply eroded sequence of metamorphic rocks.

The bedrock of NYC is a deeply eroded sequence of metamorphic rocks, a result of complex geological processes including mountain building, erosions, and volcanic activity (Merguerian & Sanders, 1989). Much of the rock depth varies radically and was altered by glacial activity and is interspersed with filled-in swamps, creeks, ravines, ponds, and valleys and have long since disappeared from view. The oldest and one of the hardest NYC rocks is the Fordham Gneiss. It consists of dark gray to black/white gneiss with pegmatite and granite and forms the basement cover sequence of rocks. The Fordham Gneiss is found in upper and lower Manhattan, Roosevelt Island, Wards Island, northwestern Queens and western Bronx.

4.0 SUBSURFACE INVESTIGATION

4.1 Boring Program

Eight (8) borings were drilled by Craig Geotechnical Drilling Company, Inc. (CTB) of Mays Landing, New Jersey at the project area between February 19 and February 21, 2020. All borings were inspected on full-time basis by KSE geotechnical engineer. All the borings were advanced to the top of bedrock, except Boring B-6, which was ended at 32 feet from the ground surface.

The test borings were performed using a tracked rig, each equipped with an automatic hammer. All borings were advanced using the mud rotary technique with a 3-7/8-inch diameter tri-cone roller bit. Soil samples were obtained at all boring locations in accordance with the American Society for Testing and Materials (ASTM) Standard D1586. The Standard Penetration Test (SPT) consists of driving a 2-inch outside diameter (OD) split spoon sampler for a depth of 24 inches with repeated blows of a 140-pound hammer free-falling 30 inches. The standard penetration, or N-value, is defined as the number of blows required to drive the sampler for a 12- inch interval after an initial 6 inches of penetration, and is measured in blows per foot (bpf). All field soil samples were classified in general accordance with the Burmister Soil Classification

System. All laboratory identified samples were classified in accordance with the Unified Soil Classification System (USCS; ASTM Standard D2488).

The top of bedrock was estimated based on drilling operations (e.g. excessive chatter or difficult penetration) and practical split spoon refusal, as indicated by blow counts greater than 100 for a 6-inch interval on the split spoon sampler. Rock coring was performed to verify the presence of bedrock and assess its relative quality as indicated by Recovery and the Rock Quality Designation (RQD).

Boring logs with boring location plan are presented in Appendix A.

4.2 Permeability Testing

Permeability tests were performed at 5 feet below ground surface at two locations (PT-1 & PT-2), in accordance with New York City Department of Environmental Protection (NYCDEP)'s guidelines.

Permeability test logs with permeability test location plan are presented in Appendix A.

4.3 Geotechnical Laboratory Testing

Geotechnical laboratory testing was performed on selected samples of soil and rock, collected during the subsurface exploration. The purpose of the geotechnical laboratory testing was to confirm and refine field soils classifications and to define the mechanical and physical properties or soil and rock within the project area for use in the foundation design and construction recommendations of new structures within the Park Facilities.

Geotechnical laboratory test results are shown in Appendix B.

5.0 GENERALIZED SUBSURFACE CONDITIONS

KSE's interpretation of the subsurface soil conditions at the project site is based on the results of our limited study of subsurface investigation. In general, the subsurface conditions to the depths investigated, consist of fill layer, followed by granular soils and bedrock.

Based on SPT data, one (1) subsurface profiles were developed along the proposed project site.

Subsurface profiles are presented in Appendix C.

Layer 1: Miscellaneous Fill Layer

Miscellaneous fill is composed of silty sand with various amounts of gravel, brick, asphalt and concrete fragments. The depth of the miscellaneous fill ranges from 6 feet to 10 feet below the ground surface. Based on the uncorrected SPT N-values, the fill material is characterized as medium dense in terms of relative density. SPT N-values ranged from 4 to refusal with average N-values 22 within this layer.

Layer 2: Silty Sand Layer

Very loose to very dense silty sand with pockets of gravel, silt and clay was encountered below the miscellaneous fill layer. The thickness of this layer varied from 6 feet to more than 26 feet below the ground

surface. About 2 feet thick of organic clay material was encountered in Boring B-3 at a depth of 10 feet below the ground surface. SPT N-values ranged from 3 to refusal with average N-values 33 within this layer.

Layer 3: Bedrock

The bedrock (GNEISS) was encountered below silty sand layer. The depths to the bedrock from the ground surface ranged from 12 feet to more than 32 feet below the ground surface.

6.0 SUBSURFACE SOIL PROPERTIES

The Geotechnical soil properties for each layer were established based on the field test, laboratory test results, engineering correlations and judgment. The range of average values of soil properties is presented in table below. Based on the evaluation of subsurface materials encountered during our site investigation, we have identified three (3) layers or strata, the average recommended properties of which are shown below.

Subsurface Layers	Thickness (ft)	Average SPT N-Value	Angle of Internal Friction (Φ) degree	Moist Unit Weight (γ) pcf	Young's Modulus of Elasticity (E_s) ksf	Poisson's Ratio (μ)
Stratum 1: Possible Fill	6-10	22	33	117	322	0.29
Stratum 2: Granular Soil	2-26	33	35	122	478	0.35
Stratum 3: Bedrock (GNEISS)	-	-	36	152	375,000	0.20

7.0 GROUNDWATER

Observation wells were not installed during this subsurface investigation. Based on field observation during test borings installation, the groundwater depth varied from 5 feet to 6 feet from ground surface. It should be noted that the fluctuations in the groundwater level are anticipated due to other factors such as tidal influence, seasonal variations in precipitation and local climatic conditions such as droughts or prolonged periods of precipitation.

8.0 SEISMIC DESIGN PARAMETERS

Based on the available SPT data (blow counts), the site falls within a Site Class D – soil profile. Seismic Design Category and Peak Ground Acceleration (PGA) for this site is B and 0.167, respectively, based on the International Building Code (IBC) – 2015. Seismic Design Parameters are presented in Appendix D.

9.0 FOUNDATION RECOMMENDATION

Based on the results of our investigation, it is KSE's opinion that the subsurface conditions encountered in

the recent investigation did not disclose any geotechnical impediments that could preclude the proposed construction.

Foundation Support

Based on the recent investigation performed by KSE, a layer of existing fill is present at the surface throughout site, underlain by silty sand layer. A shallow foundation system appears to be feasible based on our review of the subsurface soil conditions.

The recommended maximum allowable bearing capacity for the proposed structures are 2,000 pound per square foot (psf). We recommend that the footings be supported at a minimum embedment depth of 3.5-ft below the adjoining ground or pavement surface for protection from frost heave. Footing bearing surfaces should be level and clear of debris, standing or frozen water, and other deleterious materials.

After excavating to footing base elevation, the resulting subgrades should be compacted with a large (10-Ton) vibratory roller. Any soft or otherwise unsuitable subgrade soils revealed by the proofrolling should be removed and replaced with controlled compacted fill or clean crushed stone. Controlled fill if used should be placed in 10-inch maximum thick layers to the design foundation bottom elevation. Each layer of controlled fill should be compacted to at least 95% of Maximum Modified Proctor density.

In addition, since groundwater appears to be at shallower depths below the proposed footings, use of an appropriate vapor barrier is recommended to protect footing elements from being subjected to groundwater action.

Slabs on Grade and Pavements

Slabs on grade and pavements can be supported on the existing fill materials, after proofrolling subgrades and removing and replacing any soft spots with controlled fill, as previously described. It is recommended that concrete slabs be directly underlain by at least six inches of compacted, ¾-inch size clean crushed stone or as otherwise required by the design structural engineer. A modulus of subgrade reaction equal to 100 PCI may be used to design slabs-on-grade supported by properly prepared subgrades.

Controlled Fill and Backfill

Controlled compacted fill and backfill material should consist of environmentally clean, well graded sand and gravel, with a maximum particle size of 2 inches, and less than 12% (by weight) of non-plastic fines (material passing the No. 200 sieve). The fill material should not contain unsuitable matter, such as organic or other deleterious matter, frozen clods, construction debris, etc. The fill should be placed in even horizontal lifts, 8-inch to 10-inch thick, before compaction. It may be necessary to utilize thinner lifts at locations where compaction is performed using hand operated equipment. Each lift should be compacted to at least 95% of Maximum Modified Proctor density (ASTM D1557) below foundations or concrete slabs, and 92% of Maximum Modified Proctor density in non-structural areas. The moisture content of the fill material should be uniform and should be in a range of plus/minus two percent of optimum. Existing on-site fill materials can

be used as controlled fill, provided that they conform to the above gradation requirements, and can be properly compacted.

Excavations

Temporary excavations for foundation and retaining wall construction should be implemented and maintained in accordance with applicable requirements of the Occupational Safety and Health Administration (OSHA). Excavations in soil may be open cut to a stable slope angle or shored and braced. In accordance with 29 CFR 1926 Subpart P, Appendices A & B, the soils at the site are classified as "Type C", and all excavations should follow the procedures prescribed in the OSHA manual.

A licensed New York State Professional Engineer should be retained by the Contractor to design any required shoring or bracing system. In all cases, the Contractor's "competent person" (as defined by OSHA) should be solely responsible for excavation safety and determination of stable slope angle.

Construction Dewatering

Groundwater was encountered in all the borings performed at the time of KSE's field exploration at depths of about 5 to 6 feet below existing ground surface. However, ground water levels are tidally influenced, and can be expected to fluctuate. KSE recommends that adequate site drainage be implemented early in the construction schedule. Surface water should be directed away from exposed subgrades and should not be allowed to flow into excavations.

Excavations should not be used as temporary drainage trenches. Water that does accumulate in the excavations should be removed as soon as possible.

