Appendix L: 225 Binney Street – Haley & Aldrich Data Package

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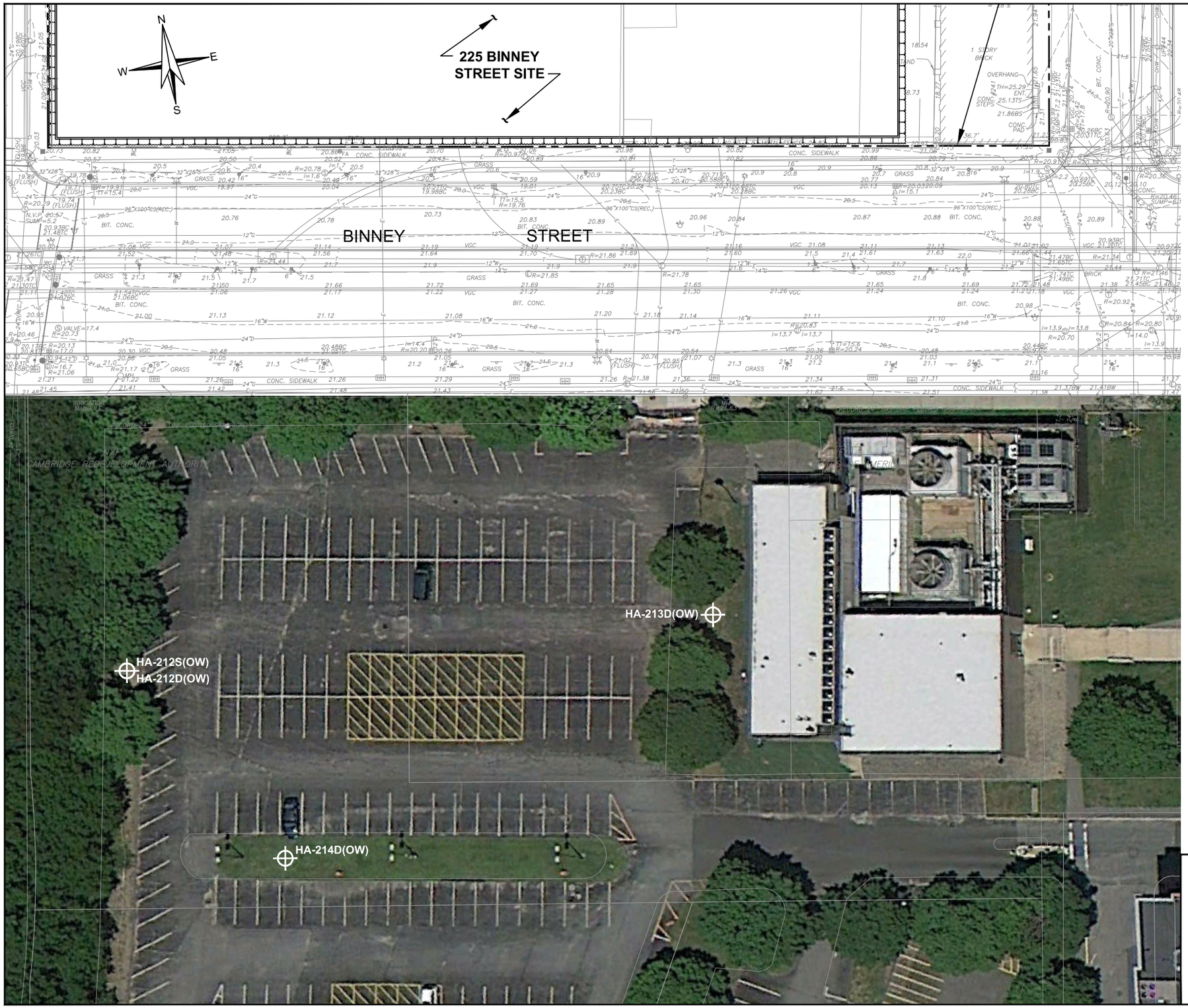


LEGEND:

HA-212S DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING DRILLED BY NORTHERN DRILL SERVICE, INC. OF NORTHBOROUGH, MASSACHUSETTS DURING THE PERIOD 26 APRIL TO 3 MAY 2013

(OW) INDICATES OBSERVATION WELL INSTALLED IN COMPLETED BOREHOLE

NOTES:

1. BASE PLAN TAKEN FROM PLAN ENTITLED "EXISTING CONDITIONS PLAN", PROVIDED BY FELDMAN PROFESSIONAL LAND SURVEYORS DATED 30 AUGUST 2011.
2. LIMITS OF BUILDING FOOTPRINT TAKEN FROM CAD DRAWING "S2.B2 FOUNDATION PLAN", PREPARED BY McNAMARA/SALVIA DATED 15 NOVEMBER 2011.
3. IMAGE OF 225 BINNEY STREET AREA, DATED 18 JUNE 2010, TAKEN ELECTRONICALLY FROM GOOGLE EARTH PRO.
4. ELEVATIONS ARE IN FEET AND REFERENCE THE CAMBRIDGE CITY BASE (CCB) DATUM.

