

CEQR GEIS

# Greenhouse

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CONSULTANTS incorporated

**RECEIVED**  
ENVIRONMENTAL REVIEW

**AUG 30 1990**

MEMORANDUM TO: Ms. Louise Basa, N.Y.S.D.E.C.

LANDMARKS PRESERVATION  
COMMISSION

FROM: William I. Roberts IV, Principal Investigator

DATE: 17 August 1990

*Title*  
SUBJECT:

Wards Island *Water Pollution Control Project* Soil Boring Report

In response to a request by Stone & Webster Engineering Corporation regarding the impacts of the proposed construction of the Indoor Curing Bunker, the Process Area, the Sludge Area and the Emergency Curing Area on potential archaeological resources at the Wards Island W.P.C.P., we have analysed a series of twentieth century maps as well as a series of Boring logs and a location map for the planned structures supplied to us by Stone & Webster.

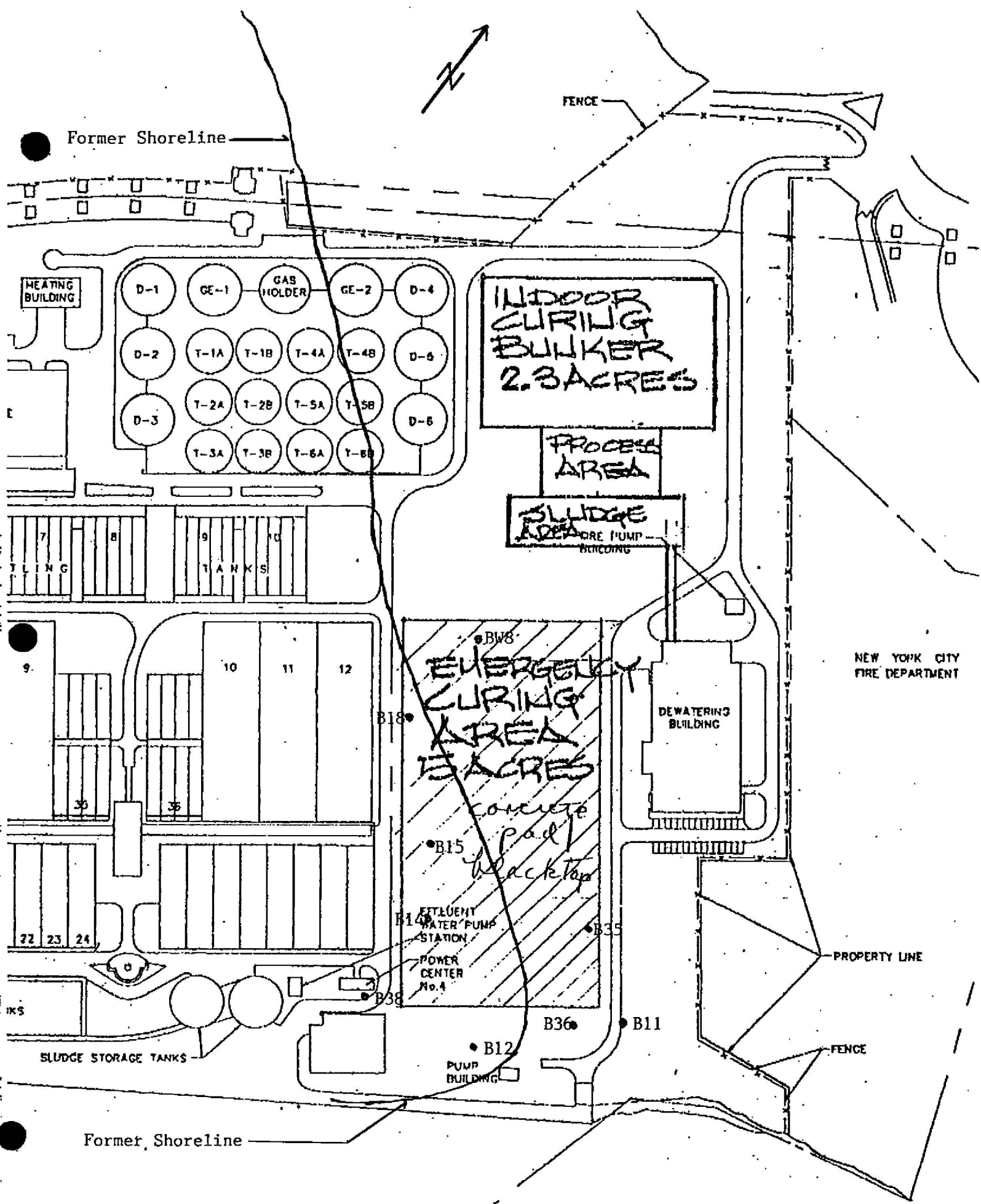
A detailed comparison of the 1966 (photorevised 1979) U.S.G.S 7.5 minute Central Park quadrangle with the 1909, 1937, 1941 and 1969 U.S. Coast and Geodetic Survey Maps proves that the locations of the proposed Indoor Curing Bunker, the Process Area and the Sludge Area are all within the former location of the Little Hellgate Channel. This is also the case for the northern half of the Emergency Curing Area. The attached figure shows the 1937 shoreline running diagonally across the proposed Emergency Curing Area footprint. This cartographic evidence shows that all of the proposed structures excepting the southern half of the Emergency Curing Area will be constructed on this filled waterway and therefore will not impact any potential cultural resources, as discussed in our April 1990 report (Roberts et al 1990:3-4).