Utility Trench Backfill

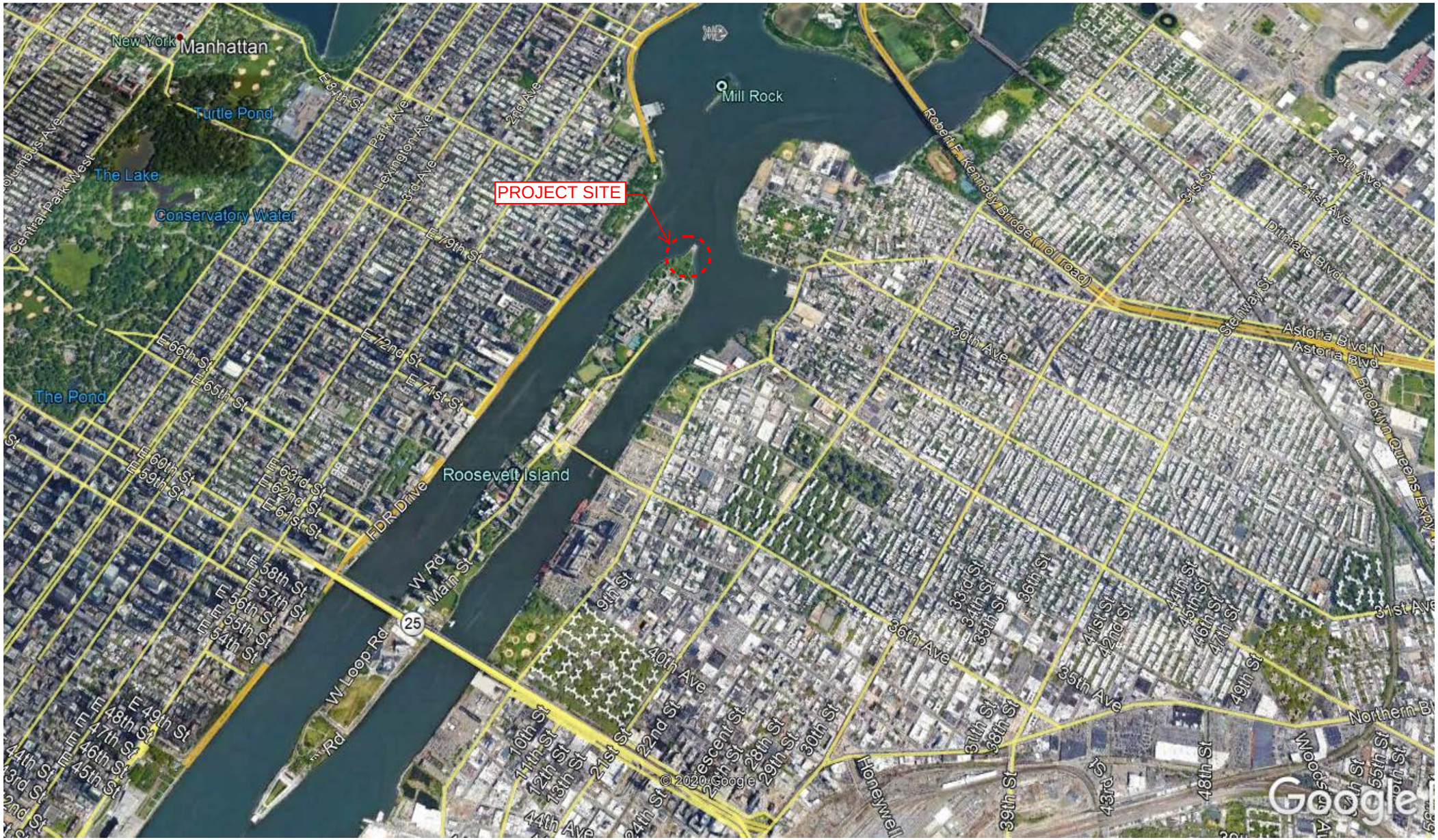
Backfill for utility trenches should be placed and compacted in a controlled manner. The controlled fill should consist of clean sand or sand and gravel, with a maximum gravel size of 1.5 inches. The backfill soil materials should be free of any unsuitable matter, such as lumps, organic matter, stones, frozen clods, construction debris, and boulders. The backfill should be placed in uniform lifts, not more than eight inches in thickness. Each lift should be properly moisture conditioned and compacted to at least 95% of Modified Proctor maximum dry density (ASTM D1557). The moisture content of the fill should be relatively uniform and should be in a range of plus/minus two percent of optimum.

10.0 LIMITATIONS

The conclusions and recommendations contained in this report are based on our best professional judgment and generally accepted local geotechnical engineering practices. KSE's professional services have been performed using the degree of care and skill ordinarily exercised under similar circumstances by other geotechnical engineers practicing in this or similar localities. No other warranty, expressed or implied, is made. This geotechnical study has been prepared for the exclusive use of Stantec, Inc., for specific

application to the proposed Roosevelt Island Lighthouse Park project in the borough of Manhattan, New York.

FIGURES



KSE KS Engineers, P.C.	PROJECT SITE LOCATION	FIGURE 1

LEGEND

t	Till
og	Outwash Sand and Gravel
tm	Till Moraine

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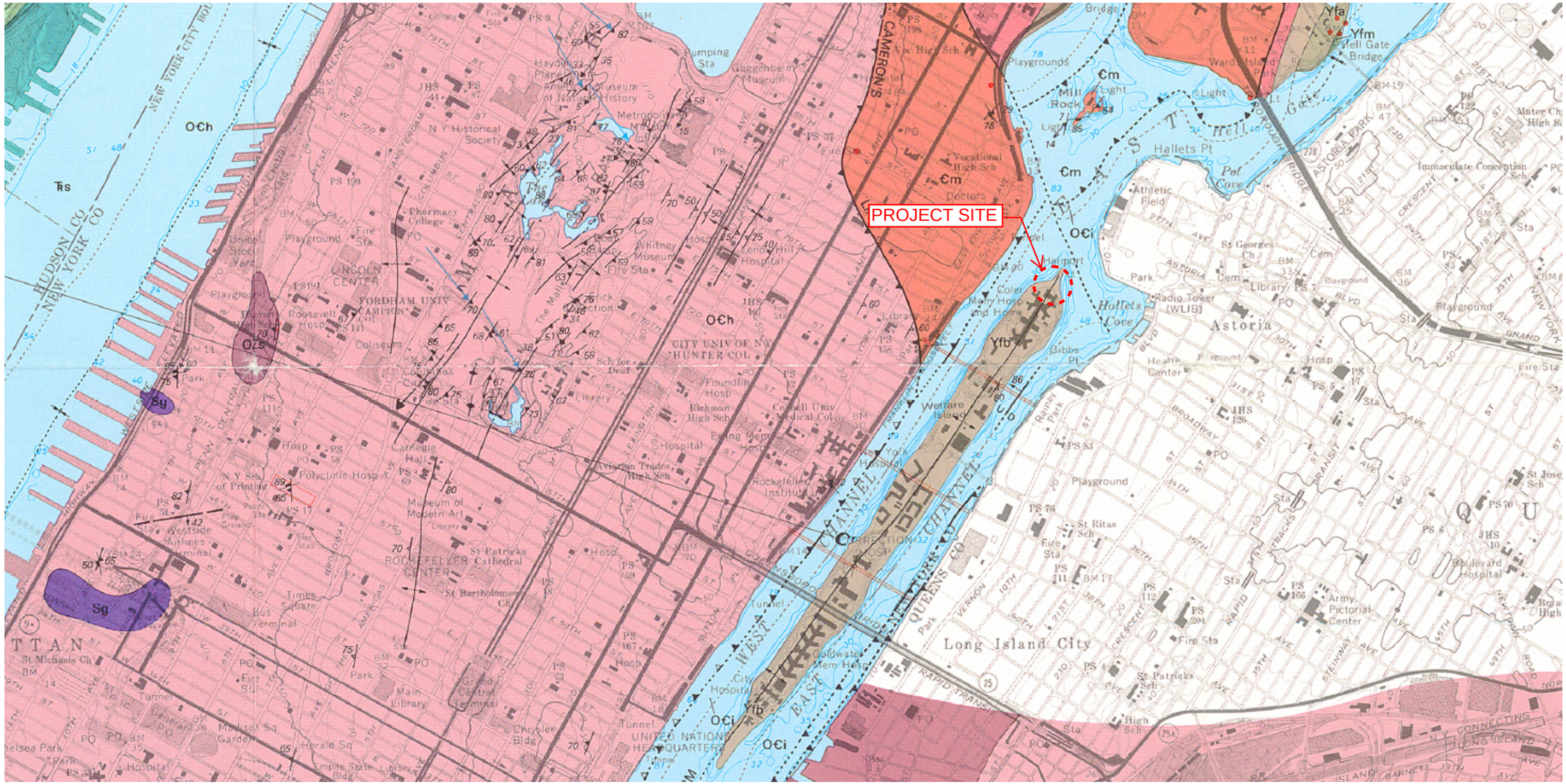
SURFACE GEOLOGY OF PROJECT AREA

FIGURE 2



LEGEND

- Yfb: Black and White layered gneiss
- bw/gpb/g: Black and white garnet-plagioclas-biotite gneiss (Fordham Gneiss member B)
- g/sgmi/g: Gray sillimanite-garnet-microline gneiss (Ravenswood Granodiorite)
- g/smt/s: Gray sillimanite-muscovite-tourmaline schist (Manhattan Schist)

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BEDROCK GEOLOGY OF PROJECT AREA

