SR 400 (I-4) Project Development and Environment (PD&E) Study

FM No.: 432100-1-22-01

Report of Preliminary Geotechnical Engineering Investigation for Ponds

Segment 3: State Road 400 (SR 400)/Interstate 4 (I-4) from One Mile East of SR 434 to East of SR 15-600/US 17-92

Seminole County (77160), Florida

December 15, 2015

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February 21, 2014
Revised April 30, 2015
Revised December 15, 2015

HNTB
610 Crescent Executive Court, Suite 400
Lake Mary, Florida 32746

Attention: Mr. Luis Diaz, P.E.

Subject: Report of Preliminary Geotechnical Engineering Investigation for Ponds
SR 400 (I-4) FROM US 27 TO KIRKMAN ROAD AND FROM E OF SR 434 TO SR 472
SEGMENT 3
Polk, Osceola, Orange, Seminole and Volusia Counties, Florida
FPN 432100-1-22-01
GEC Project No. 3492G

Dear Mr. Diaz:

Geotechnical and Environmental Consultants, Inc. (GEC) is pleased to provide this Report of Preliminary Geotechnical Engineering Investigation for Ponds for the above-referenced project. This revised report incorporates the combination of Swales 313A, B, and C into one new combined Swale 313A. The purpose of this investigation was to evaluate soil and groundwater conditions at the proposed pond locations and develop preliminary geotechnical engineering recommendations to aid in the initial planning and design of the ponds. This report describes our exploration procedures, exhibits the data obtained and presents our preliminary conclusions and recommendations regarding the geotechnical engineering aspects of this project.

GEC appreciates the opportunity to be of service to you on this project and trusts that the information contained herein is sufficient for your needs. Should you have any questions concerning the contents of this report, or if we may be of further assistance, please contact us.

Very truly yours,

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
Certificate of Authorization No. 5882

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Engineer Intern

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Geotechnical Services Manager
Florida License No. 49328

VEW/CPM/dbj

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1.0 Project Description and Purpose

The Florida Department of Transportation (FDOT) is proposing to reconstruct and widen I-4 as part of the I-4 Ultimate concept. This involves the build-out of I-4 to its ultimate condition through Central Florida, including segments in Polk, Osceola, Orange, Seminole, and Volusia Counties. The concept design proposed the addition of two (2) new express lanes in each direction giving it a total of ten (10) dedicated lanes.

This Report of Preliminary Geotechnical Investigation has been prepared as a part of the SR 400 (I-4) Project Development and Environment (PD&E) Study. The PD&E Study is being performed for the proposed improvements to an approximately 40 mile long stretch of SR 400 (I-4) from US 27 to Kirkman Road and from east of SR 434 to SR 472. This PD&E project is divided into five separate segments (Segment 1, 2, 3, 4 and 5).

Segment 3 of the project is located in southwest Seminole County, Florida. The approximate Segment 3 project limits begin east of SR 434 and extend to east of US 17/92. The typical section for this segment includes a 6-lane divided grassed median interstate with grassed right-of-way and stormwater ponds/roadside swales within the right-of-way. This Report of Preliminary Geotechnical Investigation includes geotechnical investigation and analyses at the three requested alternative stormwater pond locations and one swale location within Segment 3.

The Segment 3 project alignment is bordered by mostly residential construction along with spare commercial buildings. However, there are small sections of undeveloped land consisting of pine flatwoods and palmetto bushes. Two of the proposed ponds are located in heavily wooded area and the third is located on the same site as an existing billboard. The project study area is shown on a United States Geological Society (USGS) Quadrangle Map and the United States Department of Agriculture (USDA) National Resource Conservation Services (NRCS) Soil Survey Map provided on **Figures 1A** and **1B**.

2.0 Review of Available Information

GEC reviewed available data including the USGS Quadrangle map and USDA NRCS Soil Survey map to obtain information on soil and groundwater conditions along the proposed alignment. The results of our review are presented in the following report sections.

2.1 USGS Quadrangle Map

The pond locations for Segment 3 are depicted on the USGS Forest City, Casselberry and Sanford, Florida Quadrangle maps shown on **Figures 1A** and **1B**. Review of the USGS Quadrangle maps indicates that the natural ground surface elevation for the 3-investigated ponds in Segment 3 ranges from approximately +60 feet NGVD to +75 feet NGVD and for the new swale near SR 46 is approximately +30 feet NGVD.

