REPORT OF GEOTECHNICAL SERVICES

KENSINGTON AVENUE AREA
DRAINAGE IMPROVEMENTS
TAMPA, FL

AREHNA PROJECT NO. B-13-047

February 24, 2014

Prepared For:
City of Tampa
306 W. Jackson Street, 6N
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February 24, 2014

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Subject: **Report of Geotechnical Engineering Services**
Kensington Avenue Area Drainage Improvements
Tampa, FL
AREHNA Project Number B-13-047

AREHNA Engineering, Inc. (AREHNA) is pleased to submit this report of our geotechnical services for the referenced project. Services were conducted in general accordance with AREHNA Proposal Prop-13-267.rev dated November 22, 2013. The purpose of our geotechnical study was to obtain information on the general subsurface conditions within the project limits.

This report presents our understanding of the project, outlines our exploratory procedures, documents the data obtained, and includes our evaluation and recommendations.

AREHNA appreciates the opportunity to have assisted City of Tampa on this project. Should you have any questions with regards to this report, or if we can be of any further assistance, please contact this office.

Best Regards,

AREHNA ENGINEERING, INC.
FLORIDA BOARD OF PROFESSIONAL ENGINEERS CERTIFICATE OF AUTHORIZATION NO. 28410

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TABLE OF CONTENTS

Page

APPENDIX

1.0 EXECUTIVE SUMMARY

The purpose of our geotechnical study was to obtain information on the general subsurface conditions within the project limits. The subsurface materials encountered were then evaluated and recommendations provided regarding the design of subsurface drainage improvements and the repair or reconstruction of the existing streets. In this regard, our deliverable is this written report along with ACAD drawings of our Report of Core Boring Sheet and surveyed boring locations.

We performed a total of 13 Standard Penetration Test (SPT) borings and installed 5 temporary groundwater observation wells. The pavement section varied considerably. The asphalt thickness ranged from 1.5 to 4.25 inches for the 9 locations where a base layer was present. The base (shell stabilized sand) thickness ranged from 3 to 9 inches. Using layer coefficients of 0.44 for asphalt and 0.10 for shell stabilized base, with an average asphalt thickness of 3.25 inches and an average base thickness of 5.67 inches, resulted in a corresponding Structural Number of 2.0, for a properly drained new pavement with these layer thicknesses. Three locations found full depth asphalt with thickness of 3, 5, and 10 inches, with corresponding properly drained new pavement Structural Numbers of 1.32, 2.2 and 4.4.

The current streets are in fair to poor condition. The existing asphalt has a layer coefficient of approximately 0.2 and the existing base is generally saturated and not contributing to the structural capacity of the pavement. This results in an average current condition Structural Number of 0.65. The City of Tampa Technical Standards For Transportation indicate a minimum Structural Number of 2.21 for local streets. The above results are consistent with the current extensive cracking and pavement failure observed within the project area.

There are three issues that contribute to the wet subgrade observed:

1. Low permeability clayey sand and clay were found over the area. These soils limit downward flow of water and would also limit the effectiveness of any new underdrains installed.
2. Peat with natural moisture contents > 200% and over 60% organics, was found in the borings drilled on Drexel Avenue, Waverly Circle, and Waverly Avenue in the western portion of the project area.
3. The adjacent properties are generally higher than the roadway. Rain and irrigation water on these properties result in a groundwater head near the roadway surface elevation.

The ideal fix would include:

- Remove the peat soils from beneath the roadway in the western portion of the project area.
- Remove the existing soils to a depth of 4 feet or more and replace with clean sand (A-3).
- Install FDOT Type III (see FDOT Design Standards Index No. 286) on each side of the road as deep as possible, draining into the storm sewer system.
- Notify residents that excess irrigation substantially reduces pavement life in their neighborhood.
- Install a flexible pavement meeting the City's required Structural Number.

Unfortunately, budget constraints, the presence of existing utilities, and the need to maintain road service into the neighborhood make the above ideal fix unreachable for this project.

If the ideal fix is not obtainable, compromises will need to be reached. We recommend that the City approach the roadway fixes in this neighborhood as a series of smaller pilot projects were the effects of not following the ideal program can be evaluated.

Some of the most severe conditions are found on Kensington Avenue. We recommend underdrains (sloped to drain into the storm sewer system) as deep as possible on both sides of the road, together with a FDOT Type D-2 geotextile placed on the roadway subgrade, a 4-inch thick drainage layer linked to the underdrain system, and topped with 5-inches of asphalt.

The remainder of this report outlines the field and laboratory work performed, the results obtained, and our detailed evaluation and recommendations.

2.0 PROJECT INFORMATION AND SCOPE OF WORK

2.1 Project Area Description and Project Characteristics

As indicated on Figure 1 in the Appendix, the project area includes Kensington Avenue at the north end, Waverly Place on the east end. Euclid Avenue to the south, and the Selmon Expressway to the west are outside the project limits. The streets within the project area include:

- W. Kensington Avenue
- Waverly Avenue
- W. Waverly Park
- S. Waverly Park
- Waverly Circle
- Waverly Place
- S. Drexel Avenue

The total length of streets in the project area is approximately one mile. The photos below show the range in pavement conditions within the project area.

Cracking and Patching At
3123 W. Kensington Ave

Drexel Avenue
Near Waverly Circle

Excessive Overlay For South "Y"
At East End of W. Kensington Avenue

Good Pavement Condition at South End
Of Waverly Place [Asphalt Thickness = 10 inches]

2.2 Scope of Work

The purpose of our geotechnical study was to obtain information on the general subsurface conditions within the project limits. The subsurface materials encountered were evaluated and recommendations provided regarding the design of subsurface drainage improvements and the repair or reconstruction of the existing streets. In this regard, our deliverable includes this written report along with ACAD drawings of the surveyed boring locations together with a Report of Core Boring Sheet.

The following services were performed to achieve the above-outlined objectives:

- Coordinated utility location services with the City and Sunshine State One-Call.
- Obtained any permits, including City of Tampa Right of Way (ROW) and Temporary Traffic Control (TTC) permits to perform the requested services within the existing roadway. Since this is a residential neighborhood, signs and a flagman were used for traffic control during our drilling operations.
- Performed a total of 13 Standard Penetration Test (SPT) borings and installed 5 temporary groundwater observation wells. We took readings of the groundwater levels prior to backfilling and patching the well locations. The following list summarizes our boring and well locations.

Boring Number	Depth (ft)	Planned Location
B-01	10	North lane, 20 feet east of island at west end of W. Kensington Ave.
B-02	10	North lane at 3123 W. Kensington Ave.
B-03	10	North lane at 3117 W. Kensington Ave.
B-04	25	West lane near intersection of W. Kensington Ave and S. Waverly Park
B-05	10	North lane at 3139 Waverly Ave
B-06	10	North lane at 3113 South Waverly Park (north of intersection of S. Waverly Park and W. Waverly Ave)
B-07	10	North lane at 3140 S. Waverly Park
B-08	10	North lane at 3130 S. Waverly Park
B-09	10	West lane at 3610 S. Waverly Circle
B-10	10	West lane at 3610 S. Waverly Place
B-11	25	W Lane at intersection of S. Drexel Ave and Waverly Circle
B-12	25	NW Corner of intersection of Waverly Place and W. Kensington Ave.
B-13	25	Drexel Avenue, SW of the intersection of Waverly Ave and Waverly Circle
W-01	10	Between south curb and sidewalk at 3128 W. Kensington Ave.
W-02	10	North lane at 3123 W. Kensington Ave.

W-03	10	1 foot north of curb at 3123 W. Kensington Ave.
W-04	10	15 feet north of curb at 3123 W. Kensington Ave.
W-05	10	30 feet north of curb at 3123 W. Kensington Ave.

- Retained Echezabal & Associates, Inc. to survey the ground surface at the boring and well locations to the City criteria of horizontal location relative to the Florida State Plane Coordinate System, Transverse Mercator, West Zone, NAD 83/90 adjustment, and vertical location to the NAVD 88 datum; with at least one temporary bench mark set in the project area and deliverables provided in ACAD format.
- Visually classified soil samples in the laboratory using the USCS and AASHTO Classification Systems and conducted a laboratory testing program.
- The results of the subsurface exploration are presented in this written report, signed and sealed by a professional engineer specializing in geotechnical engineering with the data obtained summarized on standard Report of Core Boring Sheets.
- A general review of a report dated April 22, 2013 titled: *Hyde Park Seepage Evaluation* was provided under separate cover on December 30, 2013.

3.0 FIELD EXPLORATION & LAB TESTING

3.1 Field Exploration

We performed a total of 13 Standard Penetration Test (SPT) borings and installed 5 temporary groundwater observation wells. The approximate boring locations are presented on the Field Exploration Plan (Figure 2) in the Appendix. The borings were located in the field by referencing from nearby features. After drilling was complete, the borings and wells were located by Echezabal & Associates, Inc.

The SPT borings were performed with the use of a power drill rig using an auger to advance the boring. Samples were collected and Standard Penetration Test resistances were measured at approximate intervals of two feet for the top ten feet and at approximate intervals of five feet thereafter. The soil sampling was performed in general accordance with ASTM Test Designation D-1586, entitled "Penetration Test and Split-Barrel Sampling of Soils."

The temporary monitoring wells were initially advanced by augering to a depth of ten feet. A 2-inch diameter section of slotted PVC well screen was set in each well. The screen was then capped and covered to protect it from damage.

Representative portions of the soil samples were sealed in glass jars, labeled and transferred for appropriate classification.

3.2 Laboratory Testing

The soil samples were transported to AREHNA's soil laboratory and were classified by the Geotechnical Engineer using the USCS in general accordance with the ASTM Test Designation D-2488. AASHTO classifications were also performed. Laboratory tests included Atterberg limits, moisture content, organic content, and single sieve grain size (-200 sieve). The test results are presented below:

Boring No.	Sample Depth (feet)	Percent Moisture Content	Percent Finer (-200 sieve)	Liquid Limit	Plastic Limit	Plasticity Index	Percent Organic Content
B-02	2.0 – 4.0	25.4	25.0	- - -	- - -	- - -	- - -
B-02	4.0 – 6.0	19.1	24.0	- - -	- - -	- - -	- - -
B-02	6.0 – 8.0	15.8	22.0	- - -	- - -	- - -	- - -
B-04	1.0 – 1.5	19.8	7.0	- - -	- - -	- - -	3.2
B-05	2.0 – 4.0	284.1	4.4	- - -	- - -	- - -	68.7
B-07	4.0 – 6.0	23.0	23.0	59	21	38	- - -
B-09	2.0 – 4.0	263.3	9.3	- - -	- - -	- - -	61.6
B-10	2.0 – 4.0	54.4	- - -	75	27	48	- - -
B-12	4.0 – 6.0	21.9	3.3	- - -	- - -	- - -	3.3

- - - Not Tested

4.0 SUBSURFACE CONDITIONS

4.1 USGS Topographic Data

The topographic survey map published by the United States Geological Survey was reviewed for ground surface features at the proposed project location (Figure 3). Based on this review, the natural ground surface elevation within the project area is approximately +10 to +15 feet National Geodetic Vertical Datum of 1929 (NGVD). The highest elevations are in the northern part of the project area, while the lowest elevations are in the southwestern part of the project area.

