LETTER OF

PRELIMINARY SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING ANALYSIS

ROBINSON TERMINAL – ALEXANDRIA WATERFRONT (SOUTH PARCEL)

ECS PROJECT NO. 01:21983-A

FOR

EYA

OCTOBER 11, 2013

October 11, 2013

Mr. Adam Hayes
EYA
4800 Hampden Lane
Suite 300
Bethesda, Maryland 20814

ECS Job No. 01:21983-A

Reference: Letter of Preliminary Subsurface Investigation and Geotechnical Engineering Analysis, Robinson Terminal – Alexandria Waterfront (South Parcel), 2 Duke Street, City of Alexandria, Virginia

Dear Mr. Hayes:

This letter provides a summary of exploration procedures, subsurface soils encountered and initial geotechnical design considerations to aid during the preliminary evaluations of the site feasibility. A preliminary report will be issued upon completion of soil lab testing and the final analysis of those results; therefore, all data contained herein should be considered "draft" until the final testing and analysis is complete and the report is published.

Based on our recent conversations with Robert Silman and Associates, the project Structural Engineer, information that was provided within the conceptual renderings prepared by Shalom Baranes, the project Architect, as well as conversations with your group, we have developed an understanding of the project scope. We understand that the proposed development will consist of five multi-family residential structures with a total residential area of 265,850 square feet (sf) which will vary in height from four to five levels (concrete-frame) above grade with up to one level of below grade parking in Parcel G. The retail/commercial space within Parcel G and the entirety of Parcel E is anticipated to have a combined square footage of 23,950 sf. We understand that structural column loads will range between 300 and 600 kips, and uplift pressure will be on the order of 750 pounds per square foot (psf) with a net uplift of 400 kips at column locations. The below grade areas are understood to be designed in an undrained condition and the structures will be expected to resist uplift from the anticipated hydrostatic pressures typically associated with an undrained condition.

As authorized by your acceptance of our proposal, we have conducted 6 borings within the proposed development. Five borings were conducted within Parcel G and one within Parcel E. All borings were drilled using a rotary drilling methods and were extended to the depths on the order of 60 feet below the existing ground surface or structure slab (depending on the location of the boring). Prior to the drilling operations, borings that were located within and around the existing warehouse facility were cored in order to access the subsurface soils.

The following section presents the preliminary results and recommendations for the construction of the proposed developments based on the subsurface exploration and geotechnical engineering analysis conducted on site.

EXPLORATION RESULTS

Based on results of this exploration as well as information obtained from the previous exploration performed by Schnabel Engineering in March 2013, the soils observed at the test locations appeared to be generally consistent with the coastal plain geology for the region. The site has had varying amounts of uncontrolled fill soil placed within the limits of the parcel. This is not unusual within urbanized areas of the City of Alexandria; particularly at sites near the shoreline where fill may have been placed to reclaim land. The following generalized soils strata were encountered during our exploration:

Stratum I - Fill

Beneath the surficial concrete slabs and pavement areas, fill soils were encountered in each boring, ranging from depths of 4.5 to 12 feet below existing ground surface. Fill depths correspond with elevations ranging from approximately EL. 5.5 to -2 feet. The fill soils varied greatly in type, moisture, and relative density/consistency. These materials included sand, silt, clay, bricks, asphalt, organics, and gravel in addition to other debris. These materials are anticipated to have been placed in an uncontrolled manner.

Stratum II – Alluvial Soils

Beneath the fill soils, natural alluvial soils were encountered in the borings. This stratum was generally encountered below the Stratum I Fill soils and extended to EL. -45 to -50 feet. It should be noted that, in some borings, the alluvial soils may extend below EL. -50 feet; however, based on our knowledge of the regional geology and the increasing SPT N-values of the soils at these depths, we would expect that the transition to Stratum III would typically occur near this elevation. Generally, each boring encountered interblended layers of varying thicknesses of SAND, both poorly graded and well graded (SP, SW), and CLAY (CL), with varying amounts of sand and mica present. In general, the soils ranged from very loose to dense and very soft to stiff in relative density and consistency, respectively. The Stratum II soils varied widely in relative density and/or consistency as well as in soil type over short horizontal distances; a characteristic common for site bordering large rivers such as the Potomac. It is likely that the ancient Potomac River eroded and replaced soils of differing type and density over long periods of time, the result of which is a highly variable soil layer extending from approximately EL. -5 feet to EL. -50 feet. Multiple samples across all borings had increments where the weight of hammer (WOH) alone was sufficient to advance the SPT sampler 6 to 18 inches (full depth of the split spoon sampler). In some cases, there was no recovery of soil at these depths as the material was too soft/loose to enter the split spoon sampler. SPT resistances within this stratum typically ranged from WOH to 12 blows per foot (bpf); however, resistances of 4 bpf or less were common.