FIGURE 3

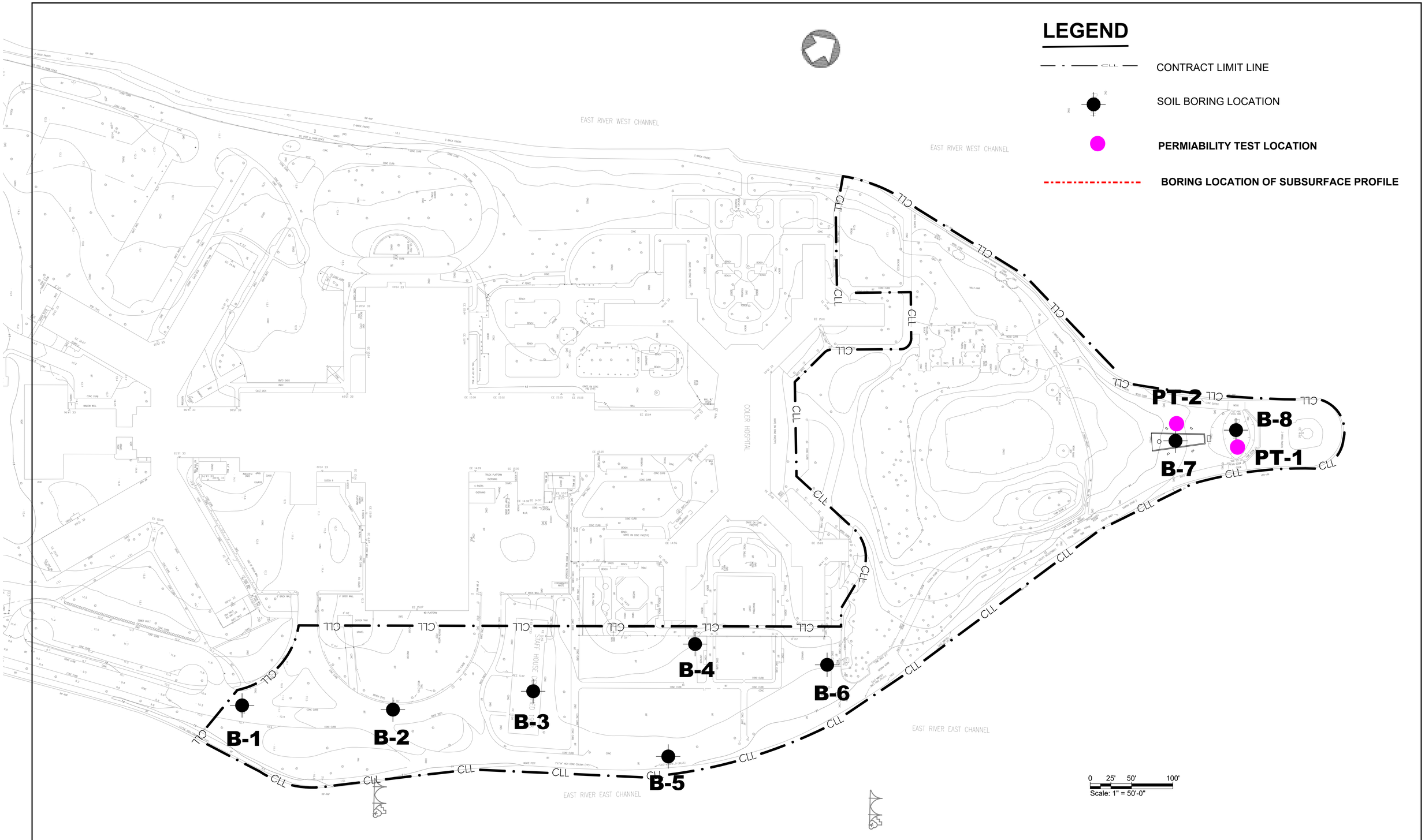
APPENDIX A

BORING & PERMEABILITY TEST LOGS

1. BORING & PERMEABILITY TEST LOCATION PLAN

2. BORING LOGS

3. PERMEABILITY TEST LOGS



BORING & PERMEABILITY TEST LOCATION PLAN

BORING LOGS

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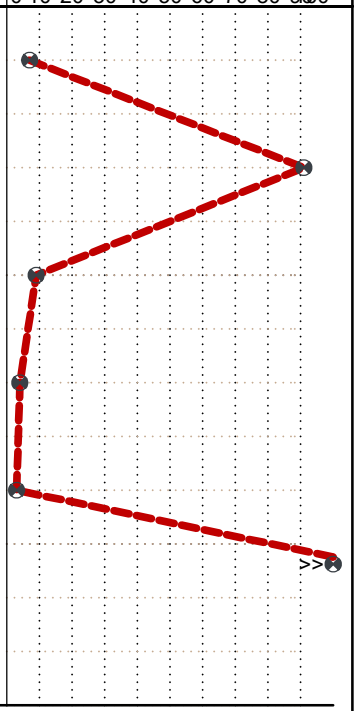
KSE
494 Broad Street
Newark, NJ 07102

BORING NUMBER B-1

CLIENT Stantec, Inc.
PROJECT NAME Roosevelt Island Lighthouse Park
PROJECT NUMBER 2020-2313
PROJECT LOCATION Roosevelt Island, Borough of Manhattan, New York
DATE STARTED 2/20/20 **COMPLETED** 2/20/20
GROUND ELEVATION 10.6 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR CTB
GROUND WATER LEVELS:
DRILLING METHOD Mud Rotary
AT TIME OF DRILLING ---
LOGGED BY MO **CHECKED BY** PG
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)	NYC Classification
0		(SM) Loose, Brown, coarse to fine SAND, little coarse to fine Gravel, trace Silt (fill)	SS 1	67	**2-3-4-9 (7)**		7
		(GP-GM) Very dense, Brown, coarse to fine GRAVEL, and coarse to fine Sand, trace Silt (fill)	SS 2	92	**5-78-13-7 (91)**		7
5		(SM) loose, Brown, Fine SAND, little Silt, trace meduim to fine Gravel (fill)	SS 3	42	**5-6-3-7 (9)**		7
		No Recovery	SS 4	0	**1-2-2-2 (4)**		
		(GP-GM) Very loose, Reddish-brown, coarse to fine GRAVEL, and fine Sand, trace Silt	SS 6	21	**0-0-3-25 (3)**		6
10		(SM) Very dense, Brown, coarse to fine SAND, little Silt, trace meduim to fine Gravel (fill)	SS 7	267	**125-100/3"**		3a
		Drilled down (Roller bit refusal at 13 feet; possible bedrock)					
		Gray GNEISS	RC 1	100 (100)			1a

Bottom of borehole at 13.0 feet.



KSE
494 Broad Street
Newark, NJ 07102

BORING NUMBER B-2

CLIENT Stantec, Inc. **PROJECT NAME** Roosevelt Island Lighthouse Park

PROJECT NUMBER 2020-2313 **PROJECT LOCATION** Roosevelt Island, Borough of Manhattan, New York

DATE STARTED 2/20/20 **COMPLETED** 2/20/20 **GROUND ELEVATION** 10.5 ft **HOLE SIZE** 4 inches

DRILLING CONTRACTOR CTB **GROUND WATER LEVELS:**

DRILLING METHOD Mud Rotary **AT TIME OF DRILLING** ---

LOGGED BY MO **CHECKED BY** PG **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)	NYC Classification
0		Concrete					
		(SP) Very loose, Reddish-brown, medium to fine SAND, trace fine Gravel, trace silt (fill)	SS 1	50	4-2-3-12 (5)		7
		(GP-GM) Very dense, Reddish- gray, coarse to fine GRAVEL, little coarse to fine Sand, trace Silt (fill)	SS 2	67	3-5-50-54 (55)		7
5		(GP-GM) Medium dense, brown coarse to fine GRAVEL, some coarse to fine Sand, trace Silt with some brick fregnents (fill)	SS 3	42	5-7-10-30 (17)		7
		(SP) Medium dense, brown coarse to fine SAND, trace coarse to fine Gravel, trace Silt with brick fregnents (fill)	SS 4	21	3-4-6-8 (10)		7
10		No Recovery	SS 5	0	6-3-2-1 (5)		
		(GC) Dense, Brown, coarse to fine GRAVEL, some Silt, little Clay, trace Sand	SS 6	100	5-4-30-85 (34)		3a

Bottom of borehole at 13.0 feet.

SPT N VALUE
10 20 30 40 50 60 70 80 90
PL MC LL
10 20 30 40 50 60 70 80 90
FINES CONTENT (%)
0 10 20 30 40 50 60 70 80 90 100

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494 Broad Street
Newark, NJ 07102

BORING NUMBER B-3

CLIENT Stantec, Inc. **PROJECT NAME** Roosevelt Island Lighthouse Park

PROJECT NUMBER 2020-2313 **PROJECT LOCATION** Roosevelt Island, Borough of Manhattan, New York

DATE STARTED 2/20/20 **COMPLETED** 2/20/20 **GROUND ELEVATION** 10.3 ft **HOLE SIZE** 4 inches

DRILLING CONTRACTOR CTB **GROUND WATER LEVELS:**

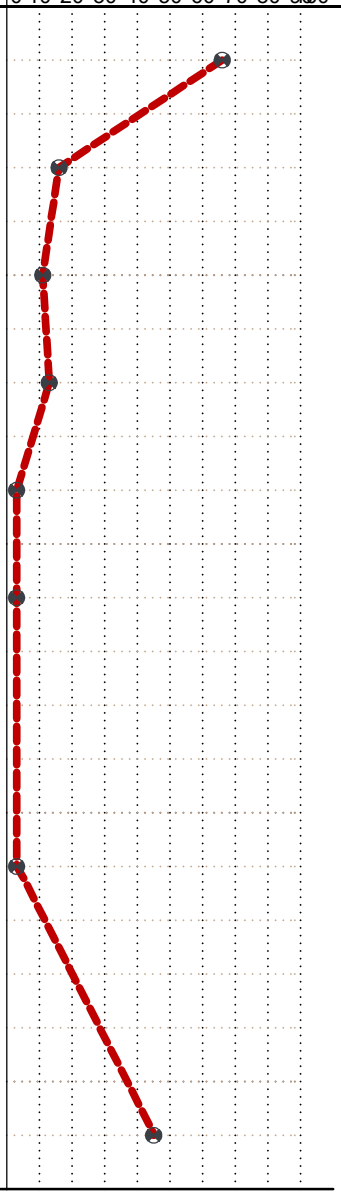
DRILLING METHOD Mud Rotary **AT TIME OF DRILLING** ---

LOGGED BY MO **CHECKED BY** PG **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)	NYC Classification
0		(SP) Very dense, Brown, coarse to fine SAND, little coarse to fine Gravel, trace Silt with asphalt (fill)	SS 1	29	**5-50-16-15 (66)**		7
		(SP) Medium dense, Brown, coarse to fine SAND, little coarse to fine Gravel, trace Silt with asphalt (fill)	SS 2	63	**7-9-7-6 (16)**		7
5		(GP-GM) Medium dense, Brown, coarse to fine GRAVEL, some coarse to fine Sand, trace Silt (fill)	SS 3	42	**1-4-7-5 (11)**		7
		(GP-GM) Medium dense, Brown, coarse to fine GRAVEL, and coarse to fine Sand, trace Silt with brick fragments & asphalt (fill)	SS 4	33	**3-6-7-9 (13)**		7
		(SP) Very loose, Brown, coarse to fine SAND, trace coarse to fine Gravel, trace Silt with asphalt (fill)	SS 5	25	**1-2-1-2 (3)**		7
10		(OH) Soft, reddish-gray, CLAY (Organic)	SS 6	100	**1-2-1-2 (3)**		6
		Drilled down					
15		(CH) Soft, reddish-gray, CLAY	SS 7	58	**1-2-1-2 (3)**		6
		Drilled down					
20		(SP) Dense, Brown, coarse to fine SAND, little coarse to fine Gravel, trace Silt	SS 8	100	**27-20-25-140 (45)**		3a

Bottom of borehole at 22.0 feet.



KSE
494 Broad Street
Newark, NJ 07102

BORING NUMBER B-4

CLIENT Stantec, Inc. **PROJECT NAME** Roosevelt Island Lighthouse Park

PROJECT NUMBER 2020-2313 **PROJECT LOCATION** Roosevelt Island, Borough of Manhattan, New York

DATE STARTED 2/21/20 **COMPLETED** 2/21/20 **GROUND ELEVATION** 10.2 ft **HOLE SIZE** 4 inches

DRILLING CONTRACTOR CTB **GROUND WATER LEVELS:**

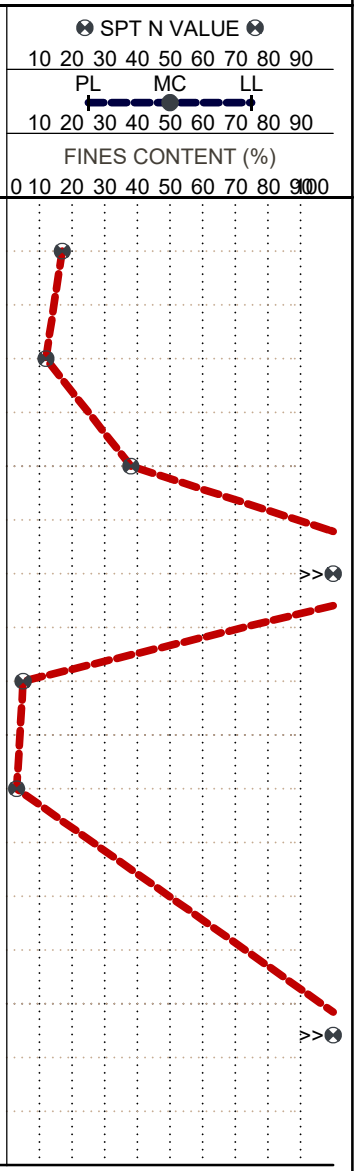
DRILLING METHOD Mud Rotary **AT TIME OF DRILLING** ---

LOGGED BY MO **CHECKED BY** PG **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)	NYC Classification
0		(GP-GM) Medium dense, Brown, coarse to fine GRAVEL, some coarse to fine Sand, trace Silt with brick fragments & asphalt (fill)	SS 1	29	**11-8-9-13 (17)**		7
		(SP) Medium dense, Brown, coarse to fine SAND, some coarse to fine Gravel, trace Silt (fill)	SS 2	63	**7-5-7-8 (12)**		7
5		(GP) Dense, Gray, coarse to fine GRAVEL, and coarse to fine Sand, trace Silt (fill)	SS 3	71	**11-10-28-47 (38)**		7
		(SP) Very dense, Gray, coarse to fine SAND, and coarse to fine Gravel, trace Silt (fill)	SS 4	21	**17-100-40-15 (140)**		7
		(SP-SM) Loose. Brown, fine SAND, some Silt, trace fine Gravel (fill)	SS 5	42	**4-3-2-2 (5)**		7
10		(CL) Soft, Brown, CLAY & SILT	SS 6	42	**1-2-1-2 (3)**		6
		Drilled down					
15		(SM) Very dense, Brown, fine SAND, and Silt, trace coarse Gravel	SS 7	71	**3-5-100/2"**		3a
		Drilled down					
		Gray GNEISS	RC 1	50 (50)			1c

Bottom of borehole at 18.0 feet.