0 40 80

APPROXIMATE SCALE IN FEET

HALEY & ALDRICH

225 BINNEY STREET DEVELOPMENT
CAMBRIDGE, MASSACHUSETTS

GROUNDWATER MONITORING WELL LOCATION PLAN
(DOT PARKING LOT)

SCALE: AS SHOWN
JUNE 2013

FIGURE 1

J:\GRAPHICS\34250\34250-449-B327.DWG

TEST BORING REPORT

HALEY & ALDRICH

Boring No. HA-212 D (OW)

Project	225 BINNEY STREET, CAMBRIDGE, MA
Client	ALEXANDRIA REAL ESTATE EQUITIES, INC.
Contractor	NORTHERN DRILL SERVICE, INC.

File No.	34250-449
Sheet No.	1 of 3
Start	April 29, 2013
Finish	April 30, 2013
Driller	C. Tucker
H&A Rep.	D. Warren
Elevation	21.5 (est.)
Datum	CCB
Location	See Plan

	Casing	Sampler	Barrel
Type	HW	S	-
Inside Diameter (in.)	4	1 3/8	-
Hammer Weight (lb)	300	140	-
Hammer Fall (in.)	24	30	-

Drilling Equipment and Procedures

Rig Make & Model: B-59 Mobile Drill on Truck
Bit Type: Roller Bit
Drill Mud: None
Casing: HW Driven 60.0 ft
Hoist/Hammer: Cat-Head Doughnut Hammer
PID Make & Model:

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0						Note: Pre-cleared boring to 8.5 ft using Vac Truck.										
5						-FILL-										
	4 5	S1 9	9.0 10.0	SM		Loose gray silty SAND with gravel (SM), mps 1.5 in., no structure, no odor, wet, trace cinders	5	10	5	10	30	40				
10	4 4	S1A 10	10.0 11.0	PT	11.5 10.0	Medium stiff brown fibrous PEAT (PT), mps < 1mm, no structure, organic odor, moist						100				
						-ORGANIC DEPOSITS-										
					8.5 13.0											
15	10 17 25 18	S2 12	14.0 16.0	SP		Dense gray poorly graded SAND (SP), mps 0.25 in., no structure, organic odor, wet			5	20	70	5				
						-MARINE DEPOSITS-										
					2.5 19.0											
	4 5	S3 24	19.0 21.0	CL		Stiff gray lean CLAY (CL), mps < 1mm, no structure, no odor, moist						100				
20																

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
4/30/13	1430		-	60	25.8*

*Initial OW reading, not stabilized

Sample ID

O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (ft)	60.0
Rock Cored (ft)	-
Samples	S11

Boring No. HA-212 D (OW)

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

†Note: Maximum particle size is determined by direct observation within the limitations of sampler size.

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 REV HA-LIB07-1-BOS.GLB HA-TB+CORE+WELL-07-1.GDT G:\34250\400 SERIES - 225 BINNEY STREET\449 ACCESS AGREEMENTS\GINT\34250-449_TB.GPJ May 31, 13

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA-212 D (OW)
File No. 34250-449
Sheet No. 2 of 3

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Toughness	Plasticity	Strength
20	9 9																
25	3 3 4 5	S4 24	24.0 26.0	CL			Similar to above except medium stiff						100				
							-MARINE DEPOSITS-										
30	3 2 4 4	S5 24	29.0 31.0	CL			Similar to above						100				
35	3 3 4 4	S6 24	34.0 36.0	CL			Similar to above						100				
40	2 2 3 3	S7 24	39.0 41.0	CL			Medium stiff gray lean CLAY (CL), mps < 1mm, no structure, no odor, moist						100				
45	3 3 3 4	S8 24	44.0 46.0	CL			Similar to above						100				
	2	S9	49.0	CL/			Stiff gray lean CLAY (CL) interbedded with seams of gray silty SAND					20	80				

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA-212 D (OW)

H&A-TEST BORING-07-1 REV HA-LIB07-1-BOS.GLB HA-TB+CORE+WELL-07-1.GDT G:\34250\400 SERIES - 225 BINNEY STREET\449 ACCESS AGREEMENTS\GINT\34250-449_TB.GPJ May 31, 13

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA-212 D (OW)
File No. 34250-449
Sheet No. 3 of 3

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
50	4 6 9	24	51.0	SM			(SM), mps < 1mm, no structure, no odor, wet										
							-MARINE DEPOSITS-										
55	4 6 4 12	S10 12	54.0 56.0	CL/ SM			Stiff gray lean CLAY (CL) with silty SAND (SM) in occasional partings and seams, mps < 1mm, no structure, no odor, wet					15	85				
						-35.0 56.5	Note: Coarse gravel noted in wash at approximately 56.5 ft.										
							-GLACIOFLUVIAL/GLACIOMARINE DEPOSITS-										
	30* 45* 40*	S11* 16	58.0 59.5	SM			Very dense gray silty SAND with gravel (SM), mps 3 in., no structure, no odor, wet	10	5	5	5	60	15				
						-38.0 59.5											
60	61*	S11A* 5	59.5 60.0	ML		-38.5 60.0	Very dense gray SILT (ML), trace fine gravel, mps 0.5 in., weakly laminated, no odor, wet		5				95				
							-GLACIOMARINE DEPOSITS-										

BOTTOM OF EXPLORATION 60.0 FT

Notes: * denotes 3-in. spoon, 300-lb hammer.
Groundwater observation well installed at 60.0 ft upon completion.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA-212 D (OW)