Stratum III – Potomac Soils

The Potomac soils encountered typically consisted of CLAY (CL) and SAND, (SP, SW, SC) and extended from approximately EL. -45 to the boring termination depths of EL. -50 feet. The SPT resistances increased markedly from the alluvial soils of Stratum II; ranging from 13 to 49 bpf. Stratum III did not appear to have been encountered within Boring B-5.

Mud rotary drilling was used during the exploration in an effort to maintain the integrity of sidewalls and prevent premature cave-in. Groundwater depths are not able to be recorded as part of the mud rotary process; however, in two boring locations (B-1 and B-6), the borings were extended initially without the use of mud rotary drilling in order to determine potential groundwater elevations. Groundwater was encountered at 3 and 6 feet below ground surface for B-6 and B-1, respectively. Due to the proximity of the site to the Potomac River (which is considered to be tidal along this stretch of river), the groundwater table is expected to fluctuate between elevation EL. +5 feet and EL. -5 feet.

PRELIMINARY RECOMMENDATIONS

From a geotechnical perspective, the significant challenges for building development include the presence of relatively deep fill extending as deep as EL. -2 feet, variably sorted and variably soft/loose alluvial deposits associated with the adjacent Potomac River, and relatively shallow groundwater.

Based on the soil type and uplift considerations for the structure, especially within those areas in which there will be no dead load force to resist uplift pressures, we have recommended a deep foundation system that consists of driven 12 to 14 inch square pre-cast concrete piles. The piles would need to be driven into the Potomac Formation which is indicated within the borings conducted on site at elevations below EL. -45 to -50 feet. We have compiled a summary below that can be used on a preliminary basis for determining pile capacities both for end bearing and skin friction.

Table 1 – Summary of Pile Capacity

Pile Size (inch)	Estimated Design Tip Elevations (ft)	Allowable Compression (FS=2.0) Capacity (Tons)	Allowable Skin Friction (FS=3.0) Capacity (tsf) EL. 0 to -45	Allowable Skin Friction (FS=3.0) Capacity (tsf) EL. -45 and below
12	Below EL. -50	35	0.033	0.333
14	Below EL. -50	50	0.033	0.333

Based on preliminary information received from Robert Silman and Associates, it is anticipated that the bottom of the pile caps would be at an elevation of EL. -1; therefore, based on capacities indicated above, we would expect that the pile lengths could be on the order of 90 feet in order to obtain the necessary capacity to resist the 400 kip uplift pressure for those areas outside of the heavily loaded building footprints. We recommend that as part of the final geotechnical evaluation of the site, additional deeper SPT borings or Cone

Penetrometer Test soundings be conducted in order to confirm final capacities that would be needed from the piles in order to resist the anticipated uplift pressures in these areas as well as evaluate those piles which would be utilized to support the loads from the proposed above-grade buildings.

Well point dewatering, or similar methods, should be considered during below grade excavation in order to lower the ground water table at least 2 feet below the bottom of excavation elevation. A dewatering system including a network of perimeter and interior deep wells or well points should be considered to lower the water table during construction. It will also be necessary to provide a series of trenches and small interior sumps to control the basal and lateral groundwater flows anticipated within the excavated areas. We recommend that an experienced dewatering contractor be consulted in order to assist with the design and execution of the dewatering process. We would expect that over excavating will be required in order to establish a working pad that should be considered due to the presence of overly soft/loose fill and alluvial deposits that may be present at the bottom of the excavation.

As part of our conversation with Robert Silman and Associates, we expect that the slabs will be approximately 18 inches thick and will have increased thickness around the pile cap areas in order to account for the increased hydrostatic pressures and the potential for higher total and differential settlements. We recommend that the below grade walls be designed for a lateral earth pressure of 90 pounds per cubic foot (pcf) due to the higher hydrostatic pressures expected to be encountered.

CLOSING

This letter was provided for a preliminary evaluation of the proposed development and should not be considered a final document for design purposes. A preliminary report will be published once additional lab testing and analysis is completed as part of this study and a future final geotechnical exploration consisting of deeper borings should be completed once the general design of the proposed structure is developed.

Respectfully,

ECS MID-ATLANTIC, LLC

John P. Hicks, P.E.
Senior Project Engineer

Bryan C. Layman, P.E.
Principal Engineer

Enclosure: ECS Boring Logs (B-1 through B-6)
Schnabel Boring Log (SB-1)
Boring Location Diagram

PMW/ \\S01-ARES\Data\Geotechnical\{eProjects}\21900-21999\01-21983-A\d-Working\21983-A LSE2.doc

CLIENT	JOB #	BORING #	SHEET
EYA	21983-A	B-1	1 OF 2

PROJECT NAME: Robinson Terminal - Alexandria Waterfront (South Parcel)

ARCHITECT-ENGINEER:

SITE LOCATION: 2 Duke Street, City of Alexandria

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING ▶ | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 10