4.2 USDA Natural Resources Conservation Service Data

A review of the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) survey for Hillsborough County, attached as Figure 4, indicates that the soils within the project area consist of Wabasso-Urban Land Complex (mapping unit 58). The NRCS published profiles typically reports soils extending to 80 inches below the ground surface. Excerpts from the published Soil Survey are provided below for reference:

Characteristics of Wabasso-Urban land complex [58]: This complex consists of Wabasso soil that is nearly level and poorly drained and of areas of Urban land. The complex is on broad plains on the flatwoods. The slope is 0 to 2 percent.

Typically, the surface layer of Wabasso soil is very dark gray fine sand about 5 inches thick. The subsurface layer, to a depth of about 21 inches, is light brownish gray fine sand. The upper part of the subsoil, to a depth of about 31 inches, is black fine sand. The middle part, to a depth of about 37 inches, is gray, mottled sand clay loam. The lower part, to a depth of about 48 inches, is brown, mottled sandy clay loam. The substratum to a depth of about 80 inches is light gray, mottled loamy fine sand. In places, the upper part of the subsoil is at a depth of more than 30 inches. In places, the lower part of the subsoil is at a depth of more than 40 inches. In some areas, the upper part of the subsoil is brown or dark yellowish brown.

The urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Based on the borings performed, the soils at in this project area are similar to the soil unit described above.

4.3 Subsurface Conditions

A pictorial representation of the subsurface conditions encountered by the borings is shown on the General Subsurface Profile, Figure 5 in the Appendix. This profile and the following soil conditions highlight the general subsurface stratification. The Soil Test Boring Records in the Appendix should be consulted for a detailed description of the subsurface conditions encountered at each boring location.

When reviewing the boring records and the subsurface profiles, it should be understood that soil conditions may vary between and away from boring locations.

The pavement section varied considerably:

Boring / Well Number	Asphalt Thickness - inches	Base Thickness - inches
B-01	1.5	9
B-02	3.0	0
B-03	3.5	4
B-04	Not measured	
B-05	3.0	6
B-06	3.0	7
B-07	3.0	4
B-08	4.0	6
B-09	3.0	3
B-10	10.0	0
B-11	4.3	3
B-12	4.0	9
B-13	5.0	0

The asphalt thickness ranged from 1.5 to 4.3 in the 9 locations where a base layer was present. The base (shell stabilized sand) thickness ranged from 3 to 9 inches.

Peat was found in the borings in B-05, B-09, and B-11. These borings were drilled on Drexel Avenue, Waverly Circle, and Waverly Avenue in the western portion of the project area. When tested in our laboratory, the peat had natural moisture contents of 263% and 284%, with organics of 61.6% and 68.7%. These organic soils are susceptible to continued settlement and decay.

The subgrade soils in the remainder of the site were sand, slightly silty sand, and clayey sand. These soils were typically underlain by clayey sand and high plasticity clay to the boring termination depths of 10 to 30 feet. Standard penetration test N-values in boring B-1 through B-12 ranged from 2 to 50 blows for 6-inches of penetration. In boring B-13, a loss of drilling fluid circulation was noted at a depth of 18 feet. At 18.5 feet the split-spoon sampler advanced 6 inches under the weight of the drill rod and 14 inches under the added weight of the 140 pound hammer. At a depth of 23.5 feet, the sampler advanced 2.5 feet under the weight of the drill rod. This soft zone likely represents some raveling into the hard limestone found from a depth of 26 feet to the boring termination depth of 30 feet.

A page defining the terms and classification symbols used in the boring profiles is included in the Appendix of this report.

4.4 Groundwater Conditions

The groundwater level was measured in the borings at the time of drilling. The depth to the groundwater ranged from found between depths of 2 and 6 feet at the time the borings were drilled. The deeper recorded

groundwater levels are likely the result of the slow percolation of the groundwater back into the borehole through the clayey soils encountered.

It should be noted that groundwater levels tend to fluctuate during periods of prolonged drought and extended rainfall and may be affected by man-made influences. Temporary "perched" groundwater levels will occur as the result of poor vertical percolation through the upper clayey soils found within the project area.

In order to obtain more representative groundwater elevations, five temporary groundwater monitoring wells were installed near 3123 W. Kensington Avenue. The following table presents the groundwater data recorded.

Well No:	W-1	W-2	W-3	W-4	W-5
Location	Between curb and south sidewalk	North lane of Kensington Ave.	1' north of north curb	15' north of north curb	30' north of north curb
Ground Elevation (feet)	15.86	15.75	16.20	17.64	18.89
Groundwater (Depth) & [Elev.] Measured On 01/29/14	N/A	(0.9') [14.85]	(1.5') [14.70]	(3.1') [14.54]	(4.4') [14.49]
Groundwater (Depth) & [Elev.] Measured On 02/03/14	N/A	(0.3') [15.45]	(1.2') [15.00]	(2.1') [15.54]	(3.3') [15.59]
Groundwater (Depth) & [Elev.] Measured On 02/05/14	(0.5') [15.36]	(0.3') [15.45]	(1.0') [15.20]	(2.6') [15.04]	(3.9') [14.99]
Groundwater (Depth) & [Elev.] Measured On 2/14/14	(0.4') [15.46]	(0.4') [15.35]	(0.9') [15.30]	(2.6') [15.04]	(3.7') [15.19]

5.0 EVALUATION & RECOMMENDATIONS

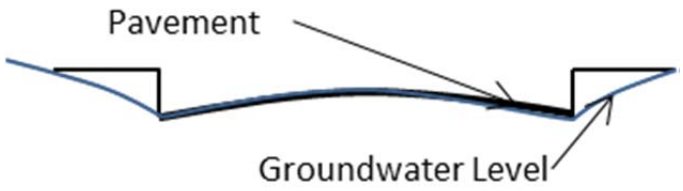
5.1 General

Our geotechnical evaluation is based upon the previously presented project information as well as the field and laboratory data obtained during this geotechnical exploration. If conditions are significantly different from those described, or if the subsurface conditions during construction are different from those revealed by our borings, we should be notified immediately so that we might review our recommendations presented in this report.

5.2 Evaluation Of Existing Groudwater Conditions

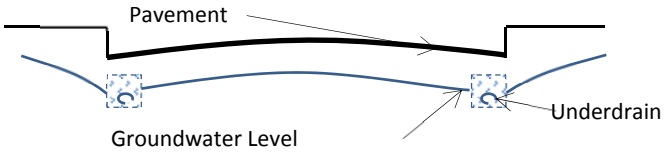
As indicated below on Figure 5.2.1, the groundwater level is high within the project area. In many places the groundwater level is higher than the sidewalk and pavement.

Figure 5.2.1



When soils are uniform and sandy, underdrains can be used to control the groundwater level, as shown below in Figure 5.2.2.

Figure 5.2.2

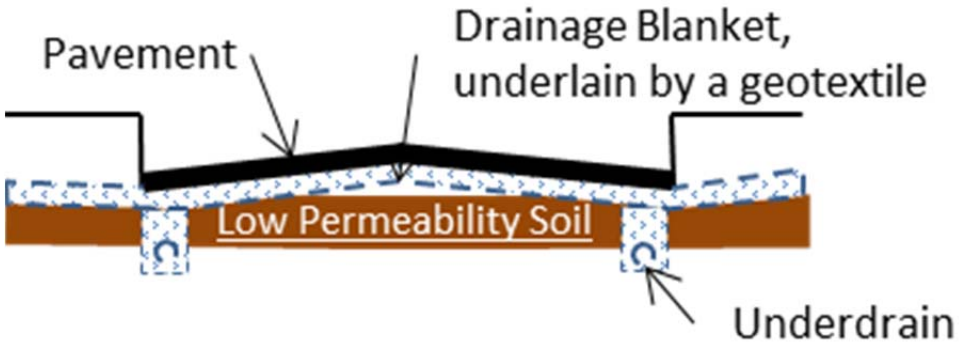


At the project site, much of the soil below the base is clayey sand or clay. These soils have a low permeability. The low permeability tends to reduce the downward flow of water through the clayey soils and result in "perched" groundwater conditions. In addition, as shown on Figure 5.2.3, the low permeability soils severely reduce the lateral effectiveness of underdrains.

Figure 5.2.3

In order to facilitate groundwater control, in addition to underdrains, we recommend a drainage blanket underlain by a separation geotextile be used between the pavement and the subgrade. See Figure 5.2.4 below:

Figure 5.2.4



The drainage blanket is integral with the underdrain system. The ideal drainage blanket is well graded gravel without fines. Free draining cement stabilized and asphalt stabilized materials can also be used. The stabilized materials result in higher pavement strength, but can clog or the bonding material can strip away with time. The No. 67 stone may rut under heavy traffic loads. The City may want to experiment with drainage blanket materials to find the ideal layer. Our initial recommendation is to use a four inch-thick layer of un-stabilized FDOT No. 67 stone for the drainage layer combined with a full depth asphalt pavement.

In order to properly function, the underdrain system must be sloped to drain into the stormwater system. One-way valves may be used to keep the storm water from back-flowing into the underdrain system.

5.3 Evaluation Of Existing Pavement Conditions

As indicated previously, the current streets are in fair to poor condition. The pavement sections encountered in our borings varied considerably. The asphalt thickness ranged from 1.5 to 4.25 inches for the 9 locations where a base layer was present. The base (shell stabilized sand) thickness ranged from 3 to 9 inches.

The existing asphalt has a layer coefficient of approximately 0.2 and the existing base is generally saturated and not contributing to the structural capacity of the pavement. This results in an average current condition Structural Number of 0.65. The City of Tampa Technical Standards For Transportation require a minimum Structural Number of 2.21 for local streets.

There are three issues that contribute to the wet subgrade observed:

1. Low permeability clayey sand and clay were found over the area. These soils limit downward flow of water and would also limit the effectiveness of any new underdrains installed.
2. Peat with a natural moisture content > 200% and over 60% organics, was found in the borings drilled on Drexel Avenue, Waverly Circle, and Waverly Avenue in the western portion of the project area. These soils also limit downward water flow and have the potential to continue to compress and decay.
3. The adjacent properties are generally higher than the roadway. Rain and irrigation water on these properties result in a groundwater head near the roadway surface elevation.

5.4 Recommendations

The ideal fix would include:

- Remove the peat soils from beneath the roadway in the western portion of the project area.
- Remove the existing soils to a depth of 4 feet or more and replace with clean sand (A-3).
- Install FDOT Type III (see FDOT Design Standards Index No. 286) on each side of the road as deep as possible.
- Notify residents that excess irrigation substantially reduces pavement life in their neighborhood.
- Install a flexible pavement meeting the City's required Structural Number.

Unfortunately, budget constraints, the presence of existing utilities, and the need to maintain road service into the neighborhood make the above ideal fix unreachable for this project.