Data from soil borings was then consulted to determine whether the southern portion of the proposed Emergency Curing Area could impact the original land surface along the former coast of Wards Island. Borings B-12, B-14, B-15, B-18 and B-38 are within the former land area. All include evidence of fill ranging in thickness from 5.5 to 14.5 feet. Borings B-11, B-35, B-36 and Boring Well BW-8 which are located within the area of the filled Little Hellgate Channel from 12.8 to 16.5 feet thick and possibly thicker. Since the excavation depth of the proposed Emergency Curing Area is only 4.0 feet, it is our conclusion that construction of this proposed structure will not affect any potential archaeological resources that may exist of the former land surface buried beneath the fill.

Please find enclosed copies of logs for Borings B-11, B-12, B-14, B-15, B-18, B-35, B-36, B-38, and Boring Well BW-8, as well as a figure illustrating the proposed building footprints and the 1937 shoreline.

cc: Dan Samela and Kathleen O'Halloran, Stone & Webster Engineering Corp.

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**Stone & Webster  
Engineering Corporation**

**BORING LOG**

**Boring B11**  
J.O. 18676.20  
Sheet 1 of 1

**Site: WARDS ISLAND WPCP**

**Client: NYCDEP/DHMP**

**Coordinates: North 1228.506 East 336.255**

**Groundwater Depth: 11.8 ft on 11/10/89**

**Contractor: Warren George, Inc.**

**Depth to Bedrock:**

**Driller: Dave Osuch**

**Logged by: R Kranes**

**Date Start - Finish: 11/10/89 - 11/10/89**

**Ground Elevation: 11.62 ft**

**Total Depth Drilled: 14.0 ft**

**Rig Type: Mobile B61**

**Methods:**

**Casing Used: None**

**Drilling Soil: 6" O.D. hollow stem auger.**

**Sampling Soil: Continuous sampling using a 3" O.D. split spoon driven by a 300 pound hammer.**

**Drilling Rock: None**

**Comments: Borehole cement grouted.**

Elev (ft)	Depth (ft)	Sample		Blows or Recovery RQD	SPT N Value	USC Symbol	Sample Description
		Type	No.				
11.6	0	S	1	(17')		SM	FILL - TOPSOIL with organics, brick fragments, cinders(?), and other debris.
10		S	2	(22')		ML	FILL - SANDY SILT with cinders(?), concrete, brick, wood pieces, and gravel.
5		S	3	(10')		ML	FILL - Same as above.
5		S	4	(9')		N/A	FILL - Cinders(?) and brick fragments to 3".
		S	5	(17')		N/A	FILL - Top 5": Black cinders(?). Bottom 12": Concrete.
10		S	6	(12')		SM	FILL - SILTY SAND with gravel to 2-1/2".
0		S	7	(9')		N/A	FILL - Black cinders and brick with silty mud layers.
15							END OF BORING AT 14.0 FT.
-5							
20							
-10							

**Legend/Notes**

- Datum is Borough of Manhattan
- $\nabla$  indicates groundwater level.
- $\blacksquare$  indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
- Recovery = % rock core recovery.
- RQD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.
- $\blacksquare$  indicates use of 300 pound hammer.