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	18	18	Concrete Depth [9"], Gravel Depth [3"]		10	5 5 5
					CLAY, Brown, Moist, Stiff (CL FILL)			
	S-2	SS	18	12	Poorly Graded SAND, With Clay, Gravel and Wood Fragments, Brown to Dark Gray, Moist, Loose to Medium Dense (SP FILL)			6 6 7
5	S-3	SS	18	18		▽	5	6 4 2
	S-4	SS	18	18				5 8 9
10							0	
					Sandy SILT, Trace Mica, Dark Gray, Moist, Very Loose to Loose (ML)			
	S-5	SS	18	18				1 1 2
15							-5	
	S-6	SS	18	18				1 1 2
20							-10	
	S-7	SS	18	18				WOH 1 3
25							-15	
	S-8	SS	18	18				WOH 2 4
30							-20	

10 19.3 | 13 16.3 | 6 50.7 | 17 33.3 | 3 42.8 | 3 46.2 | 4 39.5 | 6 36.5

CONTINUED ON NEXT PAGE.

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

▽ WL 6.00 WS ☐ WD ☐	BORING STARTED 09/30/13	
▽ WL(BCR) ▼ WL(ACR)	BORING COMPLETED 09/30/13	CAVE IN DEPTH
▽ WL	RIG CME 55 FOREMAN Jason Trogdon	DRILLING METHOD 3.25 HSA

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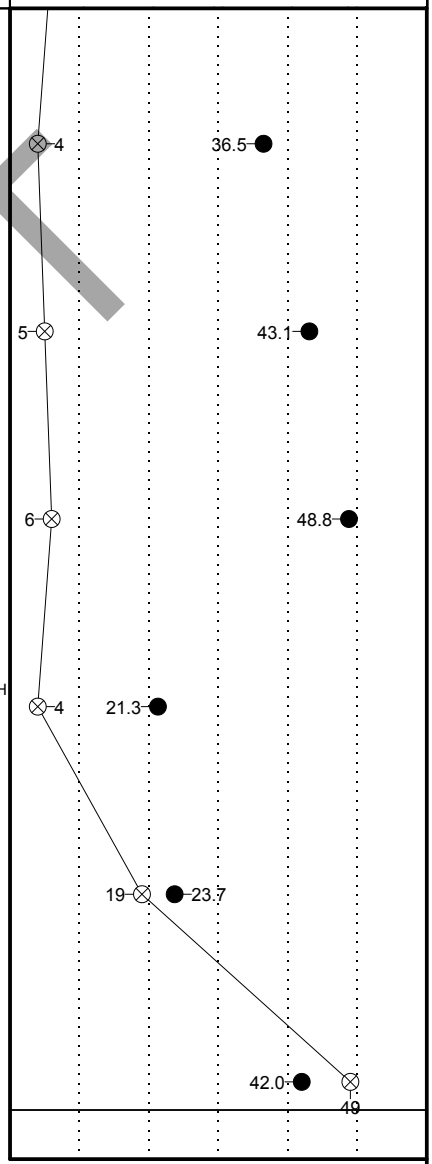
					Sandy SILT, Trace Mica, Dark Gray, Moist, Very Loose to Loose (ML)			
					CLAY, Trace Wood Fragments and Mica, Dark Gray, Moist to Wet, Soft to Medium Stiff (CL)			
35	S-9	SS	18	18			-25	2 2 2
40	S-10	SS	18	18			-30	3 2 3
45	S-11	SS	18	18			-35	1 3 3
50	S-12	SS	18	18			-40	WOH 2 2
					CLAY, With Sand and Gravel Fragments, Dark Brown, Moist, Very Stiff to Hard (CL)			
55	S-13	SS	18	2			-45	10 9 10
60	S-14	SS	18	6			-50	19 21 28
					END OF BORING @ 60.00'			



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WL 6.00 WS ☐ WD ☐	BORING STARTED 09/30/13	
WL(BCR) WL(ACR)	BORING COMPLETED 09/30/13	CAVE IN DEPTH
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CLIENT	JOB #	BORING #	SHEET
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PROJECT NAME: Robinson Terminal - Alexandria Waterfront (South Parcel)

ARCHITECT-ENGINEER:

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0					Concrete Depth [9"], Gravel Depth [3"]		10	3 3 3
	S-1	SS	18	6	CLAY, With Sand, Gravel and Glass Fragments, Brown to Gray, Moist, Medium Stiff (CL FILL)			1 1 2
	S-2	SS	18	12	Poorly Graded SAND, With Debris Fragments, Brown and Gray, Moist, Very Loose (SP FILL)			3 1 2
5	S-3	SS	18	12	Silty SAND, With Gravel Fragments, Gray, Moist, Very Loose to Medium Dense (SM)		5	2 1 5
	S-4	SS	18	6				6 9 4
10	S-5	SS	18	15			0	1 1 2
15	S-6	SS	18	0			-5	2 2 3
20	S-7	SS	18	4	CLAY, Trace Wood Fragments and Mica, Gray, Moist to Wet, Soft to Stiff (CL)		-10	2 3 2
25	S-8	SS	18	18			-15	
30							-20	

