

Andreyev Engineering, Inc.

- ▼ *Groundwater*
- ▼ *Environmental*
- ▼ *Geotechnical*
- ▼ *Materials Testing*

GEOTECHNICAL INVESTIGATION AT
SITES H-5, H-6 AND S-3B
PALM RIVER RESTORATION
PROJECT
TAMPA, HILLSBOROUGH COUNTY,
FLORIDA



Andreyev Engineering, Inc.

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▼ Groundwater ▼ Environmental ▼ Geotechnical ▼ Construction Materials Testing

September 7, 2010
AEI Project No.: APGT-10-0054

TO: **Mr. Michael Palmer**
King Engineering
4921 Memorial Highway
Suite 300
Tampa, Florida 33634

SUBJECT: Geotechnical Investigation at Sites H-5, H-6 and S-3B, Palm River
Restoration Project, Tampa, Hillsborough County, Florida

Dear Mr. Palmer:

In accordance with your request and authorization of our proposal, Andreyev Engineering, Inc. (AEI) has completed the geotechnical investigation related to the stormwater retrofit planned at site S-3B and the hydrologic restoration and stormwater retrofit planned at sites H-5 and H-6. This letter report summarizes the results of our field and laboratory work and presents our geotechnical engineering evaluations related to the proposed project.

Project Description

Based on the plans provided for our review, we understand that the proposed project consists of the design and construction of a stormwater treatment pond at site S-3B and design and creation of stormwater ponds and wetlands at sites H-5 and H-6. Our study herein addresses geotechnical design recommendations for the proposed work.

Project Approach

The objective of our geotechnical investigation for the proposed project was to obtain information concerning the subsurface conditions within the pond and restoration areas in order to make geotechnical engineering conclusions in each of the following areas:

1. Soil stratigraphy at the boring locations and the development of the approximate soil profile within the boring locations.
2. General location and description of potentially deleterious materials which may interfere with construction progress, including buried or surficial existing fills, organics, construction debris, etc.

3. Identification of some critical design or construction details, including present groundwater levels at the locations of the borings.

Scope of Work

In order to address the above objectives, our scope of work for this project included the following:

1. Reviewed available published information on the site, including the United States Department of Agriculture (USDA), Soil Conservation Service (SCS) soil survey data for Hillsborough County and the United States Geological Survey (USGS) topographic maps.
2. Conducted a subsurface exploration program consisting of thirty auger borings in proposed stormwater treatment and wetland areas to evaluate the shallow soils and groundwater conditions in these areas. The borings were conducted to depths of approximately 4 to 15 feet below land surface (bls).
3. Reviewed and visually classified the recovered soils in the laboratory using the Unified Soils Classification System. Developed the general soil stratigraphy at the boring locations.
4. Prepared a geotechnical engineering report which summarizes the course of our study, the field and laboratory data generated, the subsurface conditions encountered, and our geotechnical engineering evaluations related to the proposed project.

Existing Site Conditions

Site S-3B consists of open grassy park areas and sites H-5 and H-6 consist of heavily wooded, primarily low lying areas. The site grades over all three sites are relatively level.

The USGS topographic survey was reviewed for the sites. The three sites are found on the Quadrangle map entitled "Tampa, Fla." From this review, the natural ground surface elevations over sites H-5 and H-6 vary from +2 to +5 feet National Geodetic Vertical Datum of 1929. The ground elevation over the S-3B site is approximately +40 feet National Geodetic Vertical Datum of 1929.

Subsurface Soil Conditions

According to the U.S.D.A. "Soil Survey of Hillsborough County", the soils over the H-5 and H-6 sites are classified as Winder fine sands. Winder soils are level poorly drained sandy soils found on broad low lying sloughs on the flatwoods. The natural seasonal high water table is generally at a depth of less than 10 inches. The soils mapped over the S-3B site are classified as Tavares-Urban Land complex type soils which are nearly level to gently sloping, moderately well drained sandy soils and areas of Urban Land. The Urban Land soils are soils that have been covered with buildings, road and other improvements. The groundwater table in most of the areas mapped is artificially drained by sewers and canals.