**Sample Type:**

**S = 3" O.D. SPLIT SPOON**

Approved

Date

03/08/90

**Stone & Webster  
Engineering Corporation**

**BORING LOG**

**Boring B12**  
J.O. 18676.20  
Sheet 1 of 1

Site: WARDS ISLAND WPCP

Client: NYCDEP/DHMP

Coordinates: North 994.149 East 354.695

Groundwater Depth: 10.0 ft on 11/12/89

Contractor: Warren George, Inc.

Depth to Bedrock:

Driller: Dave Osuch

Logged by: R Kranes

Date Start - Finish: 11/11/89 - 11/12/89

Ground Elevation: 9.75 ft

Total Depth Drilled: 14.0 ft

Rig Type: Mobile B61

Methods:

Casing Used: None

Drilling Soil: 6" O.D. hollow stem auger.

Sampling Soil: Continuous sampling using a 3" O.D. split spoon driven by a 300 pound hammer.

Drilling Rock: None

Comments: Borehole cement grouted.

Elev (ft)	Depth (ft)	Sample		Blows or Recovery RQD	SPT N Value	USC Symbol	Sample Description
		Type	No.				
9.8	0	S	1	(23")		SM-SP	FILL - Top 6": TOPSOIL with organics.
		S	2	(8")		N/A	Next 12": SAND.
		S	3	(14")		N/A	Bottom 5": Concrete.
5	5	S	4	N/A		N/A	FILL - GRAVEL to 1-1/2" and construction debris.
		S	5	(9")		N/A	FILL - Tan SAND, GRAVEL, and SILT with concrete fragments to 2-1/2".
		S	6	(10")		N/A	FILL - Same as above.
0	10	S	7	(6")		SP	FILL - Same as above.
							FILL - SAND, SILT, and GRAVEL (to 3").
							FILL - SAND, diesel fuel on spoon.
-5	15						END OF BORING AT 14.0 FT.
-10	20						

**Legend/Notes**

- Datum is Borough of Manhattan
- ∇ indicates groundwater level.
- █ indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
- Recovery = % rock core recovery.
- RQD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.
- \* indicates use of 300 pound hammer.

• Sample Type:

S = 3" O.D. SPLIT SPOON

Approved

Date

02/16/90

**Stone & Webster  
Engineering Corporation**

**BORING LOG**

**Boring B14**

**J.O. 18676.20**

**Sheet 1 of 1**

**Site: WARDS ISLAND WPCP**

**Client: NYCDEP/DHMP**

**Coordinates: North 905.494 East 179.577**

**Groundwater Depth: 18.0 ft on 11/14/89**

**Contractor: Warren George, Inc.**

**Depth to Bedrock:**

**Driller: Dave Osuch**

**Logged by: AR Fitzpatrick**

**Date Start - Finish: 11/14/89 - 11/14/89**

**Ground Elevation: 15.41 ft**

**Total Depth Drilled: 20.0 ft**

**Rig Type: Mobile B61**

**Methods:**

**Casing Used: None**

**Drilling Soil: 6" O.D. hollow stem auger.**

**Sampling Soil: Continuous sampling using a 3" O.D. split spoon driven by a 300 pound hammer.**

**Drilling Rock: None**

**Comments: Borehole cement grouted.**

Elev (ft)	Depth (ft)	Sample		Blows or Recovery RQD	SPT N Value	USC Symbol	Sample Description
		Type	No.				
15.4	0	S	1	(20")		N/A	FILL - Top 10": TOPSOIL with organics. Bottom 10": Rock fragments. NOTE: White powder on outside of sample.
		S	2	(5")		N/A	FILL - 4" piece of rock, some topsoil.
		S	3	(10")		SP	FILL - Gray SAND with gravel and rock fragments. Petroleum odor.
10	5	S	4	(16")		SP	FILL - Same as above.
		S	5	(23")		SP	NOTE: Location of S5 is 4 ft east of other samples. FILL - Top 8": Brown SAND, medium, with pieces of rock. Next 5": Broken rock, brick, and 3" of wood. Bottom 10": Gray SAND with pieces of rock. Petroleum odor.
5	10	S	6	(3")		N/A	FILL - Gray to black SILTY SAND with rock fragments, some gravel, sticky. Noted petroleum odor.
		S	7	(4")		N/A	FILL - WOOD and small black gravel, some sand, rock fragments, saturated with oil.
		S	8	(6")		N/A	NOTE: Location of S8 is 4 ft east of other samples. FILL - WOOD and medium SAND.
0	15	S	9	(18")		SP	FILL - Top 10": Black SAND, medium, saturated with oil. Bottom 8": Brown SAND, medium.
		S	10	(4")		SP	FILL - SAND, medium to coarse, saturated with oil.
-5	20						END OF BORING AT 20.0 FT.