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WL WS ☐ WD ☐	BORING STARTED 09/24/13	
WL(BCR) WL(ACR)	BORING COMPLETED 09/24/13	CAVE IN DEPTH
WL	RIG CME 55 FOREMAN Jason Trogdon	DRILLING METHOD 3.25 HSA

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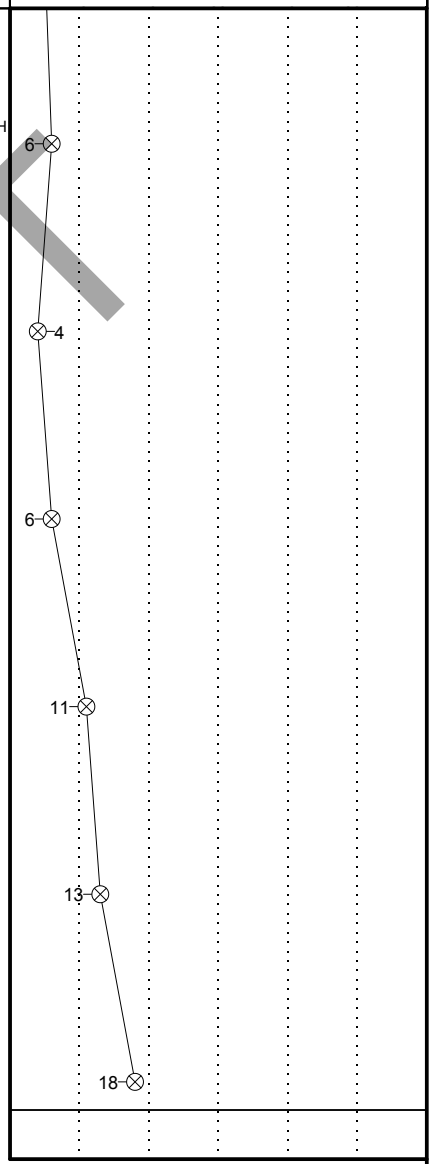
35	S-9	SS	18	18		-25	WOH 2 4
	S-10	SS	18	15		-30	2 1 3
40							
	S-11	SS	18	18		-35	2 3 3
45							
	S-12	SS	18	18		-40	3 6 5
50							
	S-13	SS	18	14		-45	4 6 7
55							
	S-14	SS	18	18		-50	4 7 11
60							

CLAY, Trace Wood Fragments and Mica, Gray, Moist to Wet, Soft to Stiff (CL)

Poorly Graded SAND, Trace Clay, Gray, Moist, Medium Dense (SP)

END OF BORING @ 60.00'



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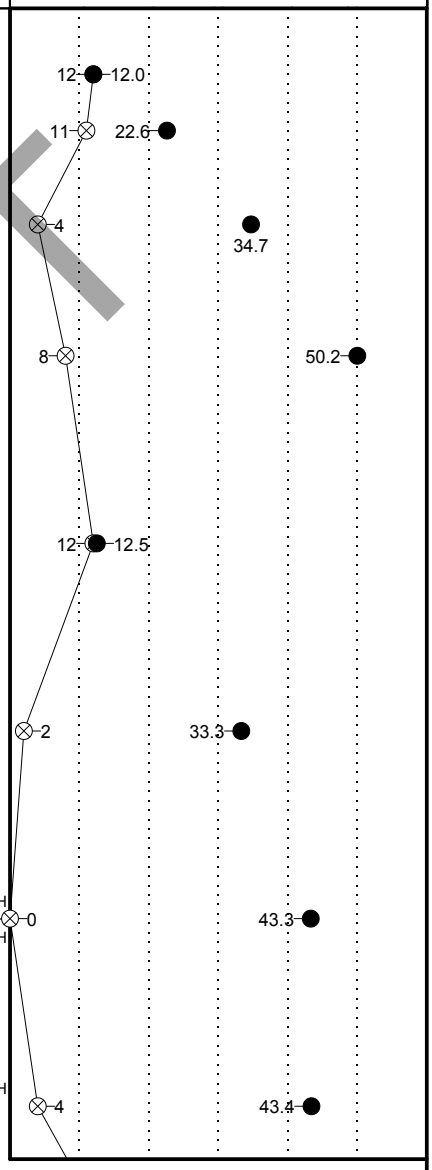
0					Concrete Depth [9"], Gravel Depth [3"]		10	
	S-1	SS	18	12	Poorly Graded SAND, With Gravel Fragments, Tan, Dry, Medium Dense (SP FILL)			14 6 6
	S-2	SS	18	18	CLAY, Brown, Moist, Stiff (CL FILL)			3 5 6
5	S-3	SS	18	4	Poorly Graded SAND, With Gravel and Wood Fragments, Black, Moist, Very Loose to Medium Dense (SP)		5	2 1 3
	S-4	SS	18	12			0	3 3 5
10	S-5	SS	18	12			-5	5 6 6
15	S-6	SS	18	8	CLAY Trace Mica, Gray, Moist, Very Soft to Soft (CL)		-10	3 1 1
20	S-7	SS	18	18			-15	WOH WOH WOH
25	S-8	SS	18	18			-20	WOH 1 3
30								