KSE
494 Broad Street
Newark, NJ 07102

BORING NUMBER B-5

CLIENT Stantec, Inc. **PROJECT NAME** Roosevelt Island Lighthouse Park

PROJECT NUMBER 2020-2313 **PROJECT LOCATION** Roosevelt Island, Borough of Manhattan, New York

DATE STARTED 2/21/20 **COMPLETED** 2/21/20 **GROUND ELEVATION** 10 ft **HOLE SIZE** 4 inches

DRILLING CONTRACTOR CTB **GROUND WATER LEVELS:**

DRILLING METHOD Mud Rotary **AT TIME OF DRILLING** ---

LOGGED BY MO **CHECKED BY** PG **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)	NYC Classification
0		(SP) Medium dense, Brown, coarse to fine SAND, little coarse to fine Gravel, trace Silt with asphalt (fill)	SS 1	21	**10-7-4-12 (11)**		7
		(SP) Very dense, Brown, coarse to fine SAND, little coarse to fine Gravel, trace Silt (fill)	SS 2	36	**5-100/5"**		7
		Drilled down					
5		(SP) Loose, Brown, coarse to fine SAND, little meduim to fine Gravel, trace Silt (fill)	SS 3	42	**2-3-4-8 (7)**		7
		(SP) Loose, Brown, coarse to fine SAND,trace fine Gravel, trace Silt (fill)	SS 4	83	**3-3-1-1 (4)**		7
		(SP) Dense, Brown, coarse to fine SAND,trace fine Gravel, trace Silt (fill)	SS 5	42	**20-20-25-25 (45)**		7
10		(SP) Very Dense, Brown, coarse to fine SAND,trace fine Gravel, trace Silt (fill)	SS 6	91	**12-60-40-100/4"**		7

SPT N VALUE
10 20 30 40 50 60 70 80 90
PL MC LL
10 20 30 40 50 60 70 80 90
FINES CONTENT (%)
0 10 20 30 40 50 60 70 80 90 100

Bottom of borehole at 11.8 feet.

KSE
494 Broad Street
Newark, NJ 07102

BORING NUMBER B-6

CLIENT Stantec, Inc. **PROJECT NAME** Roosevelt Island Lighthouse Park

PROJECT NUMBER 2020-2313 **PROJECT LOCATION** Roosevelt Island, Borough of Manhattan, New York

DATE STARTED 2/21/20 **COMPLETED** 2/21/20 **GROUND ELEVATION** 10.1 ft **HOLE SIZE** 4 inches

DRILLING CONTRACTOR CTB **GROUND WATER LEVELS:**

DRILLING METHOD Mud Rotary **AT TIME OF DRILLING** ---

LOGGED BY MO **CHECKED BY** PG **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)	NYC Classification
0	(SP) Medium dense, Reddish Brown, coarse to fine SAND, little coarse to fine Gravel, trace Silt	SS 1	42	19-7-5-8 (12)		7
	(GP-GM) Medium dense, Gray, coarse to fine GRAVEL, some coarse to fine Sand, trace Silt	SS 2	42	19-9-14-19 (23)		7
5	(SP) Dense, Brown, coarse to fine SAND, little fine Gravel, trace Silt	SS 3	38	13-25-14-8 (39)		7
	(SP) Loose, Brown, coarse to fine SAND, little fine Gravel, trace Silt	SS 4	21	6-3-3-2 (6)		7
10	(SP) Very loose, Brown, coarse to fine SAND, little coarse to fine Gravel, trace Silt	SS 5	63	2-1-2-1 (3)		7
	No Recovery	SS 6	0	1-1-1-1 (2)		
	Drilled down					
15	(SM) Very loose, Brown, fine SAND, some Silt, trace coarse to fine Gravel	SS 7	17	1-2-1-2 (3)		6
	Drilled down					
20	(CL) Very soft, Brown, CLAY	SS 8	83	0-0-0-0 (0)		6
	Drilled down					
25						

SPT N VALUE
10 20 30 40 50 60 70 80 90
PL MC LL
10 20 30 40 50 60 70 80 90
FINES CONTENT (%)
0 10 20 30 40 50 60 70 80 90 100

(Continued Next Page)

KSE
494 Broad Street
Newark, NJ 07102

BORING NUMBER B-6

CLIENT Stantec, Inc.

PROJECT NAME Roosevelt Island Lighthouse Park

PROJECT NUMBER 2020-2313

PROJECT LOCATION Roosevelt Island, Borough of Manhattan, New York

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)	NYC Classification
25		(SM) Loose, Brown, fine SAND, and Silt	SS 9	46	**3-4-5-14 (9)**		6
		Drilled down					
30		(SP) Very dense, Reddish Brown, coarse to fine SAND, and coarse to fine Gravel, trace Silt	SS 10	75	**11-30-45-66 (75)**		3a

SPT N VALUE
10 20 30 40 50 60 70 80 90
PL MC LL
10 20 30 40 50 60 70 80 90
FINES CONTENT (%)
0 10 20 30 40 50 60 70 80 90 100

Bottom of borehole at 32.0 feet.

KSE
494 Broad Street
Newark, NJ 07102

BORING NUMBER B-7

CLIENT Stantec, Inc. **PROJECT NAME** Roosevelt Island Lighthouse Park

PROJECT NUMBER 2020-2313 **PROJECT LOCATION** Roosevelt Island, Borough of Manhattan, New York

DATE STARTED 2/19/20 **COMPLETED** 2/19/20 **GROUND ELEVATION** 9.5 ft **HOLE SIZE** 4 inches

DRILLING CONTRACTOR CTB **GROUND WATER LEVELS:**

DRILLING METHOD Mud Rotary **AT TIME OF DRILLING** ---

LOGGED BY MO **CHECKED BY** PG **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)	NYC Classification
0		(SP) Medium dense, Brown, coarse to fine SAND, and coarse to fine Gravel, trace Silt (fill)	SS 1	71	**2-8-8-7 (16)**		7
		(SM) Very dense, Brown, coarse to fine SAND, and Silt, trace coarse to fine Gravel (fill)	SS 2	50	**6-17-35-15 (52)**		7
5		(SP) Medium dense, Brown, coarse to fine SAND, some coarse to fine Gravel, little Silt with brick fragments & asphalt (fill)	SS 3	50	**3-6-5-9 (11)**		7
		(SP) Medium dense, Brown, coarse to fine SAND, and coarse to fine Gravel, trace Silt (fill)	SS 4	50	**6-3-7-6 (10)**		7
10		(GP) Dense, Brown, coarse to fine GRAVEL, trace fine Sand, trace Silt	SS 5	38	**10-26-16-15 (42)**		2a
		(GP) Medium dense, Brown, coarse to fine GRAVEL, little fine Sand, trace Silt	SS 6	17	**13-15-8-27 (23)**		2b
		Gray decomposed GNEISS Drilled down	SS 7	0	**3-4-50/2"**		1c
15		Gray GNEISS	RC 1	86 (86)			1a

SPT N VALUE
10 20 30 40 50 60 70 80 90
PL MC LL
10 20 30 40 50 60 70 80 90
FINES CONTENT (%)
0 10 20 30 40 50 60 70 80 90 100

>>

Bottom of borehole at 15.5 feet.

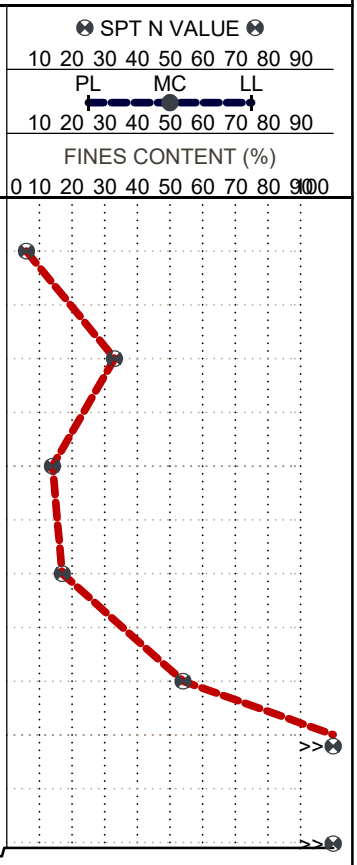
KSE
494 Broad Street
Newark, NJ 07102

BORING NUMBER B-8

CLIENT Stantec, Inc.
PROJECT NAME Roosevelt Island Lighthouse Park
PROJECT NUMBER 2020-2313
PROJECT LOCATION Roosevelt Island, Borough of Manhattan, New York
DATE STARTED 2/19/20 **COMPLETED** 2/19/20
GROUND ELEVATION 8 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR CTB
GROUND WATER LEVELS:
DRILLING METHOD Mud Rotary
AT TIME OF DRILLING ---
LOGGED BY MO **CHECKED BY** PG
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)	NYC Classification
0	(SM) Loose, Gray, Meduim to fine SAND, and Silt, trace coarse to fine Gravel (fill)	SS 1	50	2-3-3-4 (6)		7
	(SP) Dense, Brown, coarse to fine SAND, and coarse to fine Gravel, trace Silt (fill)	SS 2	33	8-18-15-15 (33)		7
5	(SP) Meduim dense, Gray, coarse to fine SAND, some coarse to fine Gravel, trace Silt (fill)	SS 3	38	9-4-10-8 (14)		7
	(SP) Medium dense, Brown, coarse to fine SAND, some coarse to fine Gravel, trace Silt (fill)	SS 4	50	12-13-4-6 (17)		7
	(GP) Very dense, Gray, coarse to fine GRAVEL, trace coarse to fine Sand, trace Silt	SS 5	46	30-32-22-10 (54)		2a
10	(GP) Very dense, Gray, coarse to fine GRAVEL, some medium to fine SAND, trace Silt Drilled down	SS 6	100	50/5"		2a
	Gray decomposed GNEISS	SS 7	100	50/1"		3a

Bottom of borehole at 12.1 feet.