Field Exploration Program

Thirty (30) auger borings (AB-1 through AB-14, HA-1 through HA-12 and S3B-1 through S3B-4) were conducted to depths of 4 to 15 feet bls at locations selected by King Engineering Associates (KEA). Three of the originally planned borings (HA-13 through HA-15) were not conducted as these areas were under water at the time of our field work. The borings were approximately located in the field according to the site plan provided. The approximate locations of the borings are shown on **Figures 1 and 2**. The recovered soil samples were visually classified in the field, and representative samples were placed in jars and transported to our office for further review and confirmation of the field classification.

Generalized Soil Stratigraphy

The results of the subsurface exploration program including the soil stratification in profile form and some pertinent exploration information such as groundwater level are included on **Figures 3 and 4**. Soil stratification was based on the review of recovered soil samples and interpretation of the field boring logs by a geotechnical engineer. The stratification lines represent the approximate boundaries between soil types; the actual transition may be gradual. The soil strata were visually classified using the Unified Soils Classification System. Minor variations in soil types not considered important to our engineering evaluations may have been abbreviated or omitted for clarity.

Site S-3B

Auger boring S3B-1 encountered slightly silty fine sands with clay and limestone (Stratum 2) to the boring termination depth of approximately 6 feet. The Stratum 2 soils appeared to be fill materials. Boring S3B-2 through S3B-4 encountered fine sands to the boring termination depths of 6 feet.

The shallow groundwater was not encountered within the 6 feet of the boring profiles. The shallow groundwater level should be expected to vary during wet seasons and heavy rainfall events. Based on review of the SCS soil survey, boring results, measured groundwater levels, adjacent surface water features and antecedent rainfall, the normal seasonal high groundwater table at the boring locations at site S-3B is estimated to occur at depths of greater than 5 feet below the existing ground surface at the boring locations.

Sites H-5 and H-6

In general, the borings conducted over sites H-5 and H-6 encountered fine sands with silt, clay, limestone, organics and shell (Strata 1, 2, 3, 9, 10 and 12). A majority of the borings encountered shallow layers of clay materials intermixed with shell, limestone, sand and organics (Strata 4, 5, 7, 8, 11 and 13) which continued to depths of 2 to 10 feet and were followed by the fine sands. All of the deeper auger borings (AB-1 through AB-14) terminated in the fine sands. Based on our visual observations, most of the shallow clay soils are likely fill materials.

The stabilized shallow groundwater was encountered at depths of 0.6 to 3.2 feet in the borings conducted. The shallow groundwater level should be expected to vary during wet seasons and heavy rainfall events. The shallow groundwater level should be expected to vary during wet


seasons and heavy rainfall events. Based on review of the SCS soil survey, boring results, measured groundwater levels, adjacent surface water features and antecedent rainfall, the normal seasonal high groundwater table at the boring locations on sites H-5 and H-6 is estimated to occur at depths of approximately 0.5 feet greater than the levels measured during our field work. A shallower perched groundwater condition will likely exist over a majority of the areas following prolonged wet periods.

Closing

Andreyev Engineering, Inc. has appreciated this opportunity to provide you with our engineering consulting services on this project. If we may be of further service to you, or if you have any questions regarding the information contained herein, please do not hesitate to contact the undersigned.

Sincerely,

ANDREYEV ENGINEERING, INC.


Jeffery E. Eller, P.E.
Vice President
Florida Registration No. 57434


9-8-10

Attachments: Figures

FIGURES



LEGEND:
☀ APPROXIMATE LOCATION OF HAND AUGER BORING

 Andreyev Engineering, Inc.		GEOTECHNICAL INVESTIGATION PALM RIVER RESTORATION PROJECT TAMPA, HILLSBOROUGH COUNTY, FL	
APPROXIMATE SCALE: 1" = 200'		DATE: 09/08/10 PN: APGT-10-0054	ENGINEER: JE DRAWN BY: DLS
		BORING LOCATION PLAN SITE S-3B	
		FIGURE 1	



LEGEND:

- ◆ APPROXIMATE LOCATION OF
AUGER BORING

0 250 500 1,000
Feet



**ANDREYEV
ENGINEERING,
INC.**

APPROXIMATE SCALE:
1" = 500'