**Legend/Notes**

- Datum is Borough of Manhattan
- ▽ indicates groundwater level.
- ■ indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
- Recovery = % rock core recovery.
- RQD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.
- indicates use of 300 pound hammer.

**Sample Type:**

**S = 3" O.D. SPLIT SPOON**

Approved  
*[Signature]*

Date  
**02/14/90**

**Stone & Webster  
Engineering Corporation**

**BORING LOG**

**Boring B15**  
J.O. 18676.20  
Sheet 1 of 1

Site: **WARDS ISLAND WPCP**

Client: **NYCDEP/DHMP**

Coordinates: **North 911.512 East 73.541**

Groundwater Depth: **15.0 ft on 11/11/89**

Contractor: **Warren George, Inc.**

Depth to Bedrock:

Driller: **Greg Marney**

Logged by: **PJ Trudeau**

Date Start - Finish: **11/11/89 - 11/11/89**

Ground Elevation: **15.68 ft**

Total Depth Drilled: **20.0 ft**

Rig Type: **Falling F6**

Methods:

Casing Used: **None**

Drilling Soil: **6" O.D. hollow stem auger.**

Sampling Soil: **Continuous sampling using a 3" O.D. split spoon driven by a 300 pound hammer.**

Drilling Rock: **None**

Comments: **Borehole cement grouted.**

Elev (ft)	Depth (ft)	Sample		Blows or Recovery RQD	SPT N Value	USC Symbol	Sample Description
		Type	No.				
15.7	0	S	1	(15")		SP	FILL - Dark brown GRAVELLY SAND with 5" broken red brick at bottom.
15		S	1	(17.5")		SP	"Duplicate" sample taken at ~2' north of original location of B15. Sample similar to S1, except included some broken concrete.
		S	2	(20")		SP	FILL - Similar to above, except bottom 16" was darker brown and noted diesel odor.
		S	3	(18")		SP	FILL - Similar to above, except has small pockets of tan powdery substance.
10	5	S	4	(15")		SP	FILL - Dark Brown SAND, fine to medium grained, with few pieces of gravel to 1-1/2", uniform, fine, brown sand at bottom, with <5% nonplastic fines.
		S	5	(2")		SP	FILL - Dark brown SAND with few pieces gravel to 1".
5	10	S	6	(1")		SP	FILL - Same as above.
		S	7	(23")		SP SP	FILL - Top 4": Same as above. Bottom 19": Similar to above, except color changed to grayish brown and sample was moister and slightly plastic near bottom, and noted strong odor of diesel fuel.
		S	8	(14")		SC	FILL - CLAYEY SAND with many lenses of black, micaceous fine sand. Sample noticeably wet on outside edge ~12" up from the bottom.
0	15	S	9	(10")		SC	FILL - Same as above, except wet throughout entire sample.
		S	10	(18")		SC SM SC	FILL - Top 6": Brownish gray CLAYEY SAND. Next 6": Very dark gray SILTY SAND, mostly fine, with several pieces of gravel to 2-1/2". Bottom 6": Same as top 6".
-5	20						END OF BORING AT 20.0 FT.

**Legend/Notes**

- Datum is Borough of Manhattan
- ∇ indicates groundwater level.
- █ indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
- Recovery = % rock core recovery.
- RQD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.
- █ indicates use of 300 pound hammer.