H&A-TEST BORING-07-1 REV HA-LIB07-1-BOS.GLB HA-TB+CORE+WELL-07-1.GDT G:\34250\400 SERIES - 225 BINNEY STREET\449 ACCESS AGREEMENTS\GINT\34250-449_TB.GPJ May 31, 13

HALEY & ALDRICH

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Well No. HA-212 D (OW)
Boring No. HA-212 D (OW)

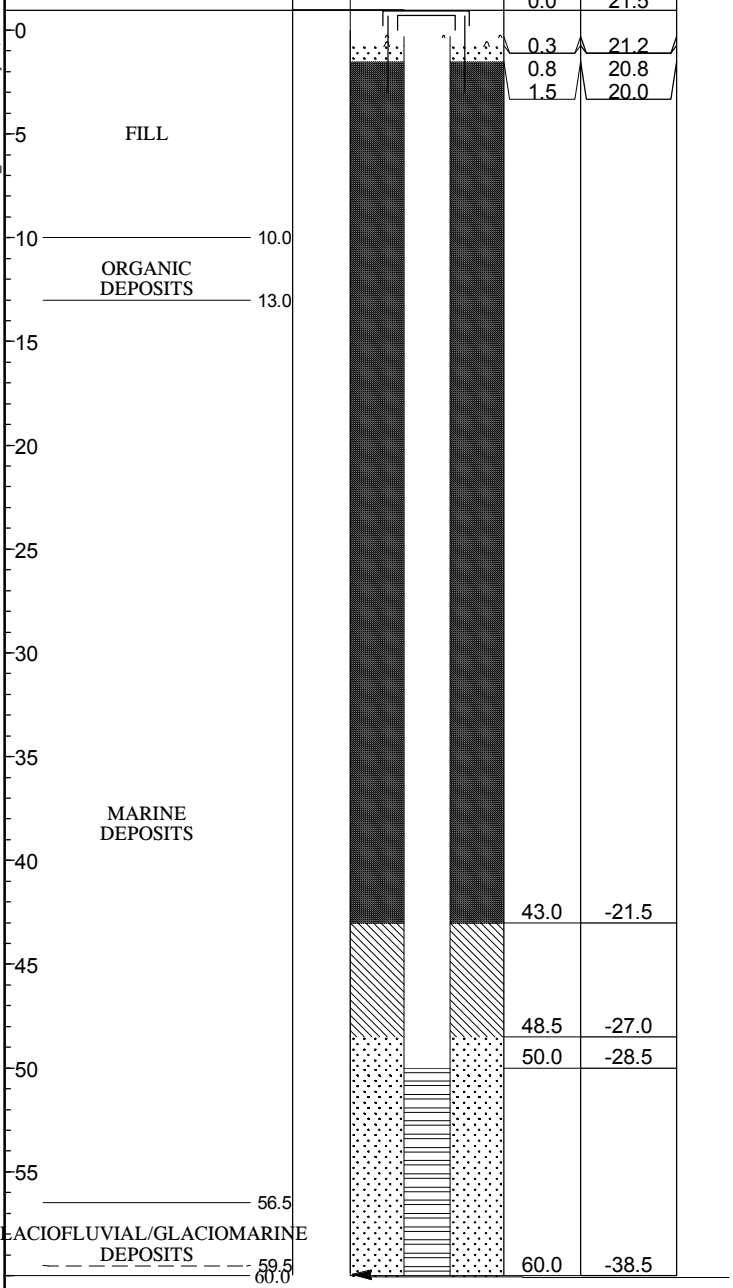
Project 225 BINNEY STREET
Location CAMBRIDGE, MA
Client ALEXANDRIA REAL ESTATE EQUITIES, INC.
Contractor NORTHERN DRILL SERVICE, INC.
Driller C. Tucker
Initial Water Level (depth bgs) 25.8 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 34250-449
Date Installed 30 Apr 2013
H&A Rep. D. Warren
Location See Plan

Ground El. 21.5 (est.)
Datum CCB

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	21.5
				0.3	21.2
				0.8	20.8
				1.5	20.0
FILL					
	10.0				
ORGANIC DEPOSITS					
	13.0				
MARINE DEPOSITS					
				43.0	-21.5
				48.5	-27.0
				50.0	-28.5
	56.5				
GLACIOFLUVIAL/GLACIOMARINE DEPOSITS					
	59.5			60.0	-38.5
	60.0				



WELL CONSTRUCTION DETAILS

Type of protective cover: Compression - pent. bolt
Depth of Roadway Box below ground surface: 0.0 ft
Depth of top of riser below ground surface: 0.3 ft
Type of protective casing: Roadway Box
Length: 1.0 ft
Inside diameter: 4.0 in.
Depth of bottom of Roadway Box: 1.0 ft
Type of riser pipe: Schedule 40 PVC
Inside diameter of riser pipe: 2.0 in.
Depth of bottom of riser pipe: 50.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	0.8
Bentonite	43.0	5.5
	-	-

Diameter of borehole: 4.5 in.
Depth to top of well screen: 50.0 ft
Type of screen: Machine slotted Sch 40 PVC
Screen gauge or size of openings: 0.010 in.
Diameter of screen: 2.0 in.
Type of Backfill around Screen: Filter Sand
Depth to bottom of well screen: 60.0 ft
Bottom of silt trap:
Depth of bottom of borehole: 60.0 ft

GW INSTALLATION REPORT-07-1 HA-LIB07-1-BOS.GLB HA-TB+CORE+WELL-07-1.GDT G:\34250\400 SERIES - 225 BINNEY STREET\449 ACCESS AGREEMENTS\GINT\34250-449_TB.GPJ May 31, 13

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA-212 S (OW)

Project 225 BINNEY STREET, CAMBRIDGE, MA
Client ALEXANDRIA REAL ESTATE EQUITIES, INC.
Contractor NORTHERN DRILL SERVICE, INC.