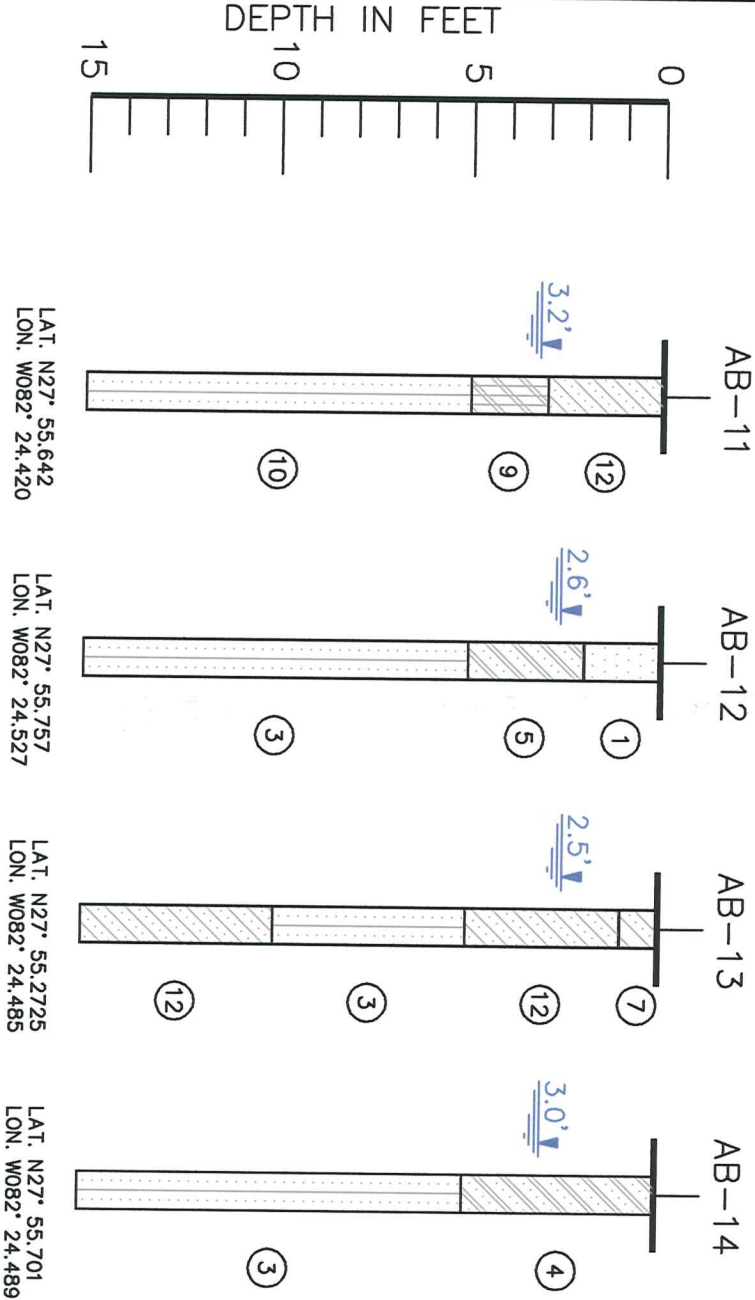
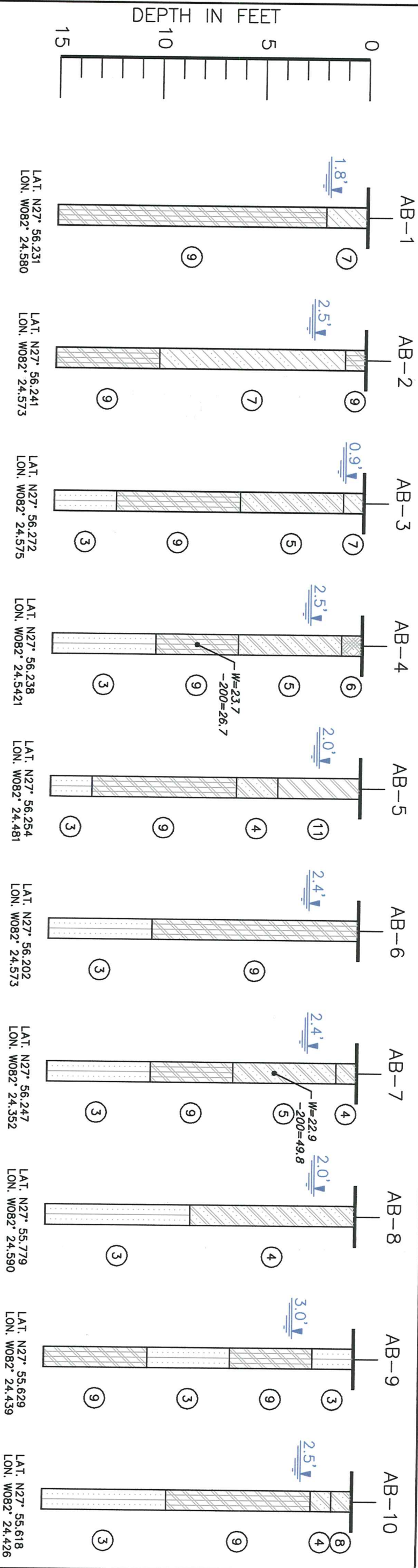
DATE: 09/08/10