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WL WS ☐ WD ☐	BORING STARTED 09/27/13	
WL(BCR) WL(ACR)	BORING COMPLETED 09/27/13	CAVE IN DEPTH
WL	RIG CME 55 FOREMAN Jason Trogdon	DRILLING METHOD 3.25 HSA

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PROJECT NAME	ARCHITECT-ENGINEER
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DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
	S-9	SS	18	18			14 10 9
35						-25	
	S-10	SS	18	3			2 2 3
40						-30	
	S-11	SS	18	18			3 2 2
45						-35	
	S-12	SS	18	18			WOH 2
50						-40	
	S-13	SS	18	18			WOH 1
55						-45	
	S-14	SS	18	18			WOH 2 46
60						-50	

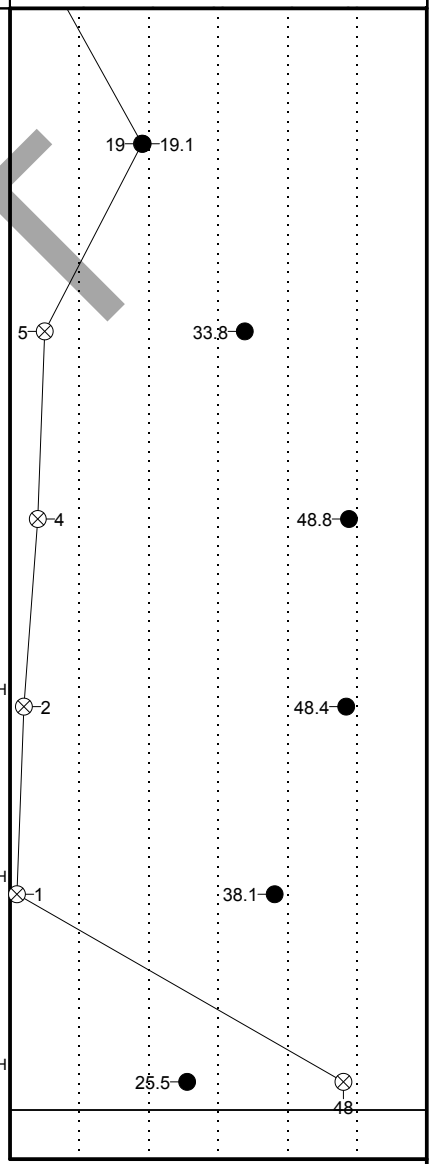
CLAY Trace Mica, Gray, Moist, Very Soft to Soft (CL)

Poorly Graded SAND, With Gravel, Gray, Moist, Medium Dense (SP)

CLAY, Trace Wood Fragments and Mica, Gray, Moist to Wet, Very Soft to Soft (CL)

Poorly Graded SAND, With Gravel, Gray, Moist, Dense (SP)

END OF BORING @ 60.00'



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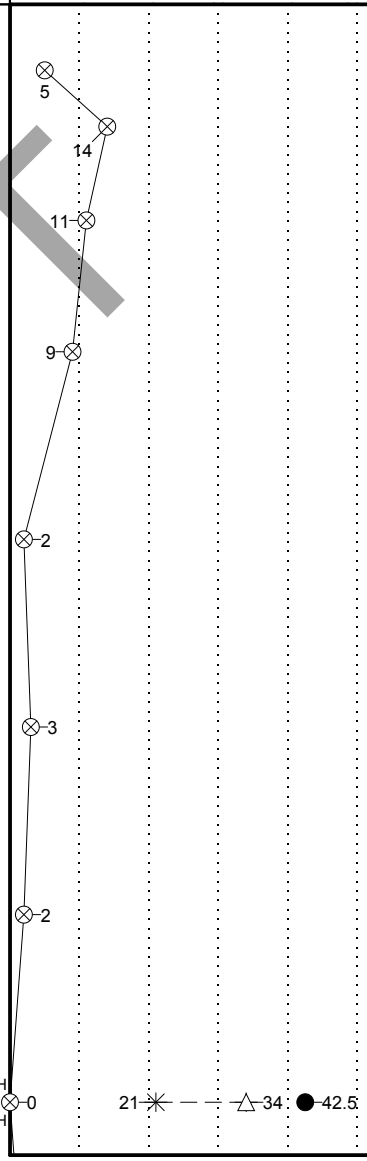
						Concrete Depth [9"], Gravel Depth [3"]
	S-1	SS	18	12		2 3 2 — Poorly Graded SAND, With Gravel and Brick Fragments, Reddish Brown, Moist, Loose (SP FILL)
	S-2	SS	18	12		6 5 9 — Sandy CLAY, Trace Gravel and Brick Fragments, Reddish Gray, Moist, Stiff (CL FILL)
5	S-3	SS	18	15	5	6 6 5
	S-4	SS	18	12		3 4 5 — Silty SAND, Trace Wood Fragments and Mica, Gray, Moist, Very Loose to Loose (SM)
10					0	
	S-5	SS	18	12		1 1 1
15					-5	
	S-6	SS	18	12		2 1 2
20					-10	
						CLAY, Trace Mica, Gray, Moist, Very Soft (CL)
	S-7	SS	18	18		2 1 1
25					-15	
	S-8	SS	18	18		WOH WOH
30					-20	