• Sample Type:

S = 3" O.D. SPLIT SPOON

Approved

Date

02/16/90

**Stone & Webster  
Engineering Corporation**

**BORING LOG**

**Boring B18**  
J.O. 18676.20  
Sheet 1 of 1

Site: **WARDS ISLAND WPCP**

Client: **NYCDEP/DHMP**

Coordinates: **North 879.064 West 256.317**

Groundwater Depth: **14.0 ft on 11/11/89**

Contractor: **Warren George, Inc.**

Depth to Bedrock:

Driller: **Dave Osuch**

Logged by: **R Kranes**

Date Start - Finish: **11/11/89 - 11/11/89**

Ground Elevation: **17.37 ft**

Total Depth Drilled: **18.0 ft**

Rig Type: **Mobile B61**

Methods:

Casing Used: **None**

Drilling Soil: **6" O.D. hollow stem auger.**

Sampling Soil: **Continuous sampling using a 3" O.D. split spoon driven by a 300 pound hammer.**

Drilling Rock: **None**

Comments: **Borehole cement grouted.**

Elev (ft)	Depth (ft)	Sample		Blows or Recovery RQD	SPT N Value	USC Symbol	Sample Description
		Type	No.				
17.4	0	S	1	(18")		SP-SM	FILL - Top 6": SILTY SAND with organics (TOPSOIL). Bottom 12": Tan SILTY SAND with weathered concrete and other debris.
15		S	2	(17")		SM	FILL - Tan SILTY SAND with gravel to 3".
		S	3	(15")		SM	FILL - Tan SILTY SAND with occasional gravel to 1-1/2".
		S	4	(13")		SM	FILL - Same as above.
10		S	5	(17")		N/A SM	FILL - Top 2": ASPHALT. Bottom 15": SILTY SAND with gravel and some weathered construction debris.
		S	6	(18")		SM	FILL - Similar to above, except included some clay.
5		S	7	(16")		SM	FILL - Tan SILTY SAND with clay, minor amounts of debris, and black shale fragments.
		S	8	(2")		SM	FILL - Gray SILTY SAND, coarse to medium. NOTE: Location is 2 ft west of other samples.
0		S	9	(14")		SM	FILL - Gray SILTY SAND, medium to coarse, with gravel to 1/2".
							END OF BORING AT 18.0 FT.

**Legend/Notes**

- Datum is Borough of Manhattan
- $\nabla$  indicates groundwater level.
- $\blacksquare$  indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
- Recovery = % rock core recovery.
- RQD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.
- $\nabla$  indicates use of 300 pound hammer.

• Sample Type:

S = 3" O.D. SPLIT SPOON

Approved

*[Signature]*

Date

02/14/90

Stone & Webster Engineering Corporation	BORING LOG	Boring B35 J.O. 18676.20 Sheet 1 of 2
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Site: WARDS ISLAND WPCP

Client: NYCDEP/DHMP

Coordinates: North 1177.803 East 184.724

Groundwater Depth: 17.5 ft on 02/16/90

Contractor: Warren George, Inc.

Logged by: R. Kranes

Date Start - Finish: 02/16/90 - 02/16/90

Ground Elevation: 15.71 ft

Total Depth Drilled: 20 ft

Rig Type: Mobile B-61

Methods:

Casing Used: None

Drilling Soil: 6" O.D. hollow stem auger.

Sampling Soil: Continuous sampling using a 3" O.D. split spoon driven by a 300 pound hammer.

Drilling Rock: None

Comments: Borehole cement grouted.

Elev (ft)	Depth (ft)	Sample		Blows or Recovery ROD	SPT N Value	USC Symbol	Sample Description
		Type	No.				
15.7	0	S	1	(23')		SM	FILL - Dark brown SILTY SAND, medium to fine, roots through top 3", 10% gravel to 2", with glass and brick, damp.
15		S	2	(13')		SM PT SM	FILL - Top 3": Same as above. Next 2": Peat Bottom 8": Tan SILTY SAND, mostly fine grained, brick gravel to 1", wood pieces to 1", cinders to 1/2".
		S	3	(11')		SM	FILL - Tan SILTY SAND, Quartz sand top 1 1/2", 5% brick to 1 1/2", 10% peat, other construction debris.
10	5	S	4	(11')		SM MH CL	FILL - Top 4": Same as above. Next 3": Tan SILT, inclusions of black silt and clay, 15% sand. Bottom 4": Orange SILTY CLAY with cinders, 10% gravel to 2", oyster shell to 2", wood to 2 1/2", metal wire 8" x 1/8", damp.
		S	5	(10')		ML	FILL - Dark brown SANDY SILT, gravel to 1", weathered brick, wood, metal, ceramic pieces, cinders, moist.
5	10	S	6	(7')		ML	FILL - Top 1": Gray tan SANDY SILT, gravel to 1", moist. Next 3": BRICK to 3", wood. Bottom 3": Construction debris, broken concrete, wood, weathered brick.
		S	7	(15')			FILL - Construction debris, 80% cinders, 10% wood, 10% brick.