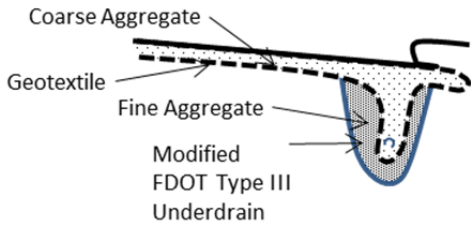
Since the ideal fix is not obtainable, compromises will need to be reached. We recommend that the City approach the roadway fixes in this neighborhood as a series of smaller pilot projects were the effects of not following the ideal program can be evaluated.

Some of the most severe conditions are found on Kensington Avenue. We recommend underdrains (sloped to drain into the storm sewer system) as deep as possible on both sides of the road, together with a FDOT Type D-2 geotextile placed on the roadway subgrade, a 4-inch thick drainage layer linked to the underdrain system should then be placed, and topped with 5-inches of asphalt. In this approach, no contribution to the overall pavement Structural Number is supplied by the drainage layer. The required Structural Number of 2.21 is obtained entirely by the full depth asphalt section.

If it is desired to replace the sidewalks of some streets, we recommend that the sidewalks be underlain by at least 4 inches of drainage stone, with any part of the drainage stone in contact with soil wrapped in a geotextile.

As outlined in Figure 5.4.1, our recommended blanket drain / underdrain detail is a modified FDOT Type III underdrain.

Figure 5.4.1



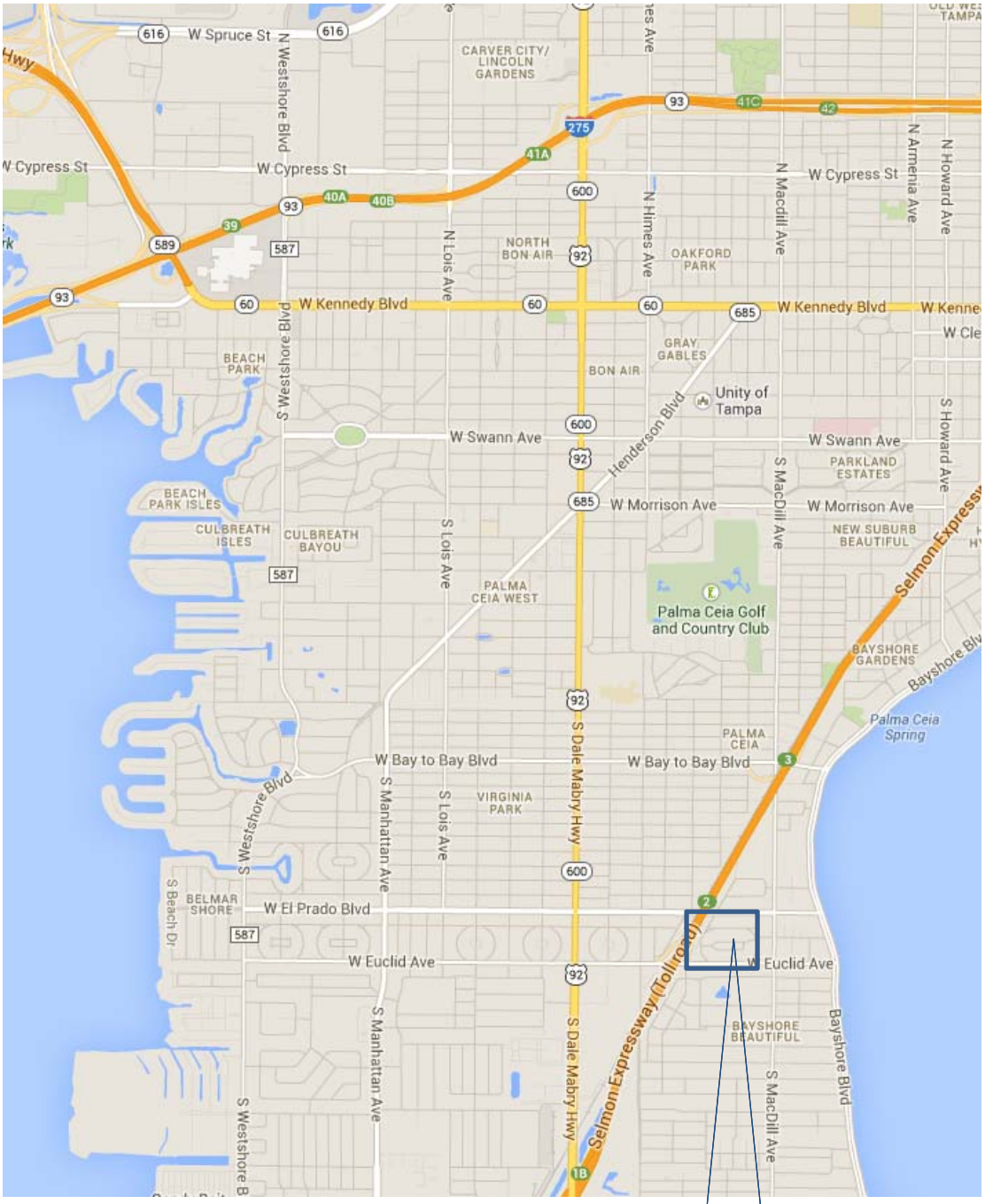
The use of fine aggregate between the soils surrounding the underdrain and the geotextile should tend to increase the time before the separation fabric clogs.

6.0 BASIS FOR RECOMMENDATIONS

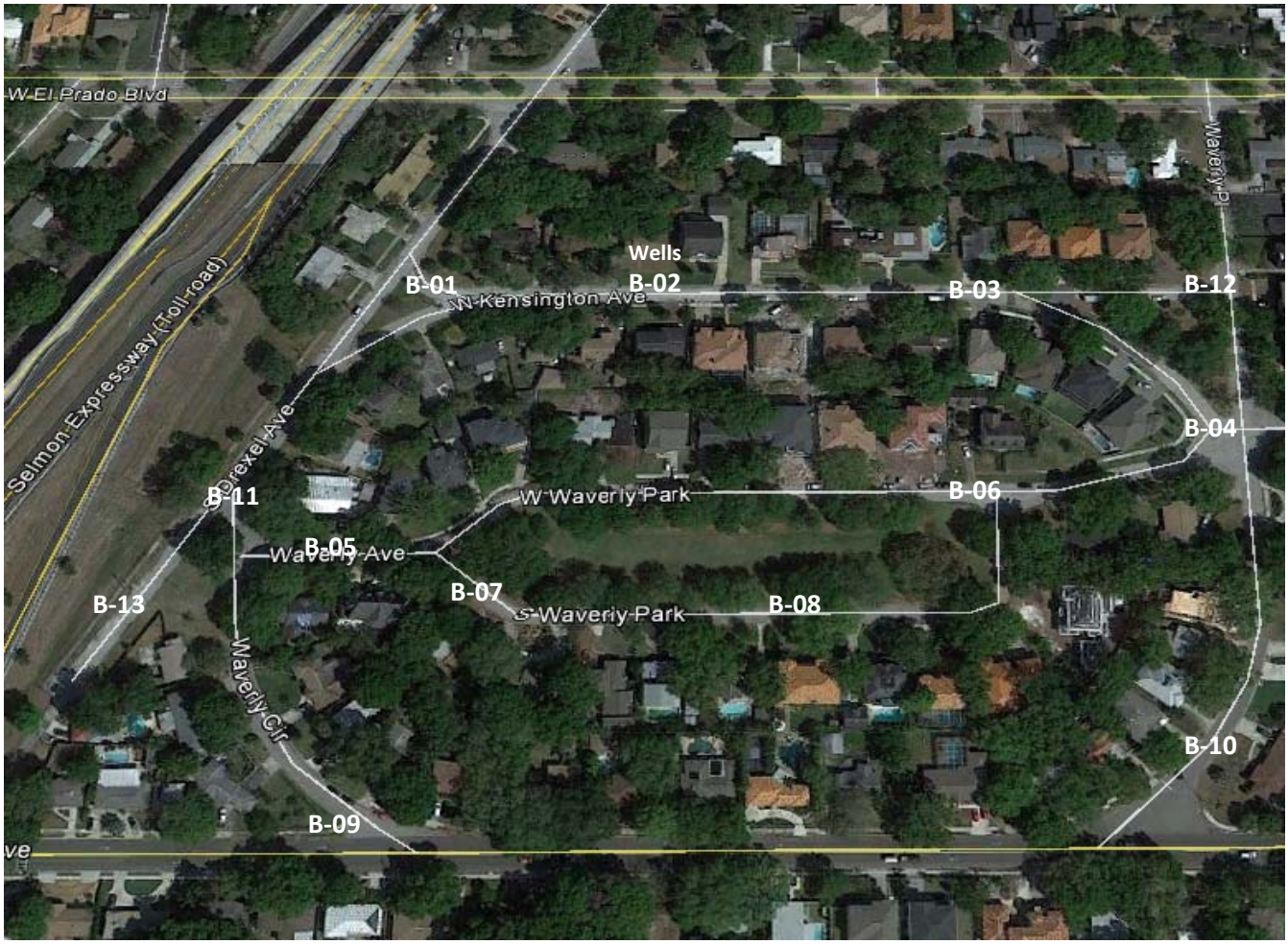
The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings performed at the locations indicated. Regardless of the thoroughness of a geotechnical exploration, there is always a possibility that conditions between borings will be different from those at specific boring locations and that conditions will not be as anticipated by the designers or contractors. In addition, the construction process itself may alter soil conditions. AREHNA is not responsible for the conclusions, opinions or recommendations made by others based on the data presented in this report.

APPENDIX

Project Area Location Map – Figure 1
Field Exploration Location Map – Figure 2
USGS Topographic Survey – Figure 3
USDA Soil Survey Map – Figure 4
Subsurface Profile – Figure 5
Soil Boring Records
Key to Soil Classifications Symbols
Boring Survey Sheet
Report of Core Borings Sheet



Kensington Area Drainage Tampa, Florida	AREHNA | Engineering, Inc. 5012 W. Lemon Street, Tampa, FL 33609 Phone 813.944.3464 ▪ Fax 813.944.4959	PROJECT AREA LOCATION MAP
Client: City of Tampa Project No: B-13-047 Date: 02/14/14	Designed By: CJR Checked By: JAM Drawn By: KSL	FIGURE 1