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					BOTTOM OF CASING ▶ LOSS OF CIRCULATION (100%)			
					SURFACE ELEVATION 10			
					CLAY, Trace Mica, Gray, Moist, Very Soft (CL)			
	S-9	SS	18	0	Clayey SAND, With Gravel, Gray, Moist, Medium Dense (SC)		-25	2 1 1
35								
	S-10	SS	18	12			-30	2 5 8
40								
					CLAY, Trace Wood Fragments and Mica, Gray, Moist to Wet, Stiff to Very Soft (CL)			
	S-11	SS	18	18			-35	4 4 5
45								
	S-12	SS	18	18			-40	1 1 1
50								
	S-13	SS	18	18			-45	WOH WOH
55								
					Well Graded SAND, With Gravel, Tan, Wet, Medium Dense (SW)			
	S-14	SS	18	18			-50	15 15 11
60					END OF BORING @ 60.00'			

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL WS ☐ WD ☐	BORING STARTED 09/23/13	
WL(BCR) WL(ACR)	BORING COMPLETED 09/23/13	CAVE IN DEPTH
WL	RIG CME 55 FOREMAN Jason Trogdon	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
EYA	21983-A	B-5	1 OF 2

PROJECT NAME: Robinson Terminal - Alexandria Waterfront (South Parcel)

ARCHITECT-ENGINEER:

SITE LOCATION: 2 Duke Street, City of Alexandria

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 10

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0						10	
							Concrete Depth [9"], Gravel Depth [3"]
	S-1	SS	18	10			3 5 5 — Well Graded SAND, With Gravel, Asphalt and Brick Fragments, Red to Black, Moist, Loose to Medium Dense (SW FILL)
	S-2	SS	18	9			2 8 4
5						5	
	S-3	SS	18	3			10 12 3
	S-4	SS	18	6			2 2 4
10						0	
							CLAY, With Sand and Wood Fragments, Grayish Brown, Moist, Stiff (CL)
	S-5	SS	18	4			8 6 5
15						-5	
							Clayey GRAVEL, Gray, Moist, Very Loose (GC)
	S-6	SS	18	10			2 2 1
20						-10	
	S-7	SS	18	4			3 1 2
25						-15	
							Well Graded SAND, With Gravel, Gray, Moist, Very Loose (SW)
	S-8	SS	18	12			2 1 1
30						-20	

CONTINUED ON NEXT PAGE.

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL WS☐ WD☐	BORING STARTED 09/24/13	
WL(BCR) WL(ACR)	BORING COMPLETED 09/24/13	CAVE IN DEPTH
WL	RIG CME 55 FOREMAN Jason Trogdon	DRILLING METHOD 3.25 HSA

CLIENT	JOB #	BORING #	SHEET
EYA	21983-A	B-5	2 OF 2

PROJECT NAME: Robinson Terminal - Alexandria Waterfront (South Parcel)

ARCHITECT-ENGINEER:

SITE LOCATION: 2 Duke Street, City of Alexandria

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL (ENGLISH UNITS)	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					BOTTOM OF CASING ▶ LOSS OF CIRCULATION 100%			
					SURFACE ELEVATION 10			
					Well Graded SAND, With Gravel, Gray, Moist, Very Loose (SW)			1 2 1
35	S-9	SS	18	0	CLAY, With Gravel, Gray, Moist, Soft to Medium Stiff (CL)		-25	
	S-10	SS	18	0				3 4 4
40							-30	
					GRAVEL, With Clay, Gray, Wet, Loose (GP)			3 4 3
	S-11	SS	18	4				
45							-35	
	S-12	SS	18	2				4 3 4
50							-40	
					CLAY, Trace Mica, Gray, Moist to Wet, Medium Stiff (CL)			
	S-13	SS	18	12				2 4 2
55							-45	
	S-14	SS	18	18				6 6 5
60					END OF BORING @ 60.00'		-50	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL WS☐ WD☐	BORING STARTED 09/24/13	
WL(BCR) WL(ACR)	BORING COMPLETED 09/24/13	CAVE IN DEPTH
WL	RIG CME 55 FOREMAN Jason Trogdon	DRILLING METHOD 3.25 HSA

CLIENT	JOB #	BORING #	SHEET
EYA	21983-A	B-6	1 OF 2

PROJECT NAME: Robinson Terminal - Alexandria Waterfront (South Parcel)