#### Legend/Notes

- Datum is Borough of Manhattan
- $\nabla$  indicates groundwater level.
- $\blacksquare$  indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
- Recovery = % rock core recovery.
- ROD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.
- \* indicates use of 300 pound hammer.

• Sample Type:

S = 3" O.D. SPLIT SPOON

Approved  
*[Signature]*

Date  
04/30/90

Stone & Webster  
Engineering Corporation

BORING LOG

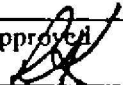
Boring B35  
J.O. 18676.20  
Sheet 2 of 2

Site: WARDS ISLAND WPCP

Logged by: R. Kranes

Elev (ft)	depth (ft)	Sample		Blows or Recovery ROD	SPT N V a l u e	USC Symbol	Sample Description
		Type	No.				
0	15	S	8	(10')		ML	FILL - Top 3': Dark brown-gray SANDY SILT, gravel to 1", damp. Bottom 7': Construction debris, 40% brick, 40% wood, 20% cinders, plastic six pack holder, damp.
		S	9	(18')		ML SW	FILL - Top 6': Same as above. Next 6': Tan GRAVELY SAND, 30% to 40% gravel to 2" X 3". Bottom 6': Black SILTY GRAVEL, gravel to 3", bottom 6" saturated.
		S	10	(16%)		CL GM	FILL - Top 9': Dark brown SILTY CLAY with organics partly decomposed, 20% gravel and sand, brick pieces. Bottom 7': Brown SILTY GRAVEL, 80% gravel up to 3".
-5							END OF BORING AT 20 FT.
-10							
-15							
-20							

Note: See Sheet 1 for Boring Summary and Legend Information

Approved 

Date 04/30/90

Stone & Webster  
Engineering Corporation

BORING LOG

Boring B36  
J.O. 18676.20  
Sheet 1 of 1

Site: WARDS ISLAND WPCP

Client: NYCDEP/DHMP

Coordinates: North 1153.137 East 322.834

Groundwater Depth: 11.5 ft on 02/17/90

Contractor: Warren George, Inc.

Logged by: J. Kaplin

Date Start - Finish: 02/17/90 - 02/17/90

Ground Elevation: 10.01 ft

Total Depth Drilled: 14.0 ft

Rig Type: Mobile B-61

Methods:

Casing Used: None

Drilling Soil: 6" O.D. hollow stem auger.

Sampling Soil: Continuous sampling using a 3" O.D. split spoon driven by a 300 pound hammer.

Drilling Rock: none

Comments: Borehole cement grouted.

Elev (ft)	Depth (ft)	Sample		Blows or Recovery RQD	SPT N Value	USC Symbol	Sample Description
		Type	No.				
10.0	0	S	1	(20")		SM	FILL - Top 3": TOPSOIL, with organics, damp. Bottom 17": Brown SANDY SILT, some clay, stiff, with 20% brick, concrete, damp, glass and other debris.
		S	2	(12")		SM	FILL - Brown SILTY SAND, with gravel, 30% concrete fragments to 2" diameter, brick and other debris.
		S	3	(6")		SM	FILL - Brown SILTY SAND, moist, some clay, rock fragment to 2", concrete and brick fragments to 1/4" diameter.
5	5	S	4	(16")		SM	FILL - Brown SILTY SAND, with clay, some gravel, with 30% concrete pieces to 2" diameter, minor amounts of brick, moist.
		S	5	(20")		SM	FILL - Brown to black SILTY SAND, with some sandy clay, soft, with 30% slag, creosote soaked wood, concrete, plastic, loose, damp.
0	10	S	6	(7")		SP	FILL - Brown SAND, medium grained, with silt, loose, with 80% brick, slag, and concrete pieces to 1" diameter.
		S	7	(6")		SP	FILL - Brown SAND, medium grained, with 80% brick and slag fragments to 1/2" diameter, loose, wet.
-5	15						END OF BORING AT 14 FT

Legend/Notes

- Datum is Borough of Manhattan
- ▽ indicates groundwater level.
- I indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
- Recovery = % rock core recovery.
- RQD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.
- indicates use of 300 pound hammer.