File No. 34250-449
Sheet No. 1 of 2
Start April 30, 2013
Finish April 30, 2013
Driller C. Tucker
H&A Rep. D. Warren
Elevation 21.5 (est.)
Datum CCB
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: B-59 Mobile Drill on Truck
Inside Diameter (in.)	4	1 3/8	-	Bit Type: Roller Bit Drill Mud: None
Hammer Weight (lb)	300	140	-	Casing: HW Driven 25.0 ft
Hammer Fall (in.)	24	30	-	Hoist/Hammer: Cat-Head Doughnut Hammer PID Make & Model:

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0						Note: Pre-cleared boring to 8.5 ft using Vac Truck.										
5						-FILL-										
	8 6	S1 8	9.0 10.0	SM	11.5	Medium dense gray-brown silty SAND with gravel (SM), trace cinders, slag, brick fragments	5	10	5	15	45	20				
10	4 6	S1A 12	10.0 11.0	PT	10.0	Stiff brown fibrous PEAT (PT), mps 1mm, no structure, organic odor, moist										
						-ORGANIC DEPOSITS-										
					8.5 13.0											
15	17 24 26 23	S2 12	14.0 16.0	SP		Dense gray poorly graded SAND (SP), mps 0.5 in., no structure, organic odor, wet		5	10	50	30	5				
						-MARINE DEPOSITS-										
					2.5 19.0											
	2 2	S3 22	19.0 21.0	CL		Medium stiff gray lean CLAY (CL), mps < 1mm, no structure, no odor, wet						100				
20																

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
4/30/13	1445			25.0	11.1*

*Initial OW reading, not stabilized

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 25.0
Rock Cored (ft) -
Samples S4

Boring No. HA-212 S (OW)

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

†Note: Maximum particle size is determined by direct observation within the limitations of sampler size.

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 REV HA-LIB07-1-BOS.GLB HA-TB+CORE+WELL-07-1.GDT G:\34250\400 SERIES - 225 BINNEY STREET\449 ACCESS AGREEMENTS\GINT\34250-449_TB.GPJ May 31, 13

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA-212 S (OW)

File No. 34250-449

Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20	4 5						-MARINE DEPOSITS-										
	2 3 3 4	S4 24	23.0 25.0	CL			Similar to above										
25						-3.5 25.0	BOTTOM OF EXPLORATION 25.0 FT Note: Groundwater observation well installed at 25.0 ft upon completion.										

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA-212 S (OW)

HALEY & ALDRICH

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Well No. HA-212 S (OW)
Boring No. HA-212 S (OW)

Project 225 BINNEY STREET
Location CAMBRIDGE, MA
Client ALEXANDRIA REAL ESTATE EQUITIES, INC.
Contractor NORTHERN DRILL SERVICE, INC.
Driller C. Tucker

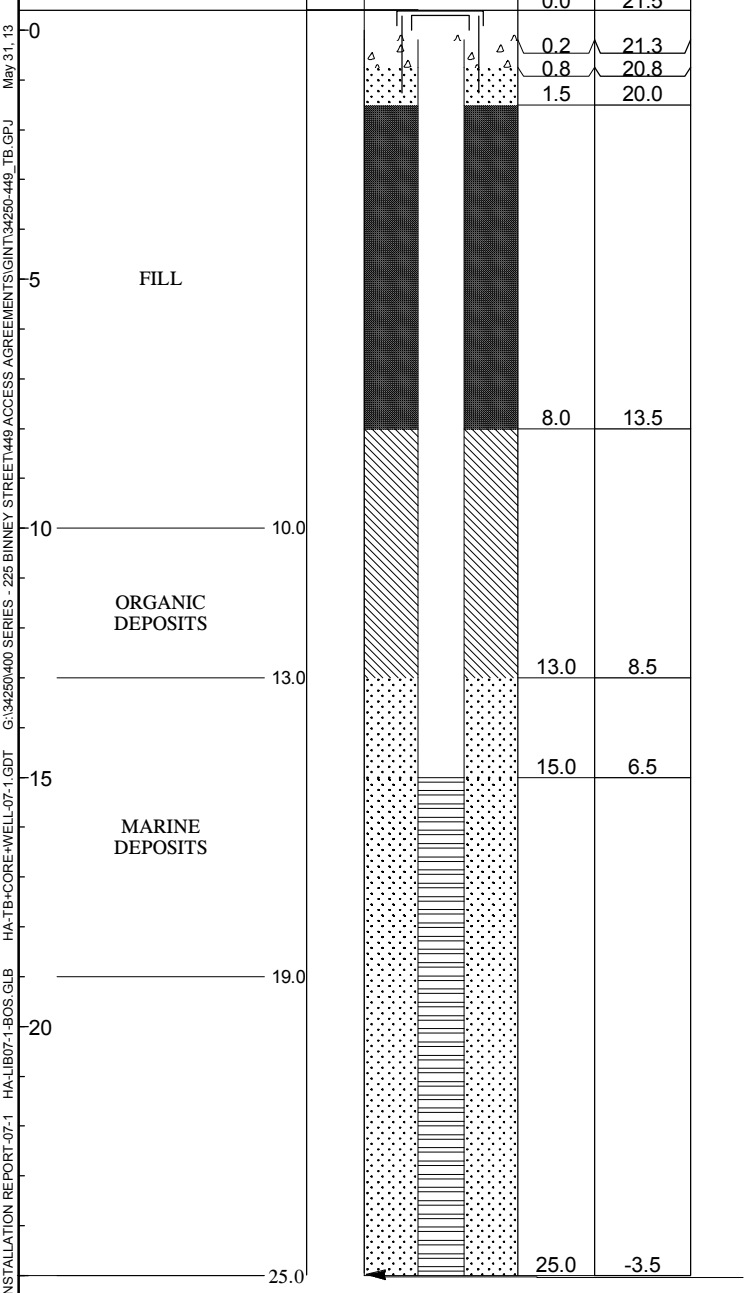
Initial Water Level (depth bgs) 11.1 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 34250-449
Date Installed 30 Apr 2013
H&A Rep. D. Warren
Location See Plan