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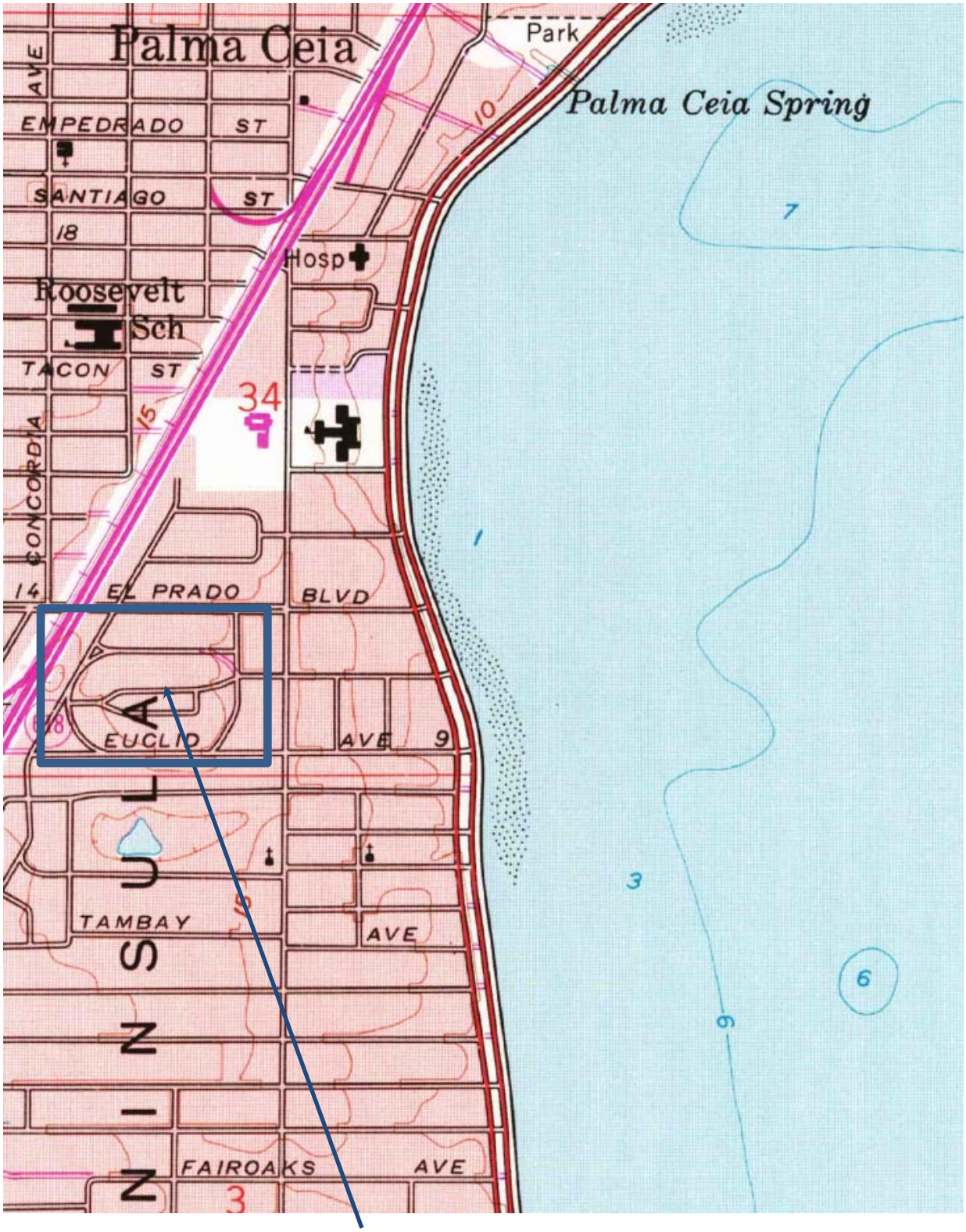
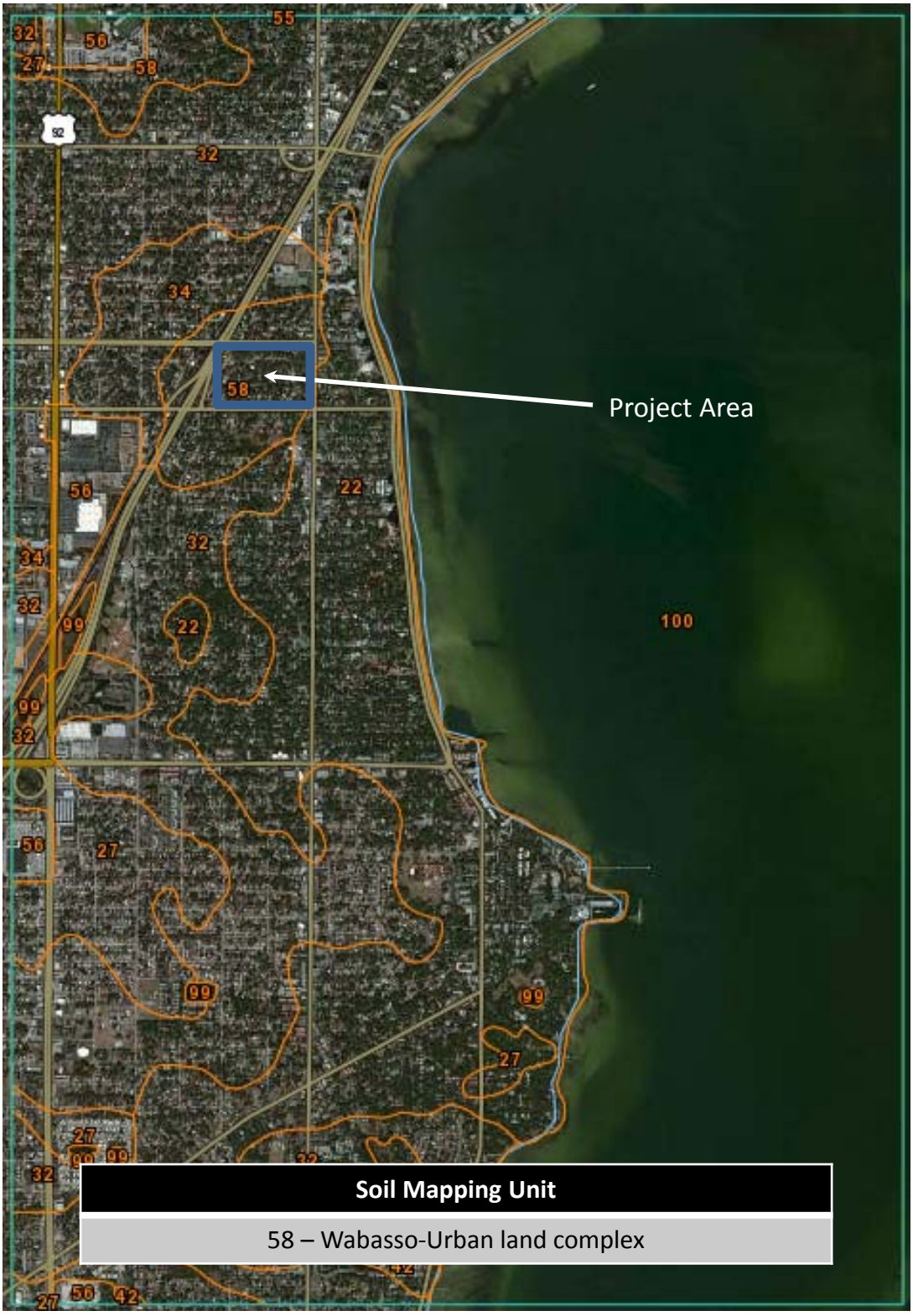
Kensington Area Drainage Tampa, Florida	AREHNA | Engineering, Inc. 5012 W. Lemon Street, Tampa, FL 33609 Phone 813.944.3464 ▪ Fax 813.944.4959	FIELD EXPLORATION LOCATION MAP
Client: City of Tampa Project No: B-13-047 Date: 02/14/14	Designed By: CJR Checked By: JAM Drawn By: KSL	FIGURE **2**



Kensington Area Drainage Tampa, Florida	AREHNA | Engineering, Inc. 5012 W. Lemon Street, Tampa, FL 33609 Phone 813.944.3464 ▪ Fax 813.944.4959	USGS TOPOGRAPHIC SURVEY	
Client: City of Tampa Project No: B-13-047 Date: 02/14/14		Designed By: CJR Checked By: JAM Drawn By: KSL	FIGURE 3



Kensington Area Drainage Tampa, Florida	AREHNA | Engineering, Inc. 5012 W. Lemon Street, Tampa, FL 33609 Phone 813.944.3464 ▪ Fax 813.944.4959	USDA SOIL SURVEY
Client: City of Tampa Project No: B-13-047 Date: 02/14/14	Designed By: CJR Checked By: JAM Drawn By: KSL	FIGURE 4

AREHNA | Engineering, Inc.
5012 W. Lemon Street
Tampa, FL 33609

Date: 1/31/14
Drawn By: LEF
Checked By: CJR

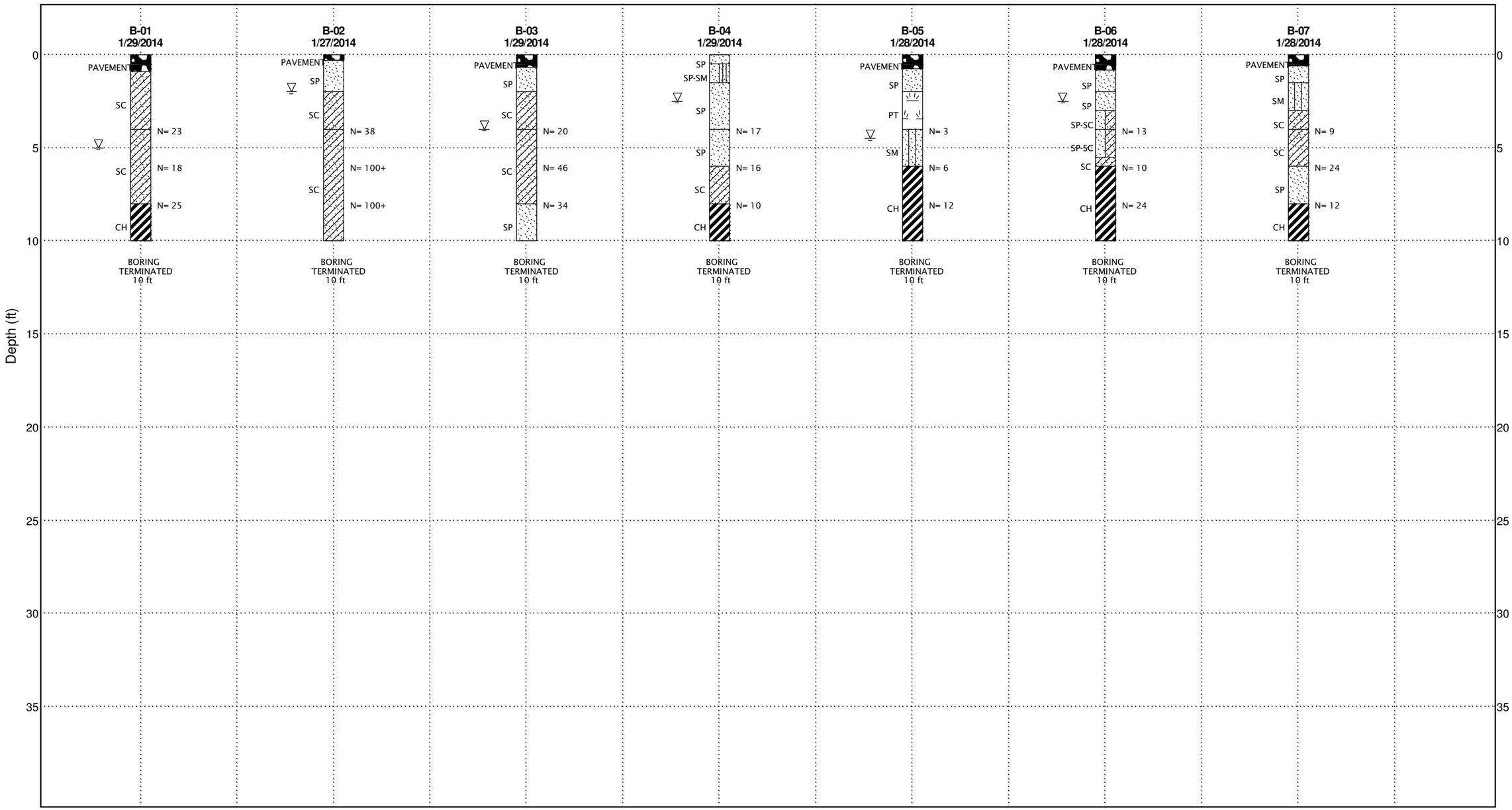
Kensington Avenue

Prepared for
City of Tampa - Stormwater Division
Project No.: B-13-047

GENERALIZED SUBSURFACE PROFILE
Figure 5.A

- Pavement
- Poorly-graded Sand
- Silty Sand
- Clayey Sand
- Poorly-graded Sand with Silt
- Poorly-graded Sand with Clay
- High Plasticity Clay
- Peat