ENGINEER: JE

PN: APGW-10-0054

DRAWN BY: DLS


GEOTECHNICAL INVESTIGATION
**PALM RIVER RESTORATION
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TAMPA, HILLSBOROUGH COUNTY, FL
BORING LOCATION PLAN
SITES H-5 & H-6
FIGURE 2



LEGEND:

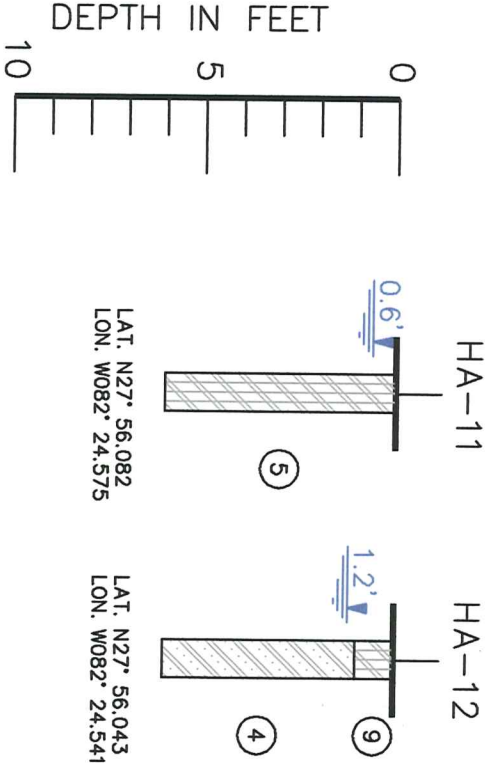
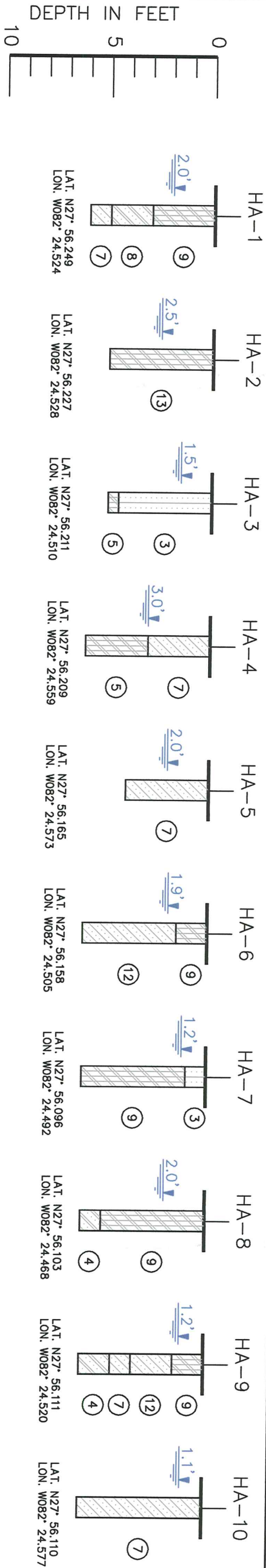
- 1 LIGHT BROWN TO TAN FINE SAND (SP)
- 2 BROWN TO TAN SLIGHTLY SILTY FINE SAND WITH CLAY & LIMESTONE FRAGMENTS (SP-SM/SC)
- 3 GRAY & LIGHT BROWN SILTY FINE SAND WITH TRACE OF SHELL (SM)
- 4 GRAY & LIGHT BROWN SANDY CLAY WITH LIMESTONE & TRACE ORGANICS (CL)
- 5 GRAY & LIGHT BROWN SILTY SANDY CLAY WITH LIMESTONE (CL-CH)
- 6 DARK BROWN SANDY MUCK (PT)
- 7 GRAY & TAN CLAYEY FINE SAND TO SANDY CLAY WITH LIMESTONE (SC/CL)
- 8 DARK BROWN SILTY, SANDY CLAY WITH TRACE ORGANICS & SHELL (CH)
- 9 GRAY, LIGHT BROWN & ORANGE SILTY, CLAYEY FINE SAND WITH TRACE SHELL (SM-SC)
- 10 LIGHT GRAY SILTY FINE SAND WITH LIMESTONE (SM)
- 11 DARK BROWN ORGANIC CLAY (CH-PT)
- 12 GRAY & BROWN CLAYEY FINE SAND WITH LIMESTONE (SC)
- 13 DARK BROWN SILTY CLAY WITH SHELL (CH)