PERMEABILITY TEST LOGS

KSE

PT- 1

Sheet 1 of 2

Prepared for:	**Stantec, Inc.**			PROJECT:	Roosevelt Island Lighthouse Park
				LOCATION / BOROUGH :	Roosevelt Island, NY
INSPECTOR:	Pradeep Gajurel	DRILLER:	Mike Tarter	Start Date:	2/19/2020
CONTRACTOR:	Craig Test Boring, Inc.	HELPER:	Jimmy Martinez	Start Time:	9:00 AM
P.E./REP.:				Weather:	43°F/Sunny
Depth of PT:	5 ft	Drill Bit Type:	Rotary	Weight of Hammer for casing:	140 lbs
Rig Type:	CME 45	Casing Internal Diameter:	4 in	Type of Hammer:	Auto
		Casing Length:	78 in		

ASTM D-6391 – 11
PERMEABILITY COEFFICIENT (Km) FORMULA:

General Formula:

$$K_m = \pi R_t \times \frac{\left[D\left\{Ln\left(\frac{h_1}{h_2}\right)\right\}\right]}{11 \times (t_2 - t_1)}$$

Formula for 4" internal diameter casing (in/hr):

$$K_m = 1.142 R_t \times \frac{\left[Ln\left(\frac{h_1}{h_2}\right)\right]}{(t_2 - t_1)}$$

where:

$$R_t = {}^{2.2902(0.9842^T)}/_{T^{0.1702}}$$

PT-1 @ 5 ft

TEST 1

Water temperature (°C), T: 7 Rt= 1.47

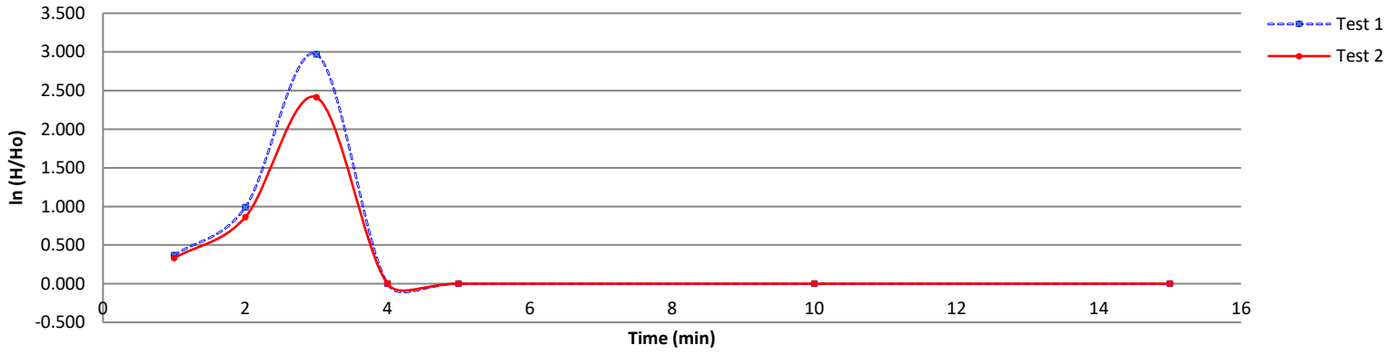
FIELD DATA		CALCULATED DATA			
Time (min)	Depth (in)	Height (in)	Ln (H/Ho)	(t_1-t_2)	*Kv (in/hr)
1	24.000	54.000	0.368	0.017	37.0777
2	49.000	29.000	0.989	0.017	62.6848
3	74.000	4.000	2.970	0.017	199.7443
4	78.000	0.000	-	0.017	-
5	78.000	0.000	-	0.017	-
10	78.000	0.000	-	0.083	-
15	78.000	0.000	-	0.083	-

TEST 2

Water temperature (°C), T: 7 Rt= 1.47

FIELD DATA		CALCULATED DATA			
Time (min)	Depth (in)	Height (in)	Ln (H/Ho)	(t_1-t_2)	*Kv (in/hr)
1	22.000	56.000	0.331	0.017	33.4107
2	45.000	33.000	0.860	0.017	53.3233
3	71.000	7.000	2.411	0.017	156.3467
4	78.000	0.000	-	0.017	-
5	78.000	0.000	-	0.017	-
10	78.000	0.000	-	0.083	-
15	78.000	0.000	-	0.083	-

PT-1 @ 5 ft



TEST 1 FINAL RESULTS

Time Weighted Average Permeability Coefficient K_m= 19.9671 in/hr

TEST 2 FINAL RESULTS

Time Weighted Average Permeability Coefficient K_m= 16.2054 in/hr

AVERAGE PT-1 @ 5 ft

Time Weighted Average Permeability Coefficient K_m= 18.0863 in/hr

Inspectors Remarks:

DEFINITION OF VARIABLES

*Km= Mean permeability
T = Temperature of permeant (water), in °C
Ln = Natural Logarithmic
t1 = Time at the start of the test in the same units selected for Km
Rt = Ratio of viscosity of water at test temperature to the viscositye of water at 20°C
t2= Time at the end of the test in the units selected for Km
h1= Height of the water above the bottom of the casing at the start of the test in the same units selected for Km
h2= Height of the water above the bottom of the casing at the end of the test in the same units selected for Km

KSE

PT- 2

Sheet 1 of 2

Prepared for:	**Stantec, Inc.**		PROJECT:	Roosevelt Island Lighthouse Park	
			LOCATION / BOROUGH :	Roosevelt Island, NY	
INSPECTOR:	Pradeep Gajurel	DRILLER: Mike Tarter	Start Date:	2/19/2020	Weather: 48°F/Sunny
CONTRACTOR:	Craig Test Boring, Inc.	HELPER: Jimmy Martinez	Start Time:	1:00 PM	
P.E./REP.:					
Depth of PT:	5 ft	Drill Bit Type: Rotary		Weight of Hammer for casing:	140 lbs
Rig Type:	CME 45	Casing Internal Diameter: 4 in		Type of Hammer:	Auto
		Casing Length: 78 in			

ASTM D-6391 – 11
PERMEABILITY COEFFICIENT (Km) FORMULA:

General Formula:

$$K_m = \pi R_t \times \frac{\left[D\left\{Ln\left(\frac{h_1}{h_2}\right)\right\}\right]}{11 \times (t_2 - t_1)}$$

Formula for 4" internal diameter casing (in/hr):

$$K_m = 1.142 R_t \times \frac{\left[Ln\left(\frac{h_1}{h_2}\right)\right]}{(t_2 - t_1)}$$

where:

$$R_t = {2.2902(0.9842^T)}/{T^{0.1702}}$$

PT-2 @ 5 ft

TEST 1

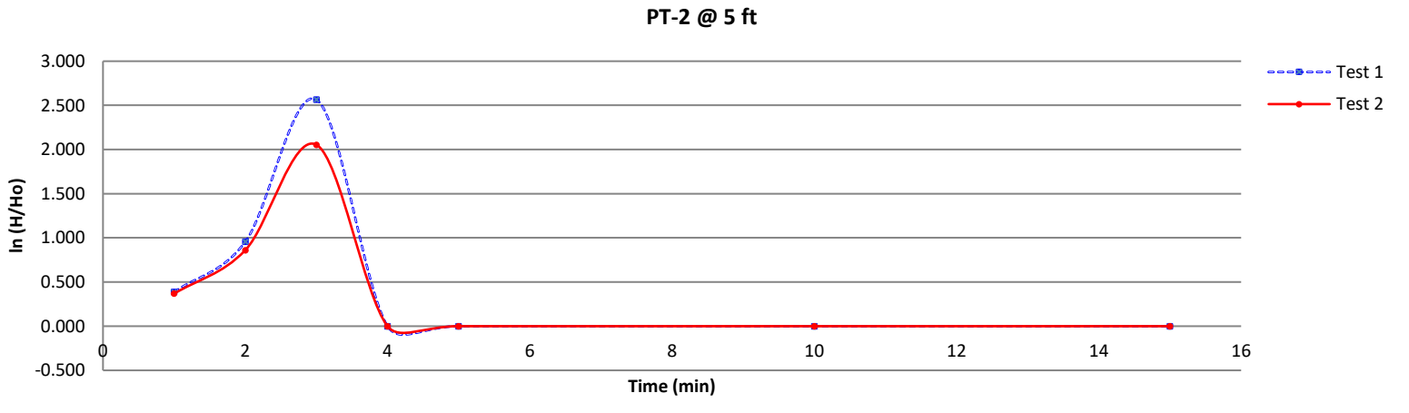
Water temperature (°C), T: 6 Rt= 1.53

FIELD DATA		CALCULATED DATA			
Time (min)	Depth (in)	Height (in)	Ln (H/Ho)	(t_1-t_2)	*Kv (in/hr)
1	25.000	53.000	0.386	0.017	40.6403
2	48.000	30.000	0.956	0.017	59.8529
3	72.000	6.000	2.565	0.017	169.2680
4	78.000	0.000	-	0.017	-
5	78.000	0.000	-	0.017	-
10	78.000	0.000	-	0.083	-
15	78.000	0.000	-	0.083	-

TEST 2

Water temperature (°C), T: 6 Rt= 1.53

FIELD DATA		CALCULATED DATA			
Time (min)	Depth (in)	Height (in)	Ln (H/Ho)	(t_1-t_2)	*Kv (in/hr)
1	24.000	54.000	0.368	0.017	38.6744
2	45.000	33.000	0.860	0.017	51.7948
3	68.000	10.000	2.054	0.017	125.5674
4	78.000	0.000	-	0.017	-
5	78.000	0.000	-	0.017	-
10	78.000	0.000	-	0.083	-
15	78.000	0.000	-	0.083	-



TEST 1 FINAL RESULTS

Time Weighted Average Permeability Coefficient K_m= 17.9841 in/hr

TEST 2 FINAL RESULTS

Time Weighted Average Permeability Coefficient K_m= 14.4024 in/hr

AVERAGE PT-2 @ 5 ft

Time Weighted Average Permeability Coefficient K_m= 16.1933 in/hr

Inspectors Remarks:

DEFINITION OF VARIABLES

*Km= Mean permeability
T = Temperature of permeant (water), in °C
Ln = Natural Logarithmic
t1 = Time at the start of the test in the same units selected for Km
Rt = Ratio of viscosity of water at test temperature to the viscositye of water at 20°C
t2= Time at the end of the test in the units selected for Km
h1= Height of the water above the bottom of the casing at the start of the test in the same units selected for Km
h2= Height of the water above the bottom of the casing at the end of the test in the same units selected for Km

APPENDIX B

LABORATORY TEST RESULTS

KSE
KS Engineers, P.C.