Ground El. 21.5 (est.)
Datum CCB

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	21.5
				0.2	21.3
				0.8	20.8
				1.5	20.0
FILL				8.0	13.5
ORGANIC DEPOSITS	10.0			13.0	8.5
MARINE DEPOSITS	13.0			15.0	6.5
	19.0				
	25.0			25.0	-3.5



WELL CONSTRUCTION DETAILS

Type of protective cover: Compression - pent. bolt

Depth of Roadway Box below ground surface: 0.0 ft

Depth of top of riser below ground surface: 0.2 ft

Type of protective casing: Roadway Box

Length: 1.0 ft

Inside diameter: 4.0 in.

Depth of bottom of Roadway Box: 1.0 ft

Type of riser pipe: Schedule 40 PVC

Inside diameter of riser pipe: 2.0 in.

Depth of bottom of riser pipe: 15.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	0.8
Bentonite	8.0	5.0
	-	-

Diameter of borehole: 4.5 in.

Depth to top of well screen: 15.0 ft

Type of screen: Machine slotted Sch 40 PVC

Screen gauge or size of openings: 0.010 in.

Diameter of screen: 2.0 in.

Type of Backfill around Screen: Filter Sand

Depth to bottom of well screen: 25.0 ft

Bottom of silt trap:

Depth of bottom of borehole: 25.0 ft

GW INSTALLATION REPORT-07-1 HA-LIB07-1-BOS.GLB HA-TB+CORE+WELL-07-1.GDT G:\34250\400 SERIES - 225 BINNEY STREET\449 ACCESS AGREEMENTS\GINT\34250-449_TB.GPJ May 31, 13

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA-213 D (OW)

Project 225 BINNEY STREET, CAMBRIDGE, MA
Client ALEXANDRIA REAL ESTATE EQUITIES, INC.
Contractor NORTHERN DRILL SERVICE, INC.

File No. 34250-449
Sheet No. 1 of 2
Start May 2, 2013
Finish May 3, 2013
Driller T. Tucker
H&A Rep. C. Bolduc
Elevation 21.0 (est.)
Datum CCB
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: B-59 Mobile Drill on Truck
Inside Diameter (in.)	4	1 3/8	-	Bit Type: Roller Bit Drill Mud: None
Hammer Weight (lb)	300	140	-	Casing: HW Driven 50.0 ft
Hammer Fall (in.)	24	30	-	Hoist/Hammer: Cat-Head Doughnut Hammer PID Make & Model:

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0						Note: Pre-cleared boring to 8.0 ft using Vac Truck.										
5						-FILL-										
					13.0 8.0											
10	5 2 3 4	S1 12	9.0 11.0	SP/ SM		Loose gray-brown poorly graded SAND (SP) with layer of black silty SAND (SM) and occasional organic soil, mps 0.5 in., slight organic odor, wet		5	5	10	60	20				
						-MARINE DEPOSITS-										
15	12 21 29 33	S2 12	14.0 16.0	SP		Very dense gray poorly graded SAND (SP), mps 1 in., no structure, no odor, wet, gravel in tip of sampler					95	5				
					3.0 18.0	Note: Drill action indicated change in stratum at 18.0 ft.										
20	4 8 11 11	S3 24	19.0 21.0	CL		Very stiff gray lean CLAY (CL), mps < 1mm, no structure, no odor, moist						100				
						-MARINE DEPOSITS-										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
5/3/13	*Initial OW reading, not stabilized			50	18*

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 50.0
Rock Cored (ft) -
Samples S9

Boring No. HA-213 D (OW)

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Plasticity**: N - Nonplastic L - Low M - Medium H - High
Toughness: L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

†Note: Maximum particle size is determined by direct observation within the limitations of sampler size.
Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 REV HA-LIB07-1-BOS.GLB HA-TB+CORE+WELL-07-1.GDT G:\34250\400 SERIES - 225 BINNEY STREET\449 ACCESS AGREEMENTS\GINT\34250-449_TB.GPJ May 31, 13