(SP) UNIFIED SOIL CLASSIFICATION SYSTEM GROUP SYMBOL
DEPTH TO GROUNDWATER, AUGUST/SEPTEMBER, 2010
W MOISTURE CONTENT, IN PERCENT
-200 PERCENT OF FINES PASSING THE U.S. No. 200 SIEVE
LAT. LATITUDE
LON. LONGITUDE



**Andreyev
Engineering,
Inc.**

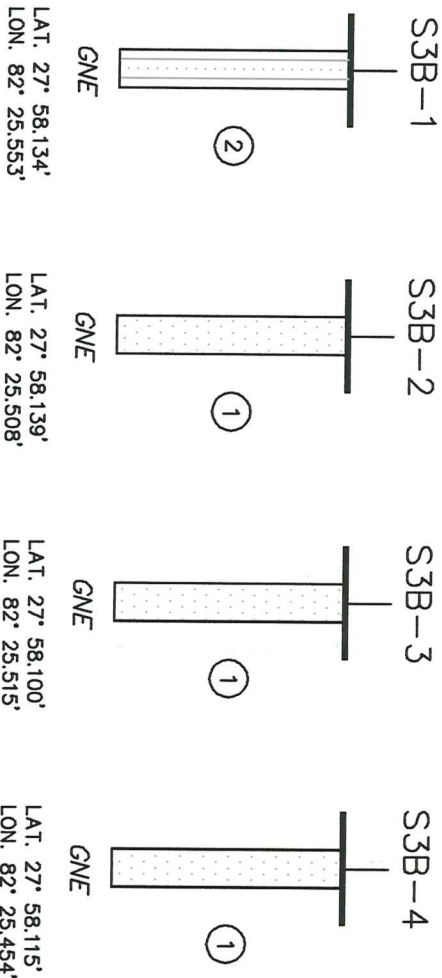
GEOTECHNICAL INVESTIGATION
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HA-13
LOCATION UNDER WATER

HA-14
LOCATION UNDER WATER

HA-15
LOCATION UNDER WATER



LEGEND:

- 1 LIGHT BROWN TO TAN FINE SAND (SP)
- 2 BROWN TO TAN SLIGHTLY SILTY FINE SAND WITH CLAY & LIMESTONE FRAGMENTS (SP-SM/SC)
- 3 GRAY & LIGHT BROWN SILTY FINE SAND WITH TRACE OF SHELL (SM)
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- 9 GRAY LIGHT BROWN & ORANGE SILTY, CLAYEY FINE SAND WITH TRACE SHELL (SM-SC)
- 10 LIGHT GRAY SILTY FINE SAND WITH LIMESTONE (SM)
- 11 DARK BROWN ORGANIC CLAY (CH-PT)
- 12 GRAY & BROWN CLAYEY FINE SAND WITH LIMESTONE (SC)
- 13 DARK BROWN SILTY CLAY WITH SHELL (CH)

(SP) UNIFIED SOIL CLASSIFICATION SYSTEM GROUP SYMBOL
1.0' DEPTH TO GROUNDWATER, AUGUST/SEPTEMBER, 2010
GNE GROUNDWATER NOT ENCOUNTERED
W MOISTURE CONTENT, IN PERCENT
-200 PERCENT OF FINES PASSING THE U.S. No. 200 SIEVE
LAT. LATITUDE
LON. LONGITUDE



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PALM RIVER RESTORATION
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TAMPA, HILLSBOROUGH COUNTY, FL

APPROXIMATE SCALE:

1" = 5'

DATE: 09/07/10 ENGINEER: JE

PN: A-PGT-10-0054 DRAWN BY: DLS

SOIL PROFILES

FIGURE 4