Soil Classification Key



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5012 W. Lemon Street
Tampa, FL 33609

Date: 1/31/14
Drawn By: LEF
Checked By: CJR

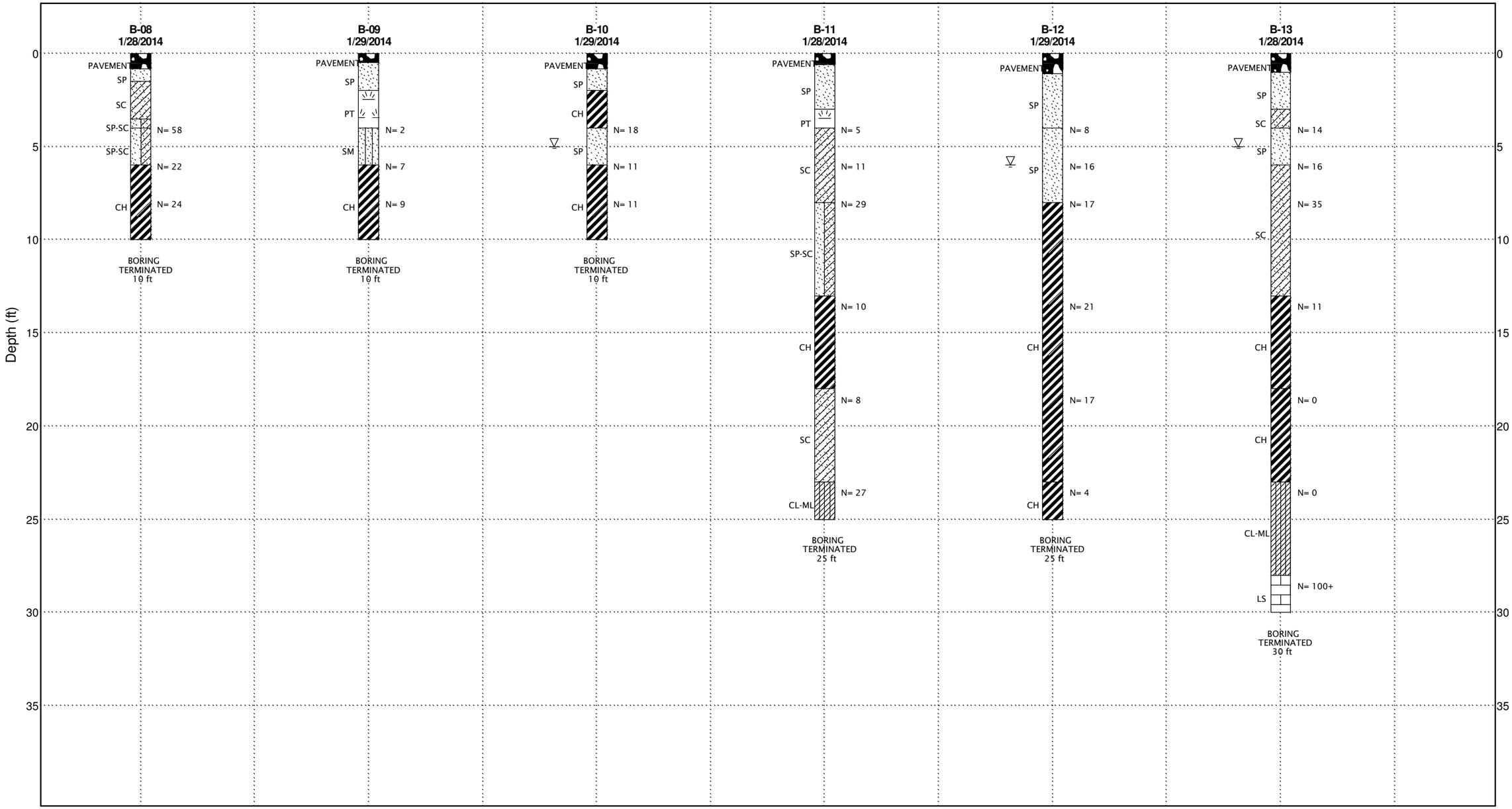
Kensington Avenue

Prepared for
City of Tampa - Stormwater Division
Project No.: B-13-047

GENERALIZED SUBSURFACE PROFILE
Figure 5.B

- Pavement
- Poorly-graded Sand with Clay
- Silty Sand
- Poorly-graded Sand
- High Plasticity Clay
- Low Plasticity Silty Clay
- Clayey Sand
- Peat
- Limestone

Soil Classification Key



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5012 W. Lemon Street
Tampa, FL 33609

Date: 1/31/14
Drawn By: LEF
Checked By: CJR

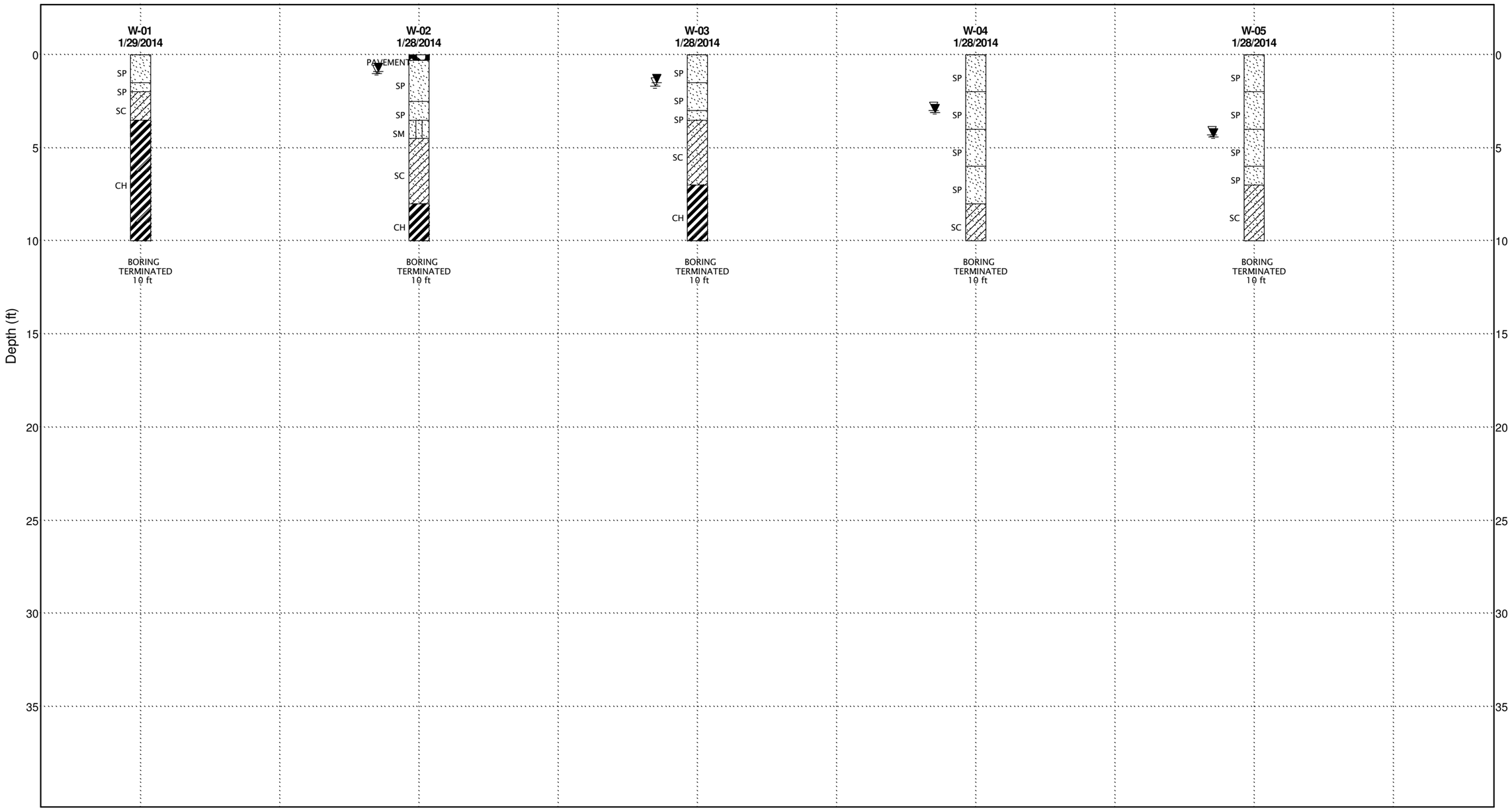
Kensington Avenue

Prepared for
City of Tampa - Stormwater Division
Project No.: B-13-047

GENERALIZED SUBSURFACE PROFILE
Figure 5.C

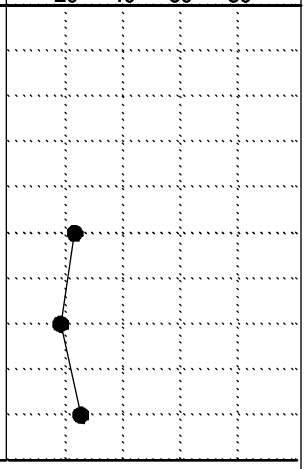
Poorly-graded Sand
Clayey Sand
High Plasticity Clay
Pavement
Silty Sand

Soil Classification Key



DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE	SPT BLOW COUNTS	N-VALUE
0	Pavement - asphalt 1.5 inches, base 9 inches					
	Greenish-gray clayey fine SAND (SC) with trace roots [A-2-7]			AU		
				AU		
5	Medium dense greenish-gray clayey fine SAND (SC) [A-2-7]	▽		SPT	6-10-13-13	23
				SPT	12-9-9-23	18
	Very stiff light green high plasticity CLAY (CH) [A-7-6]			SPT	12-13-12-12	25
10						

Bottom of borehole at 10.0 feet.