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA-213 D (OW)
File No. 34250-449
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25	2 4 5 5	S4 24	24.0 26.0	CL		Stiff gray lean CLAY (CL), mps 0.75 in., single parting of medium-grained sand, no odor, wet						100				
30	2 3 5 4	S5 24	29.0 31.0	CL		Similar to above except no structure, mps 1/8 in.						100				
35	2 3 4 4	S6 24	34.0 36.0	CL		Similar to above except medium stiff, mps <1mm						100				
40	2 2 3 4	S7 24	39.0 41.0	CL		Medium stiff gray lean CLAY (CL), mps < 1mm, no structure, no odor, moist						100				
						-MARINE DEPOSITS-										
45	3 5 4 5	S8 24	44.0 46.0	CL		Stiff gray lean CLAY (CL), mps < 1mm, occasional parting along fine sand layers, no odor, wet Note: No recovery in standard spoon, pushed 3-in. spoon to obtain sample.					5	95				
					-26.0 47.0	Note: Drill action and gravel in washwater return indicated change in stratum at 47.0 ft.										
	26* 17* 19* 14*	S9 18	48.0 50.0	SM		Dense gray silty SAND with gravel (SM), mps 2.25 in., bonded, no odor, wet -GLACIAL TILL-	5	20	20	20	15	20				
50					-29.0 50.0	BOTTOM OF EXPLORATION 50.0 FT										

Notes: * denotes 3-in. spoon, 300-lb hammer.
Groundwater observation well installed at 50.0 ft upon completion.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA-213 D (OW)

H&A-TEST BORING-07-1 REV HA-LIB07-1-BOS.GLB HA-TB+CORE+WELL-07-1.GDT G:\34250\400 SERIES - 225 BINNEY STREET\449 ACCESS AGREEMENTS\GINT\34250-449_TB.GPJ May 31, 13

HALEY & ALDRICH

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Well No. HA-213 D (OW)
Boring No. HA-213 D (OW)

Project 225 BINNEY STREET
Location CAMBRIDGE, MA
Client ALEXANDRIA REAL ESTATE EQUITIES, INC.
Contractor NORTHERN DRILL SERVICE, INC.
Driller T. Tucker

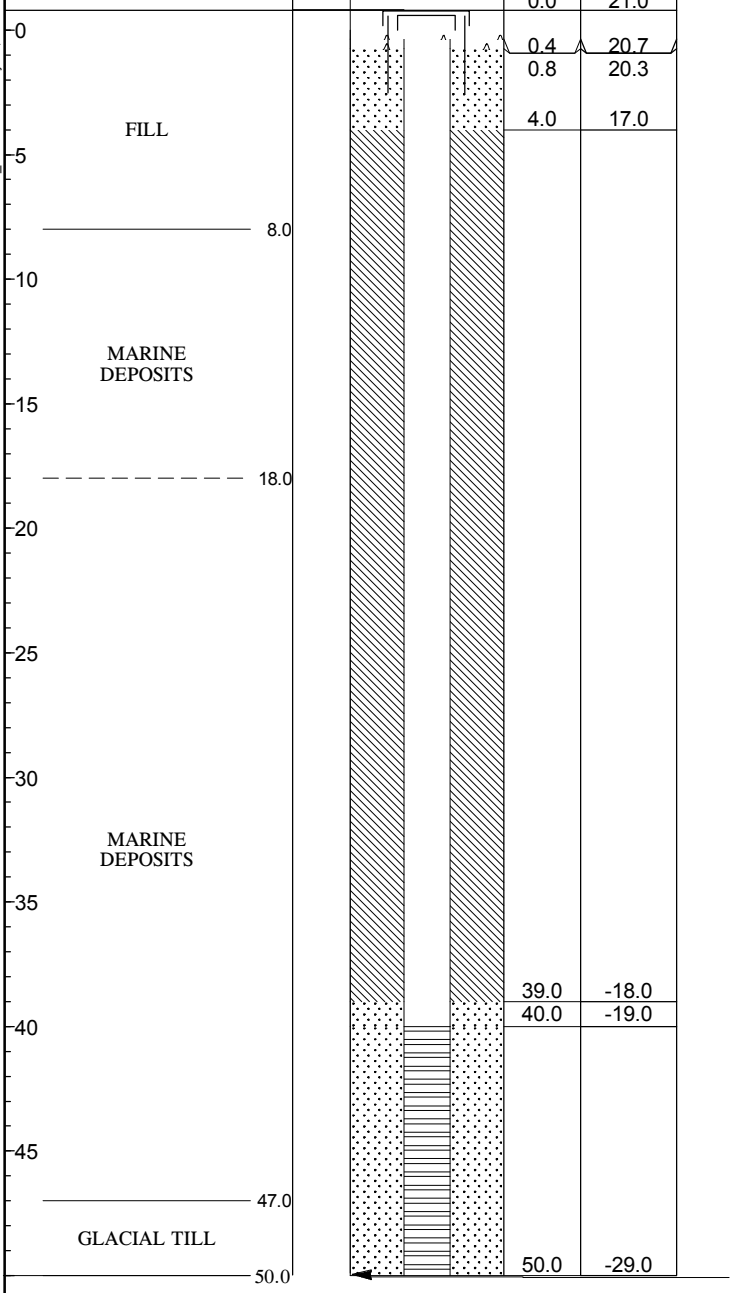
Initial Water Level (depth bgs) 18.0 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 34250-449
Date Installed 3 May 2013
H&A Rep. C. Bolduc
Location See Plan

Ground El. 21.0 (est.)
Datum CCB

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	21.0
				0.4	20.7
				0.8	20.3
FILL				4.0	17.0
	8.0				
MARINE DEPOSITS					
	18.0				
MARINE DEPOSITS					
				39.0	-18.0
				40.0	-19.0
	47.0				
GLACIAL TILL					
	50.0			50.0	-29.0



WELL CONSTRUCTION DETAILS

Type of protective cover: Compression - pent. bolt

Depth of Roadway Box below ground surface: 0.0 ft

Depth of top of riser below ground surface: 0.4 ft

Type of protective casing: Roadway Box

Length: 1.0 ft

Inside diameter: 4.0 in.