LABORATORY
100 Valley Road
Mt. Arlington NJ 07856

Date: 3/13/2020
Client: Stantec, Inc.
Project Name: Roosevelt Park Lighthouse
Project ID: 19-2313

Moisture Content Determination

Boring Number	Sample Number	Depth (ft)	Moisture Content (%)
B-1	S-1	0'-2'	14.3
B-2	S-2	3'-5'	12.5
B-2	S-4	7'-9'	13.1
B-3	S-3	4'-6'	12.4
B-3	S-6	10'-12'	83.8
B-3	S-8	20'-22'	17.0
B-4	S-1	0'-2'	7.7
B-4	S-4	6'-8'	21.0
B-5	S-2	2'-4'	12.8
B-5	S-5	8'-10'	15.9
B-6	S-7	15'-17'	22.0
B-6	S-8	20'-22'	61.9
B-6	S-10	30'-32'	11.7
B-7	S-1	0'-2'	9.3
B-7	S-3	4'-6'	15.9
B-8	S-2	2'-4'	9.4
B-8	S-4	6'-8'	10.9

Notes/Remarks:_____
_____
_____

KS Engineers, P.C.

LABORATORY
100 Valley Road
Mt. Arlington NJ 07856

Client: Stantec, Inc
Project Name: Roosevelt Park Lighthouse
Project ID: 19-2313
Date: 3/13/2020

pH Determination

Boring Number	Sample Number	Depth (ft)	pH
B-2	S-2	3'-5'	7.70
B-4	S-4	6'-8'	9.95
B-5	S-2	2'-4'	7.10
B-7	S-3	4'-6'	6.71

Notes/Remarks:_____
_____
_____

KS Engineers, P.C.

100 Valley Road
Mt. Arlington NJ, 07856
(973) 810-4820

Client: Stantec, Inc.
Project Name: Roosevelt Park Lighthouse
Project ID: 19-2313
Date: 3/13/2020

Organic Content Determination

Boring Number	Sample Number	Depth (ft)	Organic Content %
B-3	S-6	10'-12'	28.2

Notes/Remarks:_____
_____
_____

KSE
KS Engineers, P.C.

100 Valley Road
Mt. Arlington Nj, 07856
(973) 810-4820

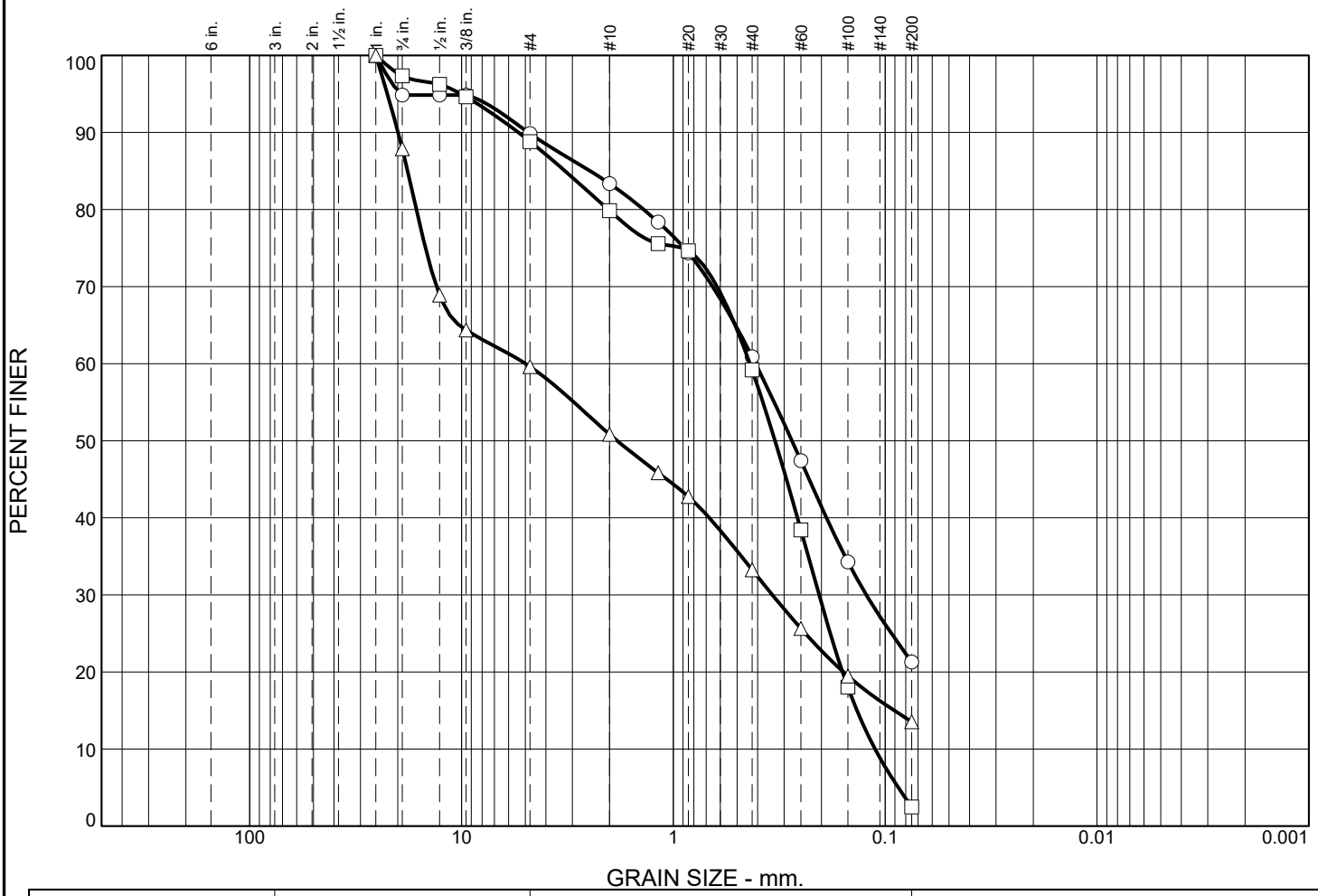
Client: Stantec, Inc.
Project Name: Roosevelt Park Lighthouse
Project #: 19-2313

Atterberg Limits Determination

Boring No:	Sample No:	Depth (ft.)	Description	Liquid Limit	Plastic Limit	Plastic Index	USCS Symbol
B-3	S-6	10'-12'	Gray Silty Clay	78	46	32	MH
B-6	S-8	20'-22'	Gray CLAY & SILT	54	35	19	ML

Note: * Sample description and USCS Symbol based on Atterberg Limits Analysis.

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	5.2	4.9	6.5	22.5	39.6	21.3	
□	0.0	2.6	8.6	9.0	20.6	56.7	2.5	
△	0.0	12.1	28.3	8.8	17.5	19.8	13.5	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				2.4724	0.4092	0.2755	0.1227				
□				3.2476	0.4354	0.3313	0.2051	0.1360	0.1116	0.87	3.90
△				17.9803	4.9857	1.8426	0.3408	0.0906			

Material Description	USCS	AASHTO
○ Dark Brown silty sand	SM	
□ Light Brown poorly graded sand	SP	
△ Brown silty sand with gravel	SM	

Project No. 19-2313 **Client:** Stantec, Inc

Project: Roosevelt Park Lighthouse

○ **Location:** B-1 **Depth:** 0-2 **Sample Number:** S-1

□ **Location:** B-2 **Depth:** 3'-5' **Sample Number:** S-2

△ **Location:** B-2 **Depth:** 7'-9' **Sample Number:** S-4

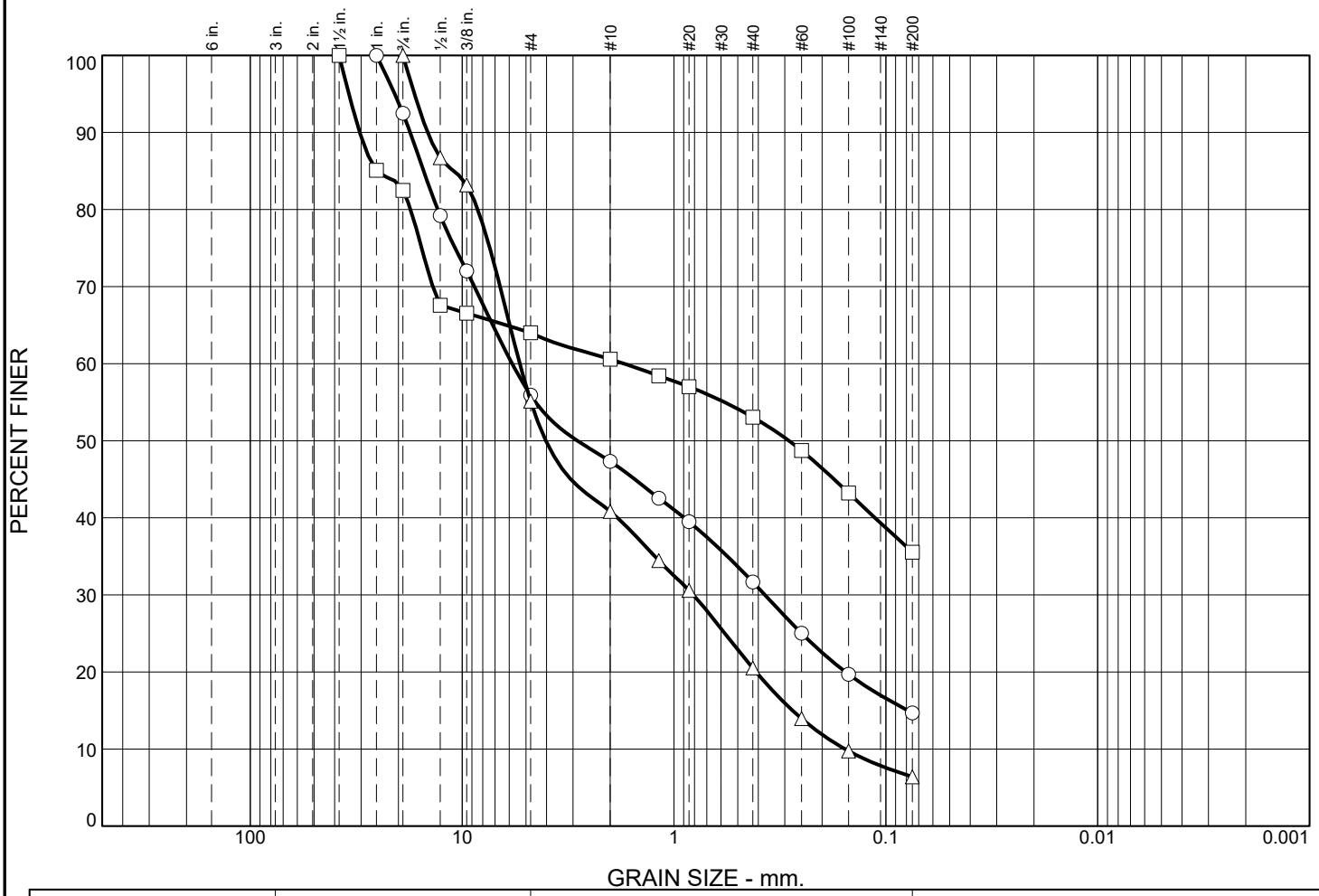
Date: ○ 3/13/2020 □ 3/13/2020 △ 3/13/2020

Remarks:

KSE
KS Engineers, P.C.