Date Drilled: 1/29/14
Drilled By: AREHNA
Method: ASTM D-1586, Standard Penetration Test Boring

Ground Water Level:

▽ At Time of Drilling: 5 ft below existing grade

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

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SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring B-01

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE	SPT BLOW COUNTS	N-VALUE	SPT N VALUE / FINES CONTENT (%)
0	Pavement - asphalt 3 inches						
	Very dark brown fine SAND (SP) with roots [A-3]	▽		AU			
	Dark grayish-green clayey fine SAND (SC) [A-2-7]			AU			
5	Dense to very dense light grayish-green clayey fine SAND (SC) [A-2-7]			SPT	4-14-24-27	38	
				SPT	40-44-50/6"	100+	>>
	50 blows for 6-inches @ 7 feet						
	50 blows for 6-inches @ 8 feet			SPT	50/6"	100+	>>
10							

SPT N VALUE: 20 40 60 80

PL MC LL

20 40 60 80

▲ FINES CONTENT (%) ▲

20 40 60 80

Bottom of borehole at 10.0 feet.

Date Drilled: 1/27/14
Drilled By: AREHNA
Method: ASTM D-1586, Standard Penetration Test Boring

Ground Water Level:

▽ At Time of Drilling: 2 ft below existing grade

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

AREHNA | Engineering, Inc.

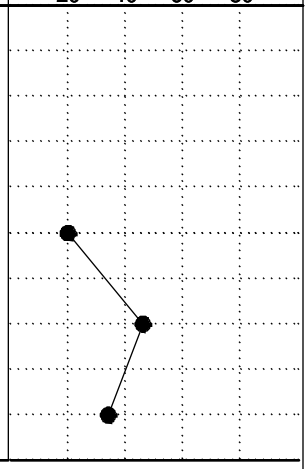
SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring B-02

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE	SPT BLOW COUNTS	N-VALUE
0	Pavement - asphalt 3.5 inches, base 4 inches					
	Gray and brown fine SAND (SP) [A-3]			AU		
	Gray clayey fine SAND (SC) with trace roots [A-2-7]			AU		
5	Medium dense to dense greenish-gray clayey fine SAND (SC) [A-2-7]	▽		SPT	4-9-11-10	20
				SPT	12-30-16-12	46
	Dense gray fine SAND (SP) [A-3]			SPT	9-13-21-22	34
10						

● SPT N VALUE ●
20 40 60 80
PL MC LL
20 40 60 80
▲ FINES CONTENT (%) ▲
20 40 60 80



Bottom of borehole at 10.0 feet.

Date Drilled: 1/29/14
Drilled By: AREHNA
Method: ASTM D-1586, Standard Penetration Test Boring

Ground Water Level:

▽ At Time of Drilling: 4 ft below existing grade

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

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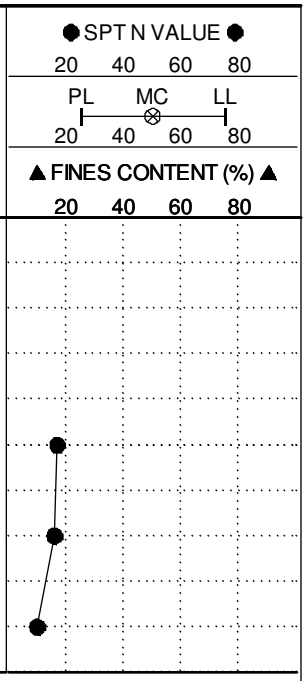
SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring B-03

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE	SPT BLOW COUNTS	N-VALUE
0	Light gray fine SAND (SP) with shell fragments [A-3]					
	Very dark gray slightly silty fine SAND (SP-SM) with organics [A-3]			AU		
	Brown fine SAND (SP) [A-3]	▽		AU		
5	Medium dense brown fine SAND (SP) [A-3]			SPT	3-7-10-14	17
	Medium dense dark gray clayey fine SAND (SC) [A-2-7]			SPT	8-8-8-5	16
	Stiff greenish-gray high plasticity CLAY (CH) with some sand [A-7-6]			SPT	4-4-6-8	10
10	Bottom of borehole at 10.0 feet.					



Date Drilled: 1/29/14
Drilled By: AREHNA
Method: ASTM D-1586, Standard Penetration Test Boring

Ground Water Level:

▽ At Time of Drilling: 2.5 ft below existing grade

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

AREHNA | Engineering, Inc.

SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring B-04

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE	SPT BLOW COUNTS	N-VALUE
0	Pavement - asphalt 3 inches, base 6 inches					
	Light gray fine SAND (SP) [A-3]			AU		
	Very dark brown PEAT (PT) [A-8]			AU		
5	Very loose very dark, brown silty fine SAND (SM) with organics [A-2-7]	▽		SPT	1-1-2-1	3
	Firm to stiff dark greenish-gray high plasticity CLAY (CH) [A-7-6]			SPT	2-3-3-3	6
				SPT	3-5-7-9	12
10						

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
▲ FINES CONTENT (%) ▲
20 40 60 80

Bottom of borehole at 10.0 feet.

Date Drilled: 1/28/14
Drilled By: AREHNA
Method: ASTM D-1586, Standard Penetration Test Boring

Ground Water Level:

▽ At Time of Drilling: 4.5 ft below existing grade

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

AREHNA | Engineering, Inc.

SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring B-05

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE	SPT BLOW COUNTS	N-VALUE
0	Pavement - asphalt 3 inches, base 7 inches					
	Gray and brown fine SAND (SP) [A-3]			AU		
	Dark brown fine SAND (SP) [A-3]	▽		AU		
	Dark brown slightly clayey fine SAND (SP-SC) [A-2-6]					
5	Medium dense dark brown slightly clayey fine SAND (SP-SC) [A-3]			SPT	3-7-6-8	13
	Medium dense gray clayey fine SAND (SC) [A-2-7]					
	Stiff to very stiff greenish-gray high plasticity CLAY (CH) [A-7-6]			SPT	4-5-5-10	10
10				SPT	8-9-15-14	24

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
▲ FINES CONTENT (%) ▲
20 40 60 80

Bottom of borehole at 10.0 feet.

Date Drilled: 1/28/14
Drilled By: AREHNA
Method: ASTM D-1586, Standard Penetration Test Boring

Ground Water Level:

▽ At Time of Drilling: 2.5 ft below existing grade

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

AREHNA | Engineering, Inc.

SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring B-06

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE	SPT BLOW COUNTS	N-VALUE
0	Pavement - asphalt 3 inches, base 4 inches					
	Gray fine SAND (SP) [A-3]			AU		
	Very dark gray silty fine SAND (SM) [A-2-4]			AU		
	Very dark gray clayey fine SAND (SC) [A-2-7]					
5	Loose dark gray clayey fine SAND (SC) [A-2-7]			SPT	3-4-5-6	9
	Medium dense gray fine SAND (SP) [A-3]			SPT	5-10-14-7	24
	Stiff greenish-gray high plasticity CLAY (CH) [A-7-6]			SPT	4-6-6-6	12
10						

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
FINES CONTENT (%)
20 40 60 80

Bottom of borehole at 10.0 feet.

Date Drilled: 1/28/14
Drilled By: AREHNA
Method: ASTM D-1586, Standard Penetration Test Boring

Ground Water Level:
Groundwater level not measured

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

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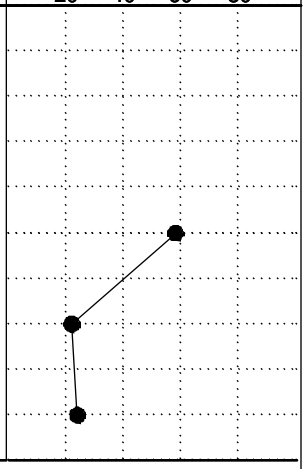
SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring B-07

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE	SPT BLOW COUNTS	N-VALUE
0	Pavement - asphalt 4 inches, base 6 inches					
	Light brown fine SAND (SP) [A-3]			AU		
	Gray clayey fine SAND (SC) [A-2-7]			AU		
	Very light gray slightly clayey fine SAND (SP-SC) [A-3]					
5	Very dense light gray slightly clayey fine SAND (SP-SC) [A-3]			SPT	9-31-27-25	58
	Very stiff greenish-gray high plasticity CLAY (CH) [A-7-6]			SPT	20-13-9-13	22
10				SPT	9-12-12-12	24

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
▲ FINES CONTENT (%) ▲
20 40 60 80



Bottom of borehole at 10.0 feet.

Date Drilled: 1/28/14
Drilled By: AREHNA
Method: ASTM D-1586, Standard Penetration Test Boring

Ground Water Level:
Groundwater level not measured

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

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SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring B-08

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE	SPT BLOW COUNTS	N-VALUE
0	Pavement - asphalt 3 inches, base 3 inches					
	Light gray fine SAND (SP) [A-3]			AU		
	Very dark brown PEAT (PT) [A-8]			AU		
5	Very loose very dark brown silty fine SAND (SM) with organics [A-2-4]			SPT	1-1-1-1	2
	Firm to stiff very dark gray and greenish-gray high plasticity CLAY (CH) [A-7-6]			SPT	5-3-4-5	7
10				SPT	3-3-6-7	9

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
▲ FINES CONTENT (%) ▲
20 40 60 80

Bottom of borehole at 10.0 feet.

Date Drilled: 1/29/14
Drilled By: AREHNA
Method: ASTM D-1586, Standard Penetration Test Boring

Ground Water Level:
Groundwater level not measured

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

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SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring B-09

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE	SPT BLOW COUNTS	N-VALUE
0	Pavement - asphalt 10 inches					
	Brown fine SAND (SP) [A-3]			AU		
	Greenish-gray high plasticity CLAY (CH) [A-7-6]			AU		
5	Medium dense dark brown fine SAND (SP) [A-3]	▽		SPT	4-11-7-5	18
	Stiff greenish-gray high plasticity CLAY (CH) with sand [A-7-6]			SPT	4-5-6-6	11
10				SPT	6-5-6-4	11

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
▲ FINES CONTENT (%) ▲
20 40 60 80

Bottom of borehole at 10.0 feet.

Date Drilled: 1/29/14
Drilled By: AREHNA
Method: ASTM D-1586, Standard Penetration Test Boring

Ground Water Level:

▽ At Time of Drilling: 5 ft below existing grade

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

AREHNA | Engineering, Inc.

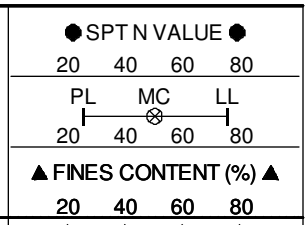
SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring B-10

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	SAMPLE TYPE	SPT BLOW COUNTS	N-VALUE
0	Pavement- asphalt 4.25 inches, base 3 inches			
	Brown and gray fine SAND (SP) [A-3]	AU		
		AU		
	Very dark brown PEAT (PT) [A-8]			
5	Loose to medium dense very dark brown clayey fine SAND (SC) with trace roots [A-2-7]	SPT	1-2-3-4	5
		SPT	6-4-7-7	11
	Medium dense dark brown slightly clayey fine SAND (SP-SC) [A-3]	SPT	9-15-14-16	29
10				
	Stiff dark green high plasticity CLAY (CH) [A-7-6]	SPT	2-4-6	10
15				
	Loose greenish-gray clayey fine SAND (SC) with roots [A-2-7]	SPT	2-4-4	8
20				
	Very stiff gray silty CLAY (CL-ML) with limestone fragments [A-7-6] Weight of rod for 6-inches @ 23.5 feet 100% loss of drilling fluid circulation @ 23.5 feet	SPT	0-19-8	27
25				

Bottom of borehole at 25.0 feet.