Depth of bottom of Roadway Box: 1.0 ft

Type of riser pipe: Schedule 40 PVC

Inside diameter of riser pipe: 2.0 in.

Depth of bottom of riser pipe: 40.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	0.8
Bentonite	4.0	35.0
	-	-

Diameter of borehole: 4.5 in.

Depth to top of well screen: 40.0 ft

Type of screen: Machine slotted Sch 40 PVC

Screen gauge or size of openings: 0.010 in.

Diameter of screen: 2.0 in.

Type of Backfill around Screen: Filter Sand

Depth to bottom of well screen: 50.0 ft

Bottom of silt trap:

Depth of bottom of borehole: 50.0 ft

GW INSTALLATION REPORT-07-1 HA-LIB07-1-BOS.GLB HA-TB+CORE+WELL-07-1.GDT G:\34250\400 SERIES - 225 BINNEY STREET\449 ACCESS AGREEMENTS\GINT\34250-449_TB.GPJ May 31, 13

TEST BORING REPORT

HALEY & ALDRICH

Boring No. HA-214 D (OW)

Project 225 BINNEY STREET, CAMBRIDGE, MA
Client ALEXANDRIA REAL ESTATE EQUITIES, INC.
Contractor NORTHERN DRILL SERVICE, INC.

File No. 34250-449
Sheet No. 1 of 3
Start May 1, 2013
Finish May 2, 2013
Driller C. Tucker
H&A Rep. C. Bolduc
Elevation 21.0 (est.)
Datum CCB
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: B-59 Mobile Drill on Truck
Inside Diameter (in.)	4	1 3/8	-	Bit Type: Roller Bit Drill Mud: None
Hammer Weight (lb)	300	140	-	Casing: HW Driven to 60.0 ft
Hammer Fall (in.)	24	30	-	Hoist/Hammer: Cat-Head Doughnut Hammer PID Make & Model:

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0						Note: Pre-cleared boring to 8.5 ft using Vac Truck.										
5						-FILL-										
					13.0 8.0											
10	2 1 2 2	S1 19	9.0 11.0	PT-SM		Soft brown fibrous PEAT (PT) with occasional seams of gray (organic) silty SAND (SM), mps 1mm, no structure, organic odor, wet -ORGANIC DEPOSITS-				5	10	85				
					9.5 11.5											
15	5 6 10 11	S2 12	14.0 16.0	SP		-MARINE DEPOSITS- Medium dense brown poorly graded SAND (SP), mps < 1mm, no structure, organic odor, wet					100					
					2.0 19.0											
20	2 2	S3 24	19.0 21.0	CL		Medium stiff gray lean CLAY (CL), mps < 1mm, no structure, no odor, wet						100				

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
5/1/13	*Initial OW reading, not stabilized			60	25*

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 60.0
Rock Cored (ft) -
Samples S11

Boring No. HA-214 D (OW)

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Plasticity**: N - Nonplastic L - Low M - Medium H - High
Toughness: L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

†Note: Maximum particle size is determined by direct observation within the limitations of sampler size.
Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 REV HA-LIB07-1-BOS.GLB HA-TB+CORE+WELL-07-1.GDT G:\34250\400 SERIES - 225 BINNEY STREET\449 ACCESS AGREEMENTS\GINT\34250-449_TB.GPJ May 31, 13

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA-214 D (OW)
File No. 34250-449
Sheet No. 2 of 3

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Toughness	Plasticity	Strength
20	3 3						-MARINE DEPOSITS-										
25	2 4 5 6	S4 24	24.0 26.0	CL			Similar to above except stiff						100				
							-MARINE DEPOSITS-										
30	2 2 4 5	S5 24	29.0 31.0	CL			Similar to above except medium stiff						100				
35	2 2 3 4	S6 24	34.0 36.0	CL			Similar to above						100				
40	2 2 3 4	S7 24	39.0 41.0	CL			Medium stiff gray lean CLAY (CL), mps < 1mm, no structure, no odor, moist						100				
45	1 2 4 4	S8 24	44.0 46.0	CL			Similar to above						100				
	2	S9	49.0	CL			Similar to above						100				

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA-214 D (OW)

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA-214 D (OW)

File No. 34250-449

Sheet No. 3 of 3

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
50	2 3 3	24	51.0														
						-32.5 53.5											
55	3 8 12 22	S10 19	54.0 56.0	CL-SM-SW			Very stiff gray lean CLAY with sand (CL), trace gravel, with occasional irregular seams of silty SAND (SM) and well-graded SAND (SW), mps 1 in., no structure, no odor, wet -GLACIOMARINE DEPOSITS-	5	5	5	5	5	75				
						-36.5 57.5											
	22* 27* 31* 31*	S11 18	58.0 60.0	ML			Very dense gray sandy SILT (ML), well bonded in-situ, moist, with cobbles, trace gravel -GLACIAL TILL-	5	5	5		15	70				
60						-39.0 60.0	BOTTOM OF EXPLORATION 60.0 FT Notes: * denotes 3-in. spoon, 300-lb hammer. Groundwater observation well installed at 60.0 ft upon completion.										