Tested By: Rosa Villa **Checked By:** Pradeep Ullikashi

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	7.5	36.6	8.6	15.6	17.0	14.7	
□	0.0	17.5	18.5	3.4	7.5	17.6	35.5	
△	0.0	0.0	44.9	14.3	20.3	14.1	6.4	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				15.1974	5.8115	2.8678	0.3725	0.0787			
□				25.2239	1.7194	0.2868					
△				10.9569	5.3488	4.0251	0.8120	0.2759	0.1559	0.79	34.30

Material Description	USCS	AASHTO
○ Dark Brown silty gravel with sand	GM	
□ Brown silty gravel with sand	GM	
△ Brown poorly graded sand with silt and gravel	SP-SM	

Project No. 19-2313 **Client:** Stantec, Inc

Project: Roosevelt Park Lighthouse

○ **Location:** B-3 **Depth:** 4'-6' **Sample Number:** S-3

□ **Location:** B-3 **Depth:** 20'-22' **Sample Number:** S-8

△ **Location:** B-4 **Depth:** 0'-2' **Sample Number:** S-1

Date: ○ 3/13/2020 □ 3/13/2020 △ 3/13/2020

Remarks:

KSE
KS Engineers, P.C.

Tested By: Rosa Villa **Checked By:** Pradeep Ullikashi

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	22.0	18.4	24.2	23.4	12.0	
□	0.0	15.4	15.6	9.0	14.2	23.9	21.9	
△	0.0	12.8	9.5	3.5	12.5	47.4	14.3	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				6.9571	2.0422	1.0485	0.3237	0.1146			
□				19.2811	2.0089	0.6188	0.1420				
△				15.1140	0.3967	0.2873	0.1636	0.0790			

Material Description	USCS	AASHTO
○ Light Gray poorly graded sand with silt and gravel	SP-SM	
□ Light Brown silty sand with gravel	SM	
△ Brown silty sand with gravel	SM	

Project No. 19-2313 **Client:** Stantec, Inc

Project: Roosevelt Park Lighthouse

○ **Location:** B-4 **Depth:** 6'-8' **Sample Number:** S-4

□ **Location:** B-5 **Depth:** 2'-4' **Sample Number:** S-2

△ **Location:** B-5 **Depth:** 8'-10' **Sample Number:** S-5

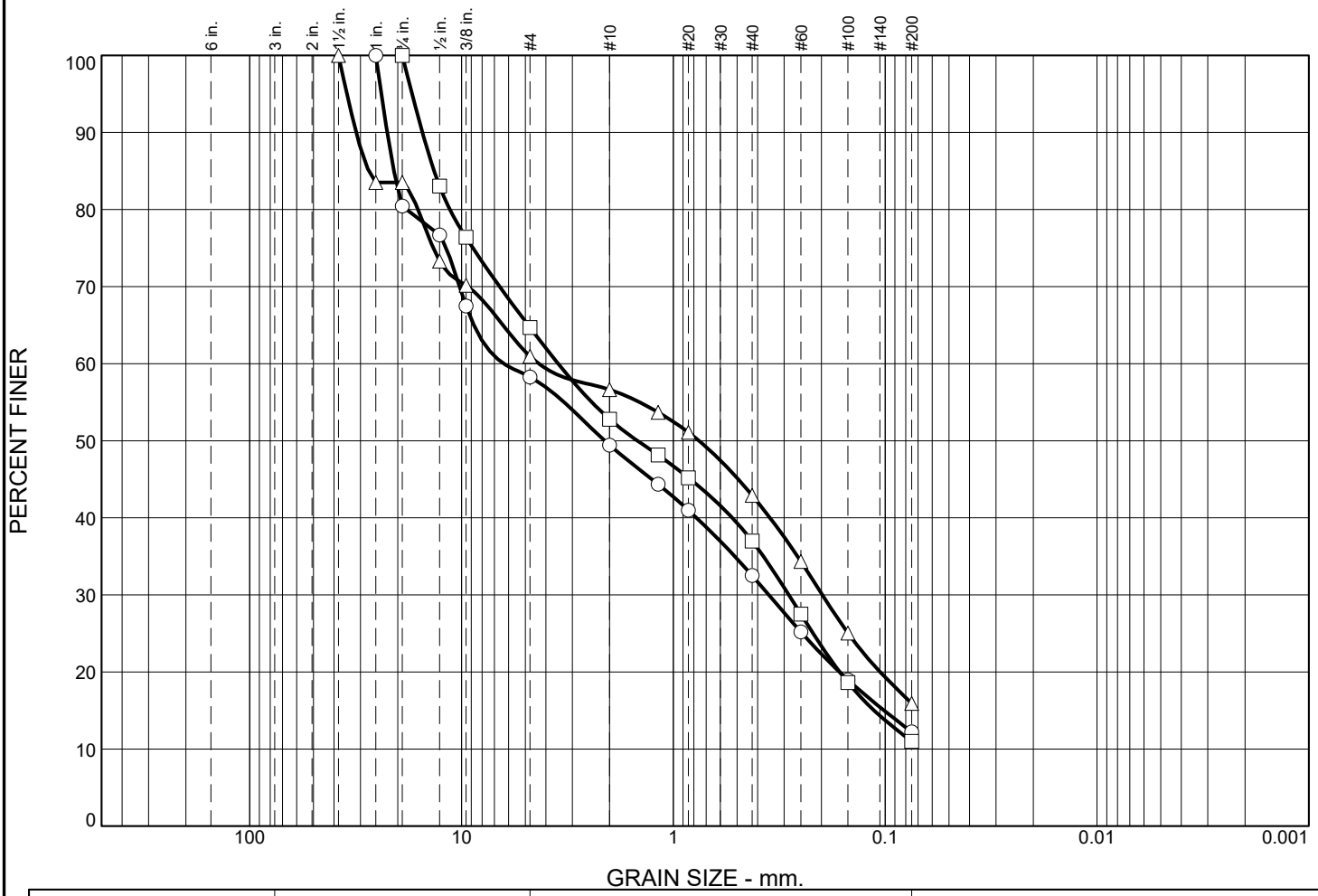
Date: ○ 3/13/2020 □ 3/13/2020 △ 3/13/2020

Remarks:

KSE
KS Engineers, P.C.

Tested By: Rosa Villa **Checked By:** Pradeep Ullikashi

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	19.5	22.2	8.9	16.9	20.3	12.2	
□	0.0	0.0	35.3	11.9	15.8	26.0	11.0	
△	0.0	16.5	22.5	4.4	13.7	27.0	15.9	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				20.8478	6.3252	2.1078	0.3541	0.1012			
□				13.4648	3.4974	1.4749	0.2853	0.1127			
△				27.4291	4.3188	0.7570	0.1979				

Material Description	USCS	AASHTO
○ Brown silty sand with gravel	SM	
□ Brwon poorly graded sand with silt and gravel	SP-SM	
△ Brown silty sand with gravel	SM	

Project No. 19-2313 **Client:** Stantec, Inc

Project: Roosevelt Park Lighthouse

○ **Location:** B-6 **Depth:** 15'-17' **Sample Number:** S-7

□ **Location:** B-6 **Depth:** 30'-32' **Sample Number:** S-10

△ **Location:** B-7 **Depth:** 0'-2' **Sample Number:** S-1

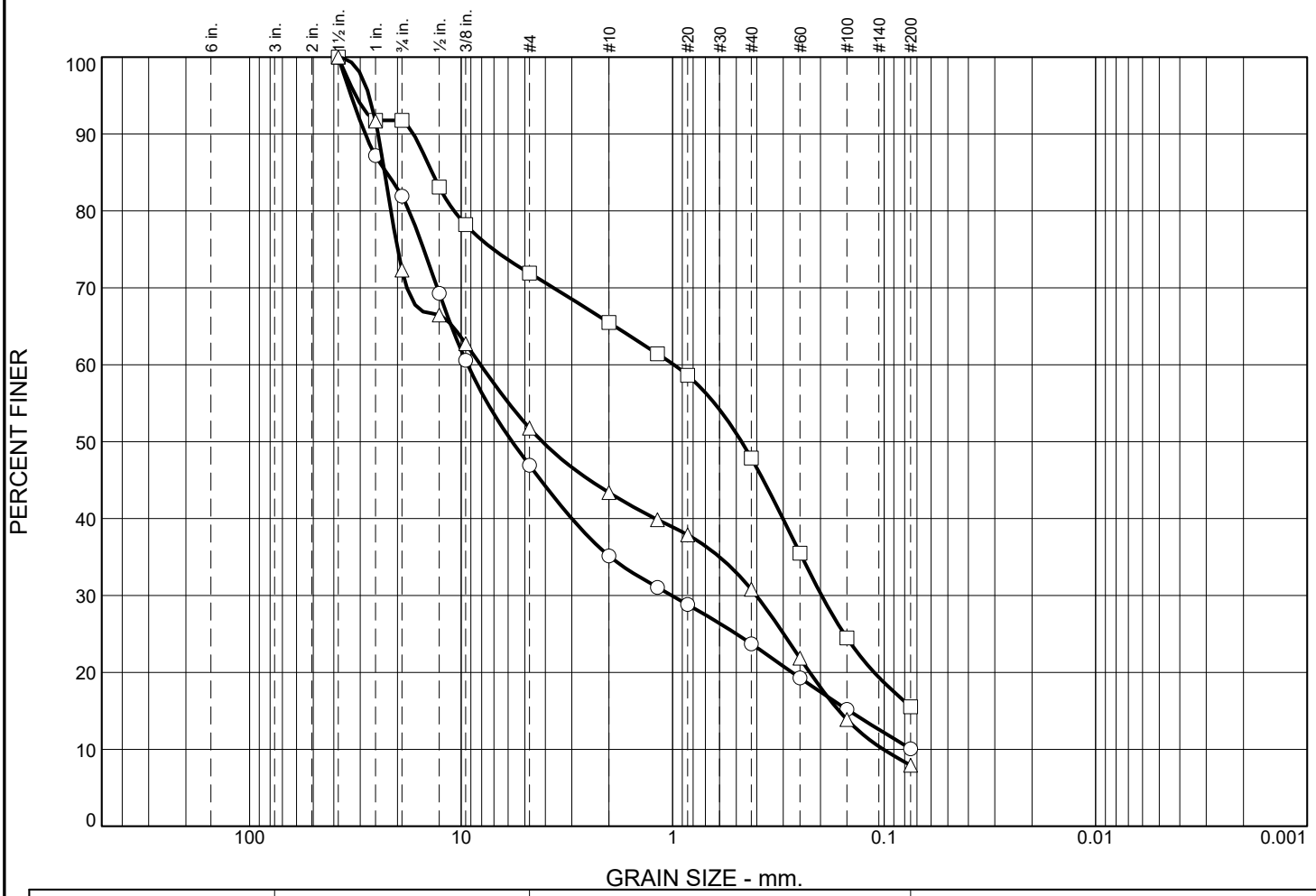
Date: ○ 3/13/2020 □ 3/13/2020 △ 3/13/2020

Remarks:

KSE
KS Engineers, P.C.