Date Drilled: 1/28/14
Drilled By: AREHNA
Method: ASTM D-1586, Standard Penetration Test Boring

Ground Water Level:
Groundwater level not measured

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

AREHNA | Engineering, Inc.

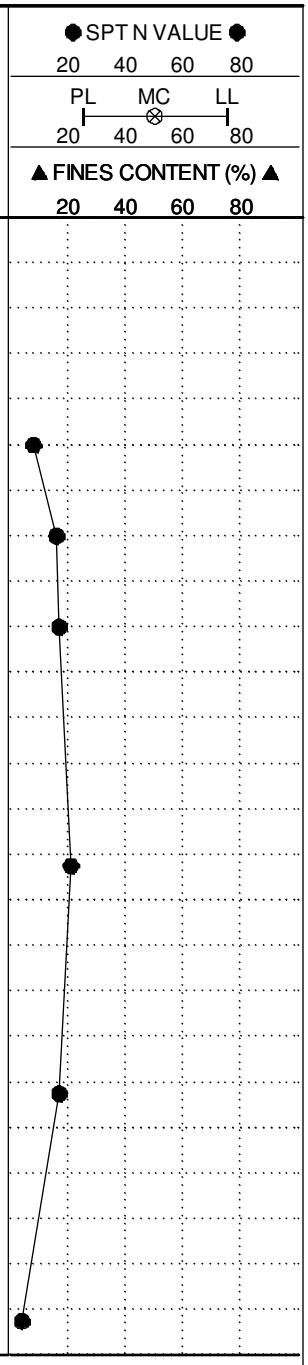
SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring B-11

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE	SPT BLOW COUNTS	N-VALUE
0	Pavement - asphalt 4 inches, base 9 inches					
	Pale brown and dark brown fine SAND (SP) [A-3]			AU		
				AU		
5	Loose to medium dense brown and dark brown fine SAND (SP) [A-3]	▽		SPT	2-4-4-4	8
				SPT	6-7-9-14	16
	Very stiff greenish-gray high plasticity CLAY (CH) with rocks [A-7-6]			SPT	4-9-8-13	17
10						
15				SPT	6-8-13	21
20				SPT	7-11-6	17
	Soft greenish-gray high plasticity CLAY (CH) [A-7-6]					
25				SPT	3-3-1	4

Bottom of borehole at 25.0 feet.



Date Drilled: 1/29/14
Drilled By: AREHNA
Method: ASTM D-1586, Standard Penetration Test Boring

Ground Water Level:

▽ At Time of Drilling: 6 ft below existing grade

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

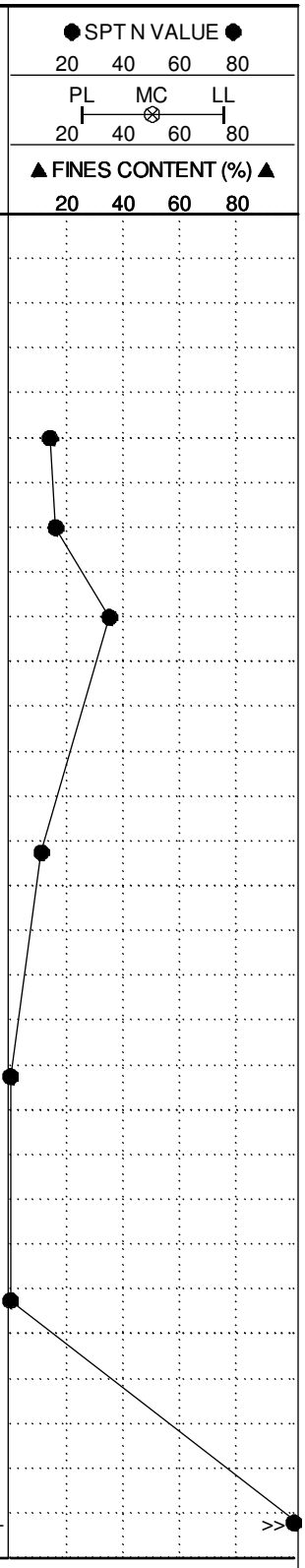
AREHNA | Engineering, Inc.

SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring B-12

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE	SPT BLOW COUNTS	N-VALUE
0	Pavement - asphalt 5 inches					
	Dark gray fine SAND (SP) [A-3]			AU		
				AU		
	Very dark brown clayey fine SAND (SC) with trace roots and shell fragments [A-2-7]					
5	Medium dense dark gray fine SAND (SP) with clay [A-3]	▽		SPT	4-6-8-5	14
	Medium dense to dense dark gray and greenish-brown clayey fine SAND (SC) [A-2-7]			SPT	2-5-11-11	16
				SPT	11-15-20-18	35
10						
	Stiff greenish-gray high plasticity CLAY (CH) [A-7-6]			SPT	1-5-6	11
15						
	Very soft greenish-gray high plasticity CLAY (CH) [A-7-6] 100% loss of drilling fluid circulation @ 18 feet Weight of rod for 6-inches @ 18.5 feet Weight of hammer for 14-inches @ 19 feet			SPT	0-0-0	0
20						
	Very soft dark green silty CLAY (CL-ML) with shell fragments [A-7-6] Weight of rod for 2.5-feet @ 23.5 feet			SPT	0-0-0	0
25						
	Hard LIMESTONE (LS)			SPT	4-10-50/5"	100+
30	50 blows for 5-inches @ 29.5 feet					
	Bottom of borehole at 30.0 feet.					



Date Drilled: 1/28/14
Drilled By: AREHNA
Method: ASTM D-1586, Standard Penetration Test Boring

Ground Water Level:

▽ At Time of Drilling: 5 ft below existing grade

Remarks:

KENSINGTON AVENUE

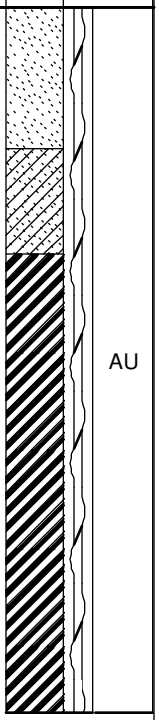
AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

AREHNA | Engineering, Inc.

SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring B-13

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE
0	Very dark brown fine SAND (SP) with rocks [A-3]			AU
	Brown fine SAND (SP) [A-3]			
	Gray to green clayey fine SAND (SC) [A-2-7]			
	Green high plasticity CLAY (CH) [A-7-6]			
5				
10				

Bottom of borehole at 10.0 feet.

Date Drilled: 1/29/14
Drilled By: AREHNA
Method: Auger Boring

Ground Water Level:
Groundwater level not measured

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

AREHNA | Engineering, Inc.

SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring W-01

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE
0	Pavement - asphalt 3 inches			
	Very dark brown to brown fine SAND (SP) [A-3]			
	Light brown fine SAND (SP) [A-3]			
	Pale brown silty fine SAND (SM) [A-2-4]			
5	Green clayey fine SAND (SC) [A-2-7]			AU
	Green high plasticity CLAY (CH) [A-7-6]			
10				

Bottom of borehole at 10.0 feet.

Date Drilled: 1/28/14
Drilled By: AREHNA
Method: Auger Boring

Ground Water Level:

▽ At Time of Drilling: 1 ft below existing grade
▼ 24 Hrs. After Drilling: 0.9 ft below existing grade

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

AREHNA | Engineering, Inc.

SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring W-02

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE
0	Dark gray fine SAND (SP) [A-3]			
	Dark brown fine SAND (SP) [A-3]			
	Brown fine SAND (SP) [A-3]			
	Green clayey fine SAND (SC) [A-2-7]			
5				AU
	Green high plasticity CLAY (CH) [A-7-6]			
10				

Bottom of borehole at 10.0 feet.

Date Drilled: 1/28/14
Drilled By: AREHNA
Method: Auger Boring

Ground Water Level:

▽ At Time of Drilling: 1.7 ft below existing grade
▼ 24 Hrs. After Drilling: 1.5 ft below existing grade

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

AREHNA | Engineering, Inc.

SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring W-03

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE
0	Light gray fine SAND (SP) [A-3]			
	Very dark brown fine SAND (SP) with trace silty sand [A-3]	▼		
5	Dark brown fine SAND (SP) with some cement sand [A-3]			AU
	Dark brown fine SAND (SP) with green clayey sand [A-3]			
10	Green clayey fine SAND (SC) [A-2-7]			

Bottom of borehole at 10.0 feet.

Date Drilled: 1/28/14
Drilled By: AREHNA
Method: Auger Boring

Ground Water Level:

▽ At Time of Drilling: 3 ft below existing grade
▼ 24 Hrs. After Drilling: 3.1 ft below existing grade

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

AREHNA | Engineering, Inc.

SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring W-04

DEPTH (ft)	SOIL DESCRIPTION AND REMARKS	WATER LEVEL	GRAPHIC LOG	SAMPLE TYPE
0	Light gray fine SAND (SP) [A-3]			
	Gray fine SAND (SP) [A-3]			
5	Dark brown fine SAND (SP) [A-3]	▼		AU
	Dark brown fine SAND (SP) with green clayey sand [A-3]			
10	Green clayey fine SAND (SC) with limestone fragments [A-2-7]			

Bottom of borehole at 10.0 feet.

Date Drilled: 1/28/14
Drilled By: AREHNA
Method: Auger Boring

Ground Water Level:

▽ At Time of Drilling: 4.3 ft below existing grade
▼ 24 Hrs. After Drilling: 4.4 ft below existing grade

Remarks:

KENSINGTON AVENUE

AREHNA Project No.: B-13-047
City of Tampa - Stormwater Division

AREHNA | Engineering, Inc.

SOIL BORING LOG

Drawn By: LEF
Checked By: CJR
Date: 1/31/14

Boring W-05

KEY TO SYMBOLS

AREHNA | Engineering, Inc.