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA-214 D (OW)

H&A-TEST BORING-07-1 REV HA-LIB07-1-BOS.GLB HA-TB+CORE+WELL-07-1.GDT G:\34250\400 SERIES - 225 BINNEY STREET\449 ACCESS AGREEMENTS\GINT\34250-449_TB.GPJ May 31, 13

HALEY & ALDRICH

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Well No. HA-214 D (OW)
Boring No. HA-214 D (OW)

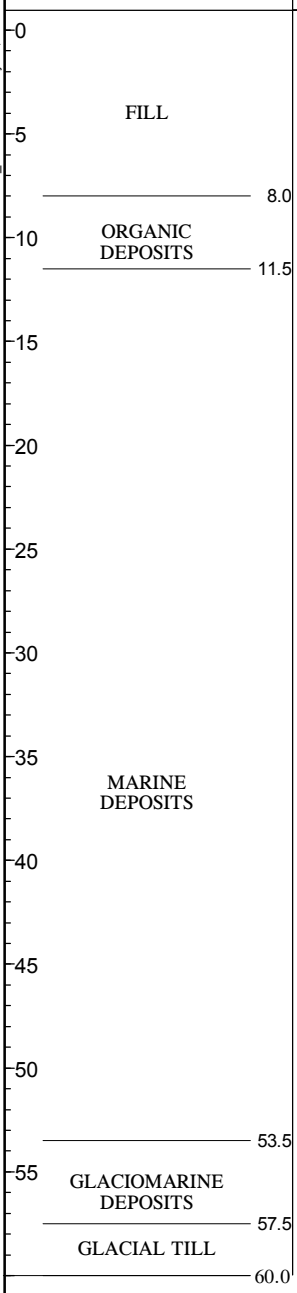
Project 225 BINNEY STREET
Location CAMBRIDGE, MA
Client ALEXANDRIA REAL ESTATE EQUITIES, INC.
Contractor NORTHERN DRILL SERVICE, INC.
Driller C. Tucker
Initial Water Level (depth bgs) 25.0 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 34250-449
Date Installed 2 May 2013
H&A Rep. C. Bolduc
Location See Plan

Ground El. 21.0 (est.)
Datum CCB

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	21.0
				0.4	20.7
				0.8	20.3
				1.5	19.5
FILL					
	8.0				
ORGANIC DEPOSITS					
	11.5				
MARINE DEPOSITS				44.0	-23.0
				49.0	-28.0
				50.0	-29.0
	53.5				
GLACIOMARINE DEPOSITS					
	57.5				
GLACIAL TILL					
	60.0			60.0	-39.0



WELL CONSTRUCTION DETAILS

Type of protective cover: Compression - pent. bolt

Depth of Roadway Box below ground surface: 0.0 ft

Depth of top of riser below ground surface: 0.4 ft

Type of protective casing: Roadway Box

- Length: 1.0 ft
- Inside diameter: 4.0 in.
- Depth of bottom of Roadway Box: 1.0 ft

Type of riser pipe: Schedule 40 PVC

- Inside diameter of riser pipe: 2.0 in.
- Depth of bottom of riser pipe: 50.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	0.8
Bentonite	44.0	5.0
	-	-

Diameter of borehole: 4.5 in.

Depth to top of well screen: 50.0 ft

- Type of screen: Machine slotted Sch 40 PVC
- Screen gauge or size of openings: 0.010 in.
- Diameter of screen: 2.0 in.
- Type of Backfill around Screen: Filter Sand
- Depth to bottom of well screen: 60.0 ft

Bottom of silt trap:

Depth of bottom of borehole: 60.0 ft

GW INSTALLATION REPORT-07-1 HA-LIB07-1-BOS.GLB HA-TB+CORE+WELL-07-1.GDT G:\34250\400 SERIES - 225 BINNEY STREET\449 ACCESS AGREEMENTS\GINT\34250-449_TB.GPJ May 31, 13

TABLE I
SUMMARY OF GROUNDWATER QUALITY DATA (DOT PARKING LOT)
225 BINNEY STREET
CAMBRIDGE, MA
FILE NO. 34250-449
6/7/2013

SAMPLE DESIGNATION	HA-212S (OW)	HA-212D (OW)	HA-213D (OW)	HA-214D (OW)
SAMPLING DATE	5/15/2013	5/15/2013	5/16/2013	5/15/2013
LAB SAMPLE ID	L1308721-01	L1308721-02	L1308870-01	L1308721-03
SAMPLE TYPE	GROUNDWATER	GROUNDWATER	GROUNDWATER	GROUNDWATER
WELL SCREEN INTERVAL (FT)	15 to 25	50 to 60	40 to 50	50 to 60
VOCs (mg/L)				
1,2-Dichloroethane	ND(0.0005)	0.084	0.03	0.083

ABBREVIATIONS:
VOCs: Volatile Organic Compounds
ND(2.5): Not detected; number in parentheses is one-half the laboratory reporting limit