Tested By: Rosa Villa **Checked By:** Pradeep Ullikashi

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	18.1	35.0	11.7	11.5	13.6	10.1	
□	0.0	8.2	19.9	6.4	17.6	32.4	15.5	
△	0.0	27.7	20.5	8.4	12.6	22.9	7.9	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				22.5679	9.3164	5.7375	1.0081	0.1464			
□				13.7153	0.9863	0.4724	0.1973				
△				22.9767	8.1055	4.1276	0.4027	0.1634	0.1009	0.20	80.32

Material Description	USCS	AASHTO
○ Gray poorly graded gravel with silt and sand	GP-GM	
□ Brown silty sand with gravel	SM	
△ Brown poorly graded gravel with silt and sand	GP-GM	

Project No. 19-2313 **Client:** Stantec, Inc

Project: Roosevelt Park Lighthouse

○ **Location:** B-7 **Depth:** 4'-6' **Sample Number:** S-3

□ **Location:** B-8 **Depth:** 2'-4' **Sample Number:** S-2

△ **Location:** B-8 **Depth:** 6'-8' **Sample Number:** S-4

Date: ○ 3/13/2020 □ 3/13/2020 △ 3/13/2020

Remarks:

KSE
KS Engineers, P.C.

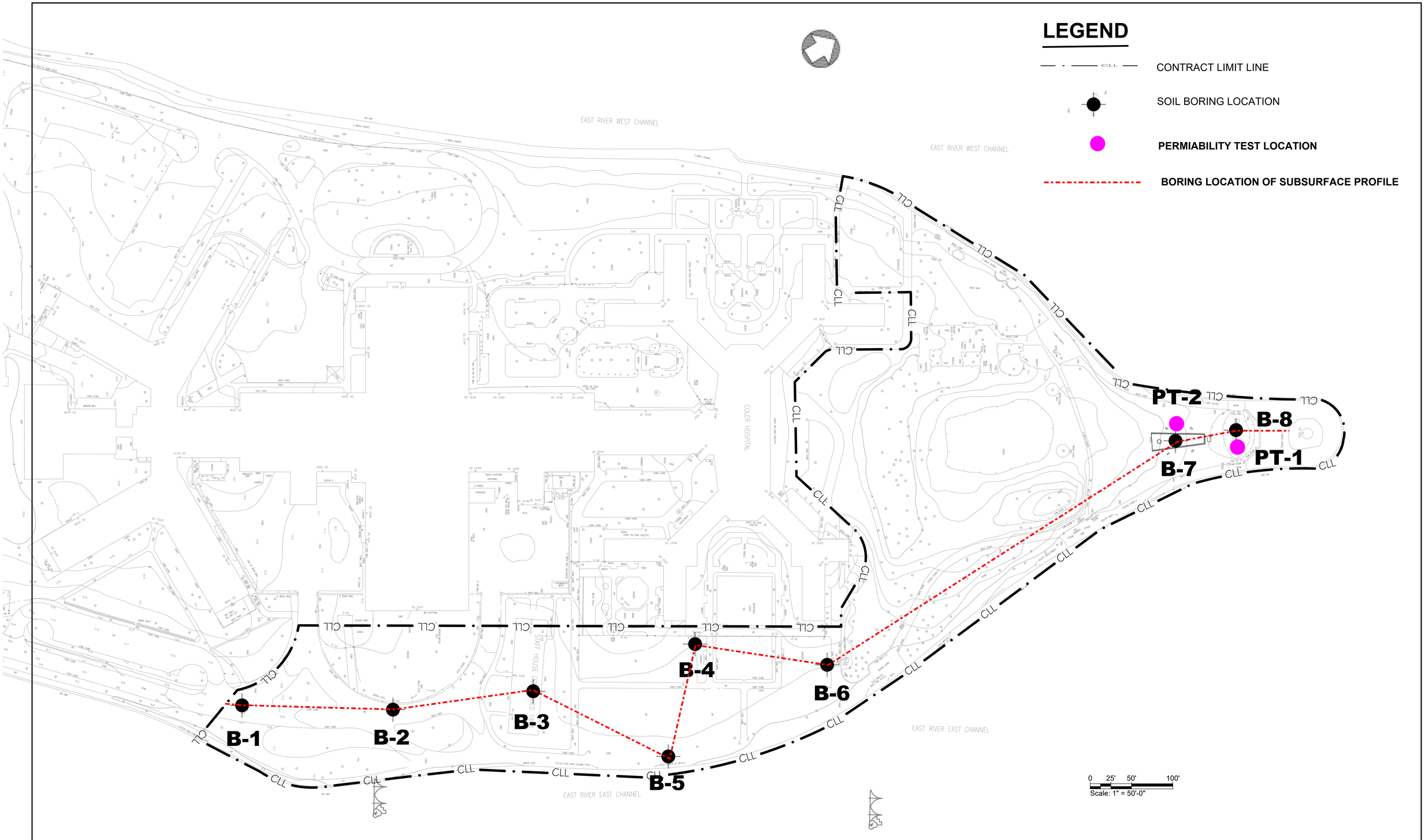
Tested By: Rosa Villa **Checked By:** Pradeep Ullikashi

APPENDIX C

SUBSURFACE PROFILE

1. BORING LOCATION OF SUBSURFACE PROFILE

2. SUBSURFACE PROFILE ALONG PROJECT SITE



BORING LOCATION OF SUBSURFACE PROFILE

KSE
494 Broad Street
Newark, NJ 07102

SUBSURFACE PROFILE ALONG THE PROJECT SITE

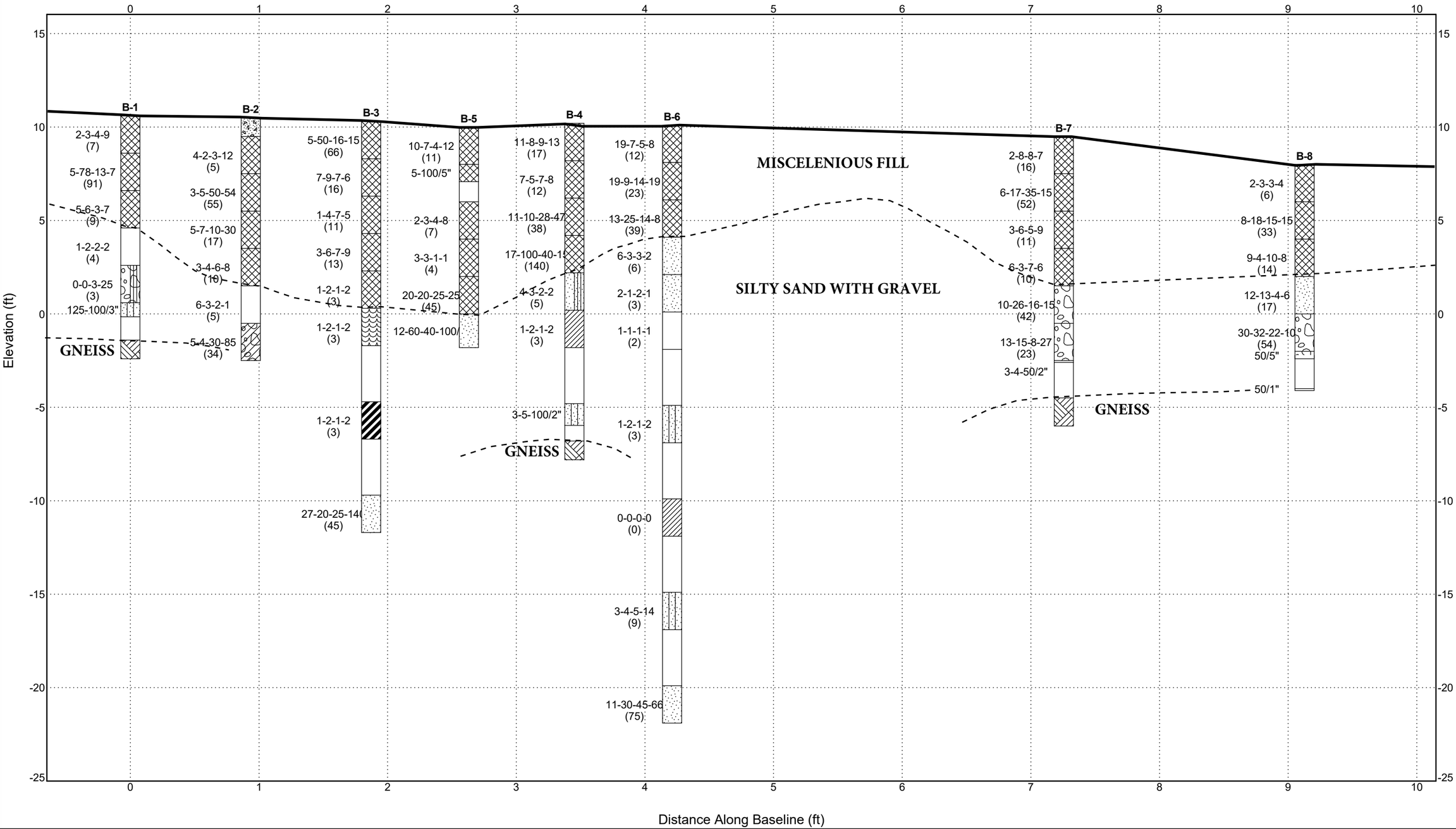
CLIENT Stantec

PROJECT NUMBER 2020-2313

PROJECT NAME Roosevelt Park Lighthouse

PROJECT LOCATION Roosevelt Island, Borough of Manhattan, New York

- Fill (made ground)
- Bedrock
- USCS High Plasticity Organic silt or clay
- USCS Poorly-graded Sand with Silt
- USCS Poorly-graded Gravel with Silt
- Concrete
- USCS High Plasticity Clay
- USCS Low Plasticity Clay
- USCS Silty Sand
- USCS Clayey Gravel
- USCS Poorly-graded Sand
- USCS Poorly-graded Gravel



APPENDIX D

SEISMIC DESIGN PARAMETERS

Roosevelt Island Lighthouse Park

Latitude, Longitude: 40.77227972, -73.94053360

Date	3/12/2020, 3:05:01 PM
Design Code Reference Document	IBC-2015
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	0.279	MCE_R ground motion. (for 0.2 second period)
S_1	0.072	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.44	Site-modified spectral acceleration value
S_{M1}	0.172	Site-modified spectral acceleration value
S_{DS}	0.293	Numeric seismic design value at 0.2 second SA
S_{D1}	0.115	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	B	Seismic design category
F_a	1.577	Site amplification factor at 0.2 second
F_v	2.4	Site amplification factor at 1.0 second
PGA	0.167	MCE_G peak ground acceleration
F_{PGA}	1.465	Site amplification factor at PGA
PGA_M	0.245	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
SsRT	0.279	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.32	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.072	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.079	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.6	Factored deterministic acceleration value. (Peak Ground Acceleration)

Type	Value	Description
C_{RS}	0.872	Mapped value of the risk coefficient at short periods
C_{R1}	0.906	Mapped value of the risk coefficient at a period of 1 s