CLIENT City of Tampa - Stormwater Division
PROJECT NAME Kensington Avenue
PROJECT NUMBER B-13-047
PROJECT LOCATION

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


PAVEMENT: Pavement


SC: Clayey Sand


CH: High Plasticity Clay


SP: Poorly-graded Sand


SP-SM: Poorly-graded Sand with Silt


PT: Peat


SM: Silty Sand


SP-SC: Poorly-graded Sand with Clay


CL-ML: Low Plasticity Silty Clay


LS: Limestone

SAMPLER SYMBOLS


Hand Auger


Standard Penetration Test

Standard Penetration Resistances

SAND & GRAVEL

No. of Blows	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
Greater than 50	Very Dense

SILT & CLAY

No. of Blows	Consistencey
0 - 2	Very Soft
3 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very Stiff
Greater than 30	Hard

LIMESTONE

No. of Blows	Consistencey
10 - 20	Soft
21 - 50	Medium
51 - 50/3"	Hard
Greater than 50/3"	Very Hard

WOR = Weight of Rod
WOH = Weight of Hammer

Ground Water Level Measurements


Water Level at Time Drilling, or as Shown


Water Level After 24 Hours, or as Shown

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTICITY INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

SOIL BOUNDARY CLASSIFICATIONS

FINE GRAINED SOILS | **COARSE GRAINED SOILS**

SILT or CLAY	SAND			GRAVEL		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

200 Sieve | #40 Sieve | #10 Sieve | #4 Sieve | 3/4-inch | 3-inch | 12-inch

KENSINGTON AVENUE AREA DRAINAGE IMPROVEMENTS RECORD SURVEY

SECTION 34, TOWNSHIP 29 SOUTH, RANGE 18 EAST
HILLSBOROUGH COUNTY, FLORIDA

B-01 STAKE AT GROUND LEVEL
Y= 1300559.6630
X= 495436.5960
Z= 15.280

W-05 TOP 2" PVC PIPE
Y= 1300570.8270
X= 495722.7760
Z= 16.890

W-04 TOP 2" PVC PIPE
Y= 1300555.0650
X= 495723.3960
Z= 17.640

W-03 TOP 2" PVC PIPE
Y= 1300541.6530
X= 495723.3280
Z= 16.200

B-02 ASPHALT PATCH
Y= 1300534.5930
X= 495732.3810
Z= 16.070

W- 02 TOP 2" PVC PIPE
Y= 1300534.3140
X= 495718.5820
Z= 15.750

W-01 TOP 2" PVC PIPE
Y= 1300515.3460
X= 495735.6350
Z= 15.860

W. KENSINGTON AVE.

B-03 ASPHALT PATCH
Y= 1300533.9590
X= 495973.0770
Z= 15.470

B-12 ASPHALT PATCH
Y= 1300542.6650
X= 496360.2970
Z= 13.630

S. DREXEL AVE.

ON-SITE BENCH MARK
SET NAIL & DISK
LB 6429
B-04 ASPHALT PATCH
Y= 1300343.0270
X= 496335.4410
Z= 12.960

W. WAVERLY PARK

B-06 ASPHALT PATCH
Y= 1300261.0120
X= 496106.3560
Z= 13.780

WAVERLY PL.

B-11 ASPHALT PATCH
Y= 1300231.6730
X= 495190.7500
Z= 10.830

ON-SITE BENCH MARK
SET NAIL & DISK
LB 6429
B-05 ASPHALT PATCH
Y= 1300181.9350
X= 495316.7950
Z= 11.390

WAVERLY AVE.

B-07 ASPHALT PATCH
Y= 1300153.2350
X= 495504.9110
Z= 13.090

B-08 ASPHALT PATCH
Y= 1300106.6110
X= 495880.1790
Z= 15.060

S. WAVERLY PARK

B-13 ASPHALT PATCH
Y= 1300095.4220
X= 495112.8140
Z= 10.410

LEGEND
Y= NORTHING COORDINATE
X= EASTING COORDINATE
Z= ELEVATION

SURVEYOR'S NOTES:

1. TYPE OF SURVEY: RECORD SURVEY TO ILLUSTRATE THE POSITIONS OF WELL & BORING SITES.
2. ELEVATIONS SHOWN HEREON ARE BASED ON BENCH MARK V 713 WITH AN ELEVATION OF 5.31' AND REFERENCED TO NAVD 1988 VERTICAL DATUM.
3. FIELD WORK WAS COMPLETED ON 2/3/14 AND WAS RECORDED IN FIELD BOOK #145.
5. NO EXCAVATION WAS PERFORMED TO VERIFY THE LOCATION OR EXISTENCE OF ANY UNDERGROUND UTILITIES, ENCROACHMENTS, IMPROVEMENTS, STRUCTURES OR FOUNDATIONS.
6. NOT VALID WITHOUT THE SIGNATURE AND THE ORIGINAL RAISED SEAL OF A FLORIDA REGISTERED SURVEYOR AND MAPPER.
7. ADDITIONS OR DELETIONS TO SURVEY MAPS OR REPORTS BY OTHER THAN THE SIGNING PARTY OR PARTIES IS PROHIBITED WITHOUT WRITTEN CONSENT OF THE SIGNING PARTY OR PARTIES.
8. COORDINATE VALUES SHOWN ARE REFERENCED TO THE FLORID STATE PLANE COORDNATE SYSTEM, WEST ZONE, ADJUSTMENT OF NAD 83/90.

B-10 ASPHALT PATCH
Y= 1299944.9790
X= 496308.1690
Z= 12.230

B-09 ASPHALT PATCH
Y= 1299869.0740
X= 495375.1960
Z= 10.080

W. EUCLID AVE.

This Survey Prepared For: ARSHNA ENGINEERING, INC.

ECHEZABAL & ASSOCIATES, INC.
Surveying & Mapping LB #6429
109 Country Club Drive
Temple, Florida 33612
(813) 933-2005
FAX (813) 933-2721

Drawn: RS	Checked: SMT	Crew: D.S.
Date: 02/21/14	Eng: ARSHNA-SURVEY	SCALE: 1" = 40'
File Name:		
SECTION 34, TOWNSHIP 29 SOUTH, RANGE 18 EAST		

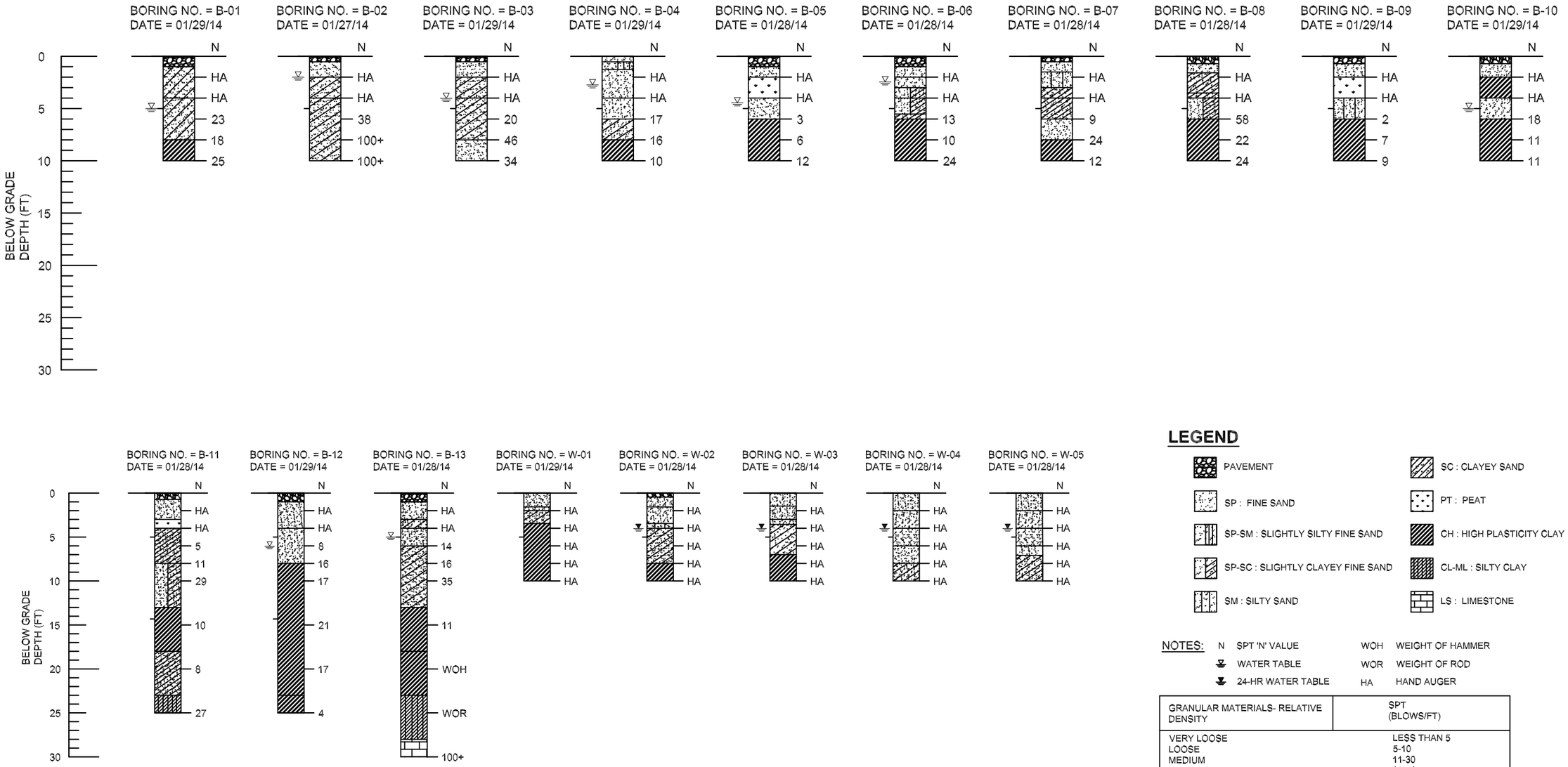
REVISIONS

Description	Date	Description	Date

SURVEYOR'S CERTIFICATE
I hereby certify that a survey of the herein shown property was made under my supervision and meets the Minimum Technical Standards set forth by the Board of Professional Surveyors and Mappers in Chapter 5J-17, Florida Administrative Code pursuant to Section 472.027, Florida Statutes.

Stephen M. Tate
FLORIDA PROFESSIONAL SURVEYOR AND MAPPER NO. 5342

THIS SURVEY NOT VALID UNLESS IMPRINTED WITH AN EMBOSSED SURVEYOR'S SEAL



LEGEND

- PAVEMENT
- SP : FINE SAND
- SP-SM : SLIGHTLY SILTY FINE SAND
- SP-SC : SLIGHTLY CLAYEY FINE SAND
- SM : SILTY SAND
- SC : CLAYEY SAND
- PT : PEAT
- CH : HIGH PLASTICITY CLAY
- CL-ML : SILTY CLAY
- LS : LIMESTONE

NOTES:
- N SPT 'N' VALUE
- WOH WEIGHT OF HAMMER
- WOR WEIGHT OF ROD
- HA HAND AUGER
- WATER TABLE
- 24-HR WATER TABLE

GRANULAR MATERIALS- RELATIVE DENSITY	SPT (BLOWS/FT)
VERY LOOSE	LESS THAN 5
LOOSE	5-10
MEDIUM	11-30
DENSE	31-50
VERY DENSE	GREATER THAN 50

SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/FT)
VERY SOFT	LESS THAN 3
SOFT	3-4
FIRM	5-8
STIFF	9-15
VERY STIFF	16-30
HARD	30-50
VERY HARD	GREATER THAN 50

DATE	NAME	REVISION	APPROVED BY:

AREHNA | Engineering,Inc.
5012 West Lemon Street, Tampa, FL 33609
Phone 813.944.3464 | Fax 813.944.4959

	NAME	DATE
DESIGNED BY:	KSL	2/18/14
DRAWN BY:	KSL	2/18/14
CHECKED BY:	CJR	2/18/14
SUPERVISED BY:		

REPORT OF CORE BORINGS	PROJECT NO.	SHEET NO.
Kensington Avenue Improvements Tampa, FL	B-13-047	1