ARCHITECT-ENGINEER:

SITE LOCATION: 2 Duke Street, City of Alexandria

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 10

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	ELEVATION (FT)	BLOWS/6"	
0	S-1	SS	18	12	10	1 2 2	CLAY, With Gravel, Brick and Asphalt Fragments, Tan to Dark Brown, Moist, Soft (CL FILL)
	S-2	SS	18	12		1 2 1	
5	S-3	SS	18	18	5	2 1 1	Clayey GRAVEL, Dark Gray, Wet, Very Loose (GC)
	S-4	SS	18	18	0	2 1 1	
10	S-5	SS	18	18	-5	1 3 1	
15	S-6	SS	18	0	-10	WOH WOH	Clayey SAND, Trace Mica, Gray, Moist, Very Loose (SC)
20	S-7	SS	18	0	-15	WOH WOH	
25	S-8	SS	18	8	-20	1 1 2	
30							

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THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL 3.00 WS ☐ WD ☐	BORING STARTED 09/26/13	
WL(BCR) WL(ACR)	BORING COMPLETED 09/26/13	CAVE IN DEPTH @ 2.50'
WL	RIG CME 55 FOREMAN Jason Trogdon	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
EYA	21983-A	B-6	2 OF 2

PROJECT NAME: Robinson Terminal - Alexandria Waterfront (South Parcel)

ARCHITECT-ENGINEER:

SITE LOCATION: 2 Duke Street, City of Alexandria

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL (ENGLISH UNITS)	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					BOTTOM OF CASING ▶ LOSS OF CIRCULATION (100%)			
					SURFACE ELEVATION 10			
					Clayey SAND, Trace Mica, Gray, Moist, Very Loose (SC)			
					CLAY, Trace Wood Fragments and Mica, Gray, Soft (CL)			
35	S-9	SS	18	18			-25	2 1 2
40	S-10	SS	18	18			-30	2 2 2
					Sandy CLAY, Gray, Moist, Medium Stiff to Stiff (CL)			
45	S-11	SS	18	12			-35	3 2 4
50	S-12	SS	18	15			-40	5 5 7
					CLAY, Brown and Gray, Moist, Hard (CL)			
55	S-13	SS	18	18			-45	10 12 19
60	S-14	SS	18	18			-50	14 20 29
					END OF BORING @ 60.00'			

3 40.6 4 55.9 6 28.4 12 14.5 31 31.8 31.2 49

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL 3.00 WS ☐ WD ☐	BORING STARTED 09/26/13	
WL(BCR) WL(ACR)	BORING COMPLETED 09/26/13	CAVE IN DEPTH @ 2.50'
WL	RIG CME 55 FOREMAN Jason Trogdon	DRILLING METHOD 2.25 HSA

Schnabel ENGINEERING **TEST BORING LOG**

Project: 2 Duke Street
Alexandria, Virginia

Boring Number: **SB-1**
Contract Number: 13612011
Sheet: 1 of 2

Contractor: Connelly and Associates, Inc.
Frederick, Maryland
Contractor Foreman: T. Redman
Schnabel Representative: D. Cepull
Equipment: CME-45C (Truck)
Method: 3-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)
Dates Started: 2/14/13 **Finished:** 2/14/13
Location: See Location Plan

Ground Surface Elevation: 9± (ft) **Total Depth:** 40.0 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered ▽	2/14	9:54 AM	8.0'	---	---
Casing Pulled ▽	2/14	11:10 AM	7.0'	---	---

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.4	Concrete		8.5					1-inch diameter temporary PVC groundwater observation well installed upon completion.
0.5	Asphalt		8.4					
	FILL, sampled as silty sand with brick and concrete fragments, fine to coarse grained sand; dark brown and red	FILL		A		SS 6+7+8+14 REC=13", 54%		
						SS 15+11+13+13 REC=12", 50%		
4.5	FILL, sampled as sandy elastic silt, fine grained sand; moist, dark brown, contains roots	FILL	4.4		5	SS 2+4+4+5 REC=24", 100%	MC = 19.1% PP = 4.50 tsf	
6.8	POORLY GRADED SAND WITH GRAVEL, fine grained sand; moist to wet, grayish brown ▽		2.1			SS 4+6+6+7 REC=18", 75%		
	Change: wet							
	Change: WITH FINE GRAVEL, rounded particles				10	SS 4+3+4 REC=18", 100%		
		SP		B	15	SS 5+5+6 REC=18", 100%	LL = NP MC = 19.2% % Passing #200 = 3.3	
					20	SS 5+2+2 REC=18", 100%		
	Change: no gravel					SS 8+8+3 REC=16", 89%		

(continued)