• Sample Type:

S = 3" O.D. SPLIT SPOON

Approved  
*[Signature]*

Date  
04/30/90

Stone & Webster  
Engineering Corporation

BORING LOG

Boring B38  
J.O. 18676.20  
Sheet 1 of 2

Site: WARDS ISLAND WPCP

Client: NYCDEP/DHMP

Coordinates: North 807.907 East 271.122

Groundwater Depth: 14.0 ft on 02/19/90

Contractor: Warren George, Inc.

Logged by: R. Kranes

Date Start - Finish: 02/19/90 - 02/19/90

Ground Elevation: 14.39 ft

Total Depth Drilled: 14.75 ft

Rig Type: Mobile B-61

Depth to Bedrock:

Driller: M. McCarthy

Methods:

Casing Used: None

Drilling Soil: 6" O.D. hollow stem auger.

Sampling Soil: Continuous sampling using a 3" O.D. split spoon driven by a 300 pound hammer.

Drilling Rock: None

Comments: Borehole cement grouted.

Elev (ft)	Depth (ft)	Sample		Blows or Recovery RQD	SPT N Value	USC Symbol	Sample Description
		Type	No.				
14.4	0	S	1	(17")		SM	FILL - Brown TOPSOIL with 10% gravel to 1/2", increased silt toward bottom 2".
		S	2	(18")		SM	FILL - Brown SILTY SAND with gravel to 1 1/2", top 6" moist and 15% silt, bottom 12" 10% silt, occasional asphalt pieces to 2".
10		S	3	(1")			NOTE: Recovered only enough for headspace analysis. No soil description possible.
		S	4	(8")		SM	FILL - Top 2": Light brown SILTY SAND with 20% clay, gravel to 1", brick. Bottom 6": Gray tan silty sand, gravel to 1/2", cinders, small brick fragments.
		S	5				NOTE: Recovered only enough for head space. No soil description possible.
5	10	S	6	(7")		SM	FILL - Top 3": Dark gray SILTY SAND, inclusions of fine tan sand, 5% gravel to 1/4", minor amounts of cinders. Bottom 4": Dark gray SANDY SILT, gravel to 1", brick fragments, cobble 3"x 4" in nose of spoon. Slight petroleum odor. NOTE: Spoon driven to only 11 1/2 ft. Auger to 12 ft.
		S	7	(14")		SP	FILL - Top 1": Cobble 1" x 3" with coarse to medium white sand. Bottom 13": Dark gray and brown SAND medium to fine, 2% silt, 5% gravel to 1 1/2", inclusions of white sand, damp. Strong odor of diesel.

Legend/Notes

- Datum is Borough of Manhattan
- $\nabla$  indicates groundwater level.
- $\blacksquare$  indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
- Recovery = % rock core recovery.
- RQD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.
- \* indicates use of 300 pound hammer.

• Sample Type:  
S = 3" O.D. SPLIT SPOON

Approved  
*[Signature]*

Date  
04/30/90

Stone & Webster  
Engineering Corporation

BORING LOG

Boring B38  
J.O. 18676.20  
Sheet 2 of 2

Site: WARDS ISLAND WPCP

Logged by: R. Kranes

Elev (ft)	depth (ft)	Sample		Blows or Recovery ROD	SPT N value	USC Symbol	Sample Description
		Type	No.				
0	15	S	8	(9')		SP	FILL - Same as above with cobble in spoon trap. Saturated full length.  NOTE: Spoon driven 9' - hit refusal. Strong odor of diesel.  END BORING AT 14' 9" FT.
-5	20						
-10	25						
-15	30						
-20	35						

Note: See Sheet 1 for Boring Summary and Legend Information

Approved *[Signature]*

Date 04/30/90

**Stone & Webster  
Engineering Corporation**

**BORING LOG**

**Boring BW8**  
J.O. 18676.20  
Sheet 1 of 2

Site: WARDS ISLAND WPCP

Client: NYCDEP/DHMP

Coordinates: North 998.228 West 375.810

Groundwater Depth: 21.07 ft on 12/11/89

Contractor: Warren George, Inc.