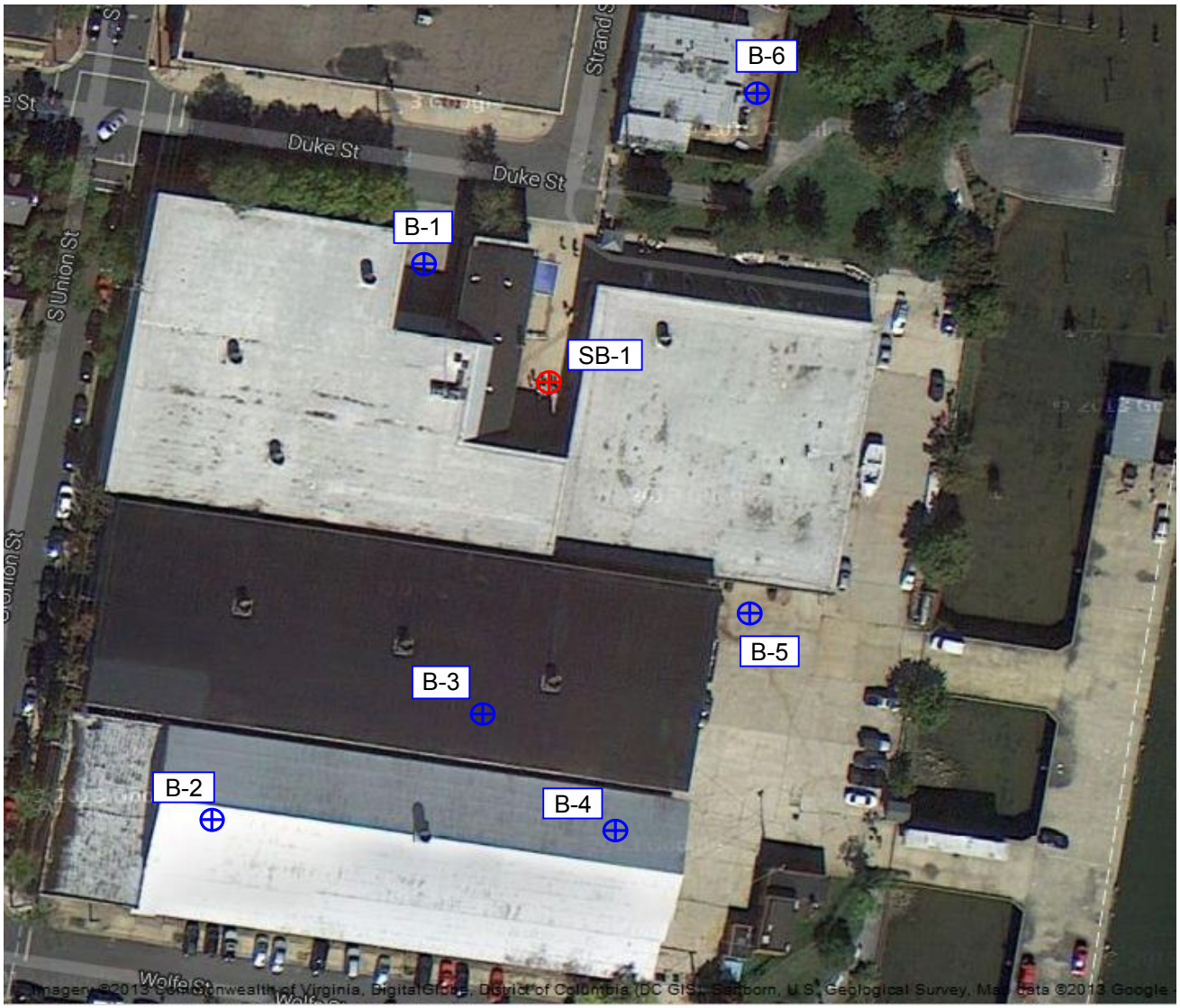
Schnabel ENGINEERING **TEST BORING LOG**

Project: 2 Duke Street
Alexandria, Virginia

Boring Number: **SB-1**
Contract Number: 13612011
Sheet: 2 of 2

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
	POORLY GRADED SAND WITH GRAVEL, fine grained sand; moist to wet, grayish brown *(continued)*							1-inch diameter temporary PVC groundwater observation well installed upon completion. *(continued)*
	Change: rounded particles; dark gray, estimated <5% fine gravel	SP		B	30	SS 3+4+1 REC=16", 89%		
	Change: no gravel				35	SS 1+WOH+1 REC=14", 78%		
39.5			-30.6			SS 2+2+4 REC=18", 100%		
40.0	SANDY SILT, fine grained sand; moist, dark gray, contains mica	ML	-31.1	C	40			

Bottom of Boring at 40.0 ft.
Boring backfilled with spoils and bentonite pellets upon completion.



Boring Location Diagram

Robinson Terminal - Alexandria Waterfront (South Parcel)

2 Duke Street

City of Alexandria, Virginia

Drawn By:	PMW	Client:	Date:	ECS Job No.:	Scale:	None
Checked By:	JPH	EYA	10/10/13	21983-A	**Drawing No.:**	**1**