Depth to Bedrock:

Driller: Greg Marney

Logged by: PJ Trudeau

Date Start - Finish: 11/08/89 - 11/10/89

Ground Elevation: 19.85 ft

Total Depth Drilled: 27.5 ft

Rig Type: Falling F6

Methods:

Casing Used: None

Drilling Soil: 10" O.D. hollow stem auger.

Sampling Soil: Continuous sampling using a 3" O.D. split spoon driven by a 300 pound hammer.

Drilling Rock: None

Comments: Borehole completed as a monitoring well.

Elev (ft)	Depth (ft)	Sample		Blows or Recovery RQD	SPT N Value	USC Symbol	Sample Description
		Type	No.				
19.9	0	S	1	(13")		SP-SM SP	FILL - Top 3": TOPSOIL with many roots. Bottom 10": Dark brown SAND with some silt, several pieces of gravel to 2" maximum, red brick fragments near bottom, and pieces of broken concrete in nose.
		S	2	(14")		SP	FILL - Dark brown GRAVELLY SAND with broken concrete and ~3" piece of red brick in nose.
		S	3	(13")		SP	FILL - Brown GRAVELLY SAND with little silt, only fine gravel, except for broken red brick and ~2" piece of concrete in nose.
15	5	S	4	(0")			1st ATTEMPT: NO RECOVERY.
		S	4A	(4")		SP	2nd ATTEMPT: ~10' north of original location of BW8. FILL - Dark brown GRAVELLY SAND with pockets of dark gray silt and few cinders.
		S	5	(1")		SP	1st ATTEMPT: FILL - SAND with 2 pieces broken concrete.
		S	5A	(15")		ML SP	2nd ATTEMPT: ~10' north of original location of BW8. FILL - Top 9": Dark gray SILT, nonplastic, damp. Bottom 6": Brown GRAVELLY SAND, damp, with several cinders to 2" maximum.
10	10	S	6	(4")		N/A	1st ATTEMPT: FILL - Light brown, friable concrete in nose. Spoon looks wet on outside.
		S	6A	(13")		SP	2nd ATTEMPT: ~10' north of original location of BW8. FILL - Brown GRAVELLY SAND with few cinders and several pieces of broken concrete to 2-1/2" maximum.

**Legend/Notes**

- Datum is Borough of Manhattan
- ∇ indicates groundwater level.
- █ indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
- Recovery = % rock core recovery.
- RQD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.
- █ indicates use of 300 pound hammer.

• Sample Type:

S = 3" O.D. SPLIT SPOON

Approved

*[Signature]*

Date

02/16/90

Stone & Webster  
Engineering Corporation

BORING LOG

Boring BW8  
J.O. 18676.20  
Sheet 2 of 2

Site: WARDS ISLAND WPCP

Logged by: PJ Trudeau

Elev (ft)	depth (ft)	Sample		Blows or Recovery RQD	SPT N Value	USC Symbol	Sample Description
		Type	No.				
		S	7	(3")		CL N/A	FILL - Top 1": Dark gray SANDY CLAY. Bottom 2": Same as S6, but could be sandstone(?), not concrete, with medium to coarse grained sand sizes.
5	15	S	8	(17")		ML SP	FILL - Top 4": Dark gray SILT, nonplastic. Bottom 13": Brown GRAVELLY SAND with broken red brick, cinders(?), and gravel to 1-1/2" maximum.
		S	9	(14")		SP	FILL - Brown GRAVELLY SAND, some silt, moist, but not saturated.
		S	10	(4.5")		SP	FILL - Dark gray SAND, coarse to fine, barely moist.
0	20	S	11	(8")		SP	FILL - Grayish brown GRAVELLY SAND, moist, but not saturated, with ~4" long black rock in nose. Outside of spoon appeared to be wet ~18" up from the bottom.
		S	12	(11")		SP	FILL - Dark grayish brown SAND, fine to medium, with ~4" to 5" of broken, friable, black rock, and one piece of light brown concrete?/sandstone?. Black rock (slag?) has a fine grained structure, ~size of fine sand to silt.
-5	25						
-10	30						

Augered to 27.5' and installed monitoring well. See Appendix C of "Site Assessment Report for Wards Island" for well installation details.

Note: See Sheet 1 for Boring Summary and Legend Information

Approved

Date 02/16/90