2.2 NRCS Soil Survey Review

The Natural Resources Conservation Service (NRCS) (formerly SCS) Soil Survey of Seminole County, Florida was reviewed for near-surface soil and groundwater information at the site. The NRCS Soil Survey map of the site vicinity is shown on **Figures 1A** and **1B** in the **Appendix**. The NRCS soil units at the project site are summarized in **Table 1** below:

Table 1
Seminole County NRCS Soil Survey Review

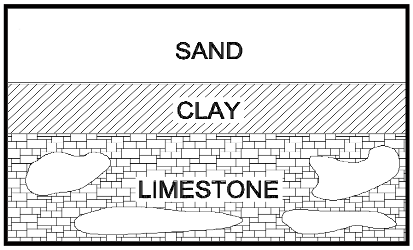
Map Symbol	Soil Name	Depth (in)	Soil Description	AASHTO Soil Classification	Seasonal High Groundwater Depth (ft)	Hydrologic Group
6	Astatula fine sand, 0 to 5 percent slopes	0 - 4 4 - 80	Fine sand Fine sand, sand	A-3 A-3	> 6	A
	Apopka fine sand, 0 to 5 percent slopes	0 - 64 64 - 80	Fine sand Sandy clay loam, sandy loam, sandy clay	A-3 A-6, A-2-4, A-2-6, A-4		
7	Astatula fine sand 5 to 8 percent slopes	0 - 3 3 - 80	Fine sand Fine sand, sand	A-3 A-3	> 6	A
	Apopka fine sand, 5 to 8 percent slopes	0 - 65 65 - 80	Fine sand Sandy clay loam, sandy loam, sandy clay	A-3 A-2-6, A-4, A-6, A-2-4		
8	Astatula fine sand, 8 to 12 percent slopes	0 - 3 3 - 80	Fine sand Fine sand, sand	A-3 A-3	> 6	A
	Apopka fine sand, 8 to 12 percent slopes	0 - 65 65 - 80	Fine sand Sandy clay loam, sandy loam, sandy clay	A-3 A-2-6, A-4, A-6, A-2-4		
20	Myakka fine sand	0 - 28 28 - 45 45 - 80	Fine sand, sand Fine sand, sand, loamy fine sand Fine sand, sand	A-3 A-2-4, A-3 A-3	0.5 - 1.5	A/D
	EauGallie fine sand	0 - 18 18 - 41 41 - 60 60 - 80	Fine sand Fine sand, sand Sandy clay loam, sandy loam, fine sandy loam Loamy sand, sand, loamy fine sand	A-3 A-2-4, A-3 A-2-6, A-2-4 A-2-4, A-3		
34	Urban Land	---	---	---	---	---

Based on review of the NRCS soil survey map, the soils within the area of the proposed ponds in Segment 3 are characterized as sands with variable silt content (A-3, A-2-4). For the majority of the soils within the 3 pond footprints the soil survey lists seasonal high water table levels at depths greater than 6 feet below the existing ground surface. However, the estimated seasonal high groundwater levels do not account for changes in groundwater due to development and are only relevant for the soil's natural, undisturbed condition. The soils in the vicinity of the new swale are generally classified as urban land with no estimated groundwater levels. However, the surrounding natural soils typically have shallow seasonal high groundwater levels within about 1 foot of the natural ground.

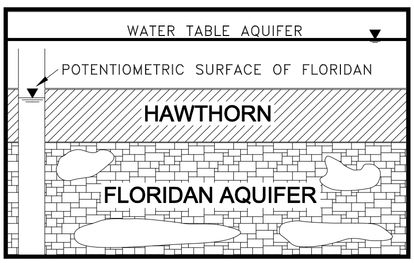
The NRCS Soil survey map also depicts Urban Land (Soil Unit No. 34) within the project area. Urban Land refers to areas where most of the ground surface is covered by asphalt, concrete, buildings and other impervious surfaces that modify surface/subsurface drainage and obscure or alter the soils so that their identification is not possible.

Information contained in the NRCS Soil Survey should be considered general and may be outdated. Therefore, it may not be reflective of actual soil and groundwater conditions, particularly if recent development in the site vicinity has modified soil conditions or surface/subsurface drainage. The information obtained from the soil borings presented in this report should be considered a more current and accurate characterization of actual site conditions.

2.3 Geology/Hydrology

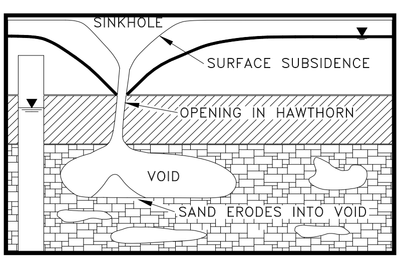


Central Florida geologic conditions can generally be described in terms of three basic sedimentary layers. The upper layer is primarily comprised of sands containing varying amounts of silt and clay. These sands are underlain by a layer of clay, clayey sand, phosphate and limestone which is locally referred to as the Hawthorn formation. The third layer underlies the Hawthorn formation and is comprised of limestone. The thickness of these three strata varies throughout Central Florida. In general, the surficial sands typically extend to depths of 40 to 70 feet, while the Hawthorn formation ranges from nearly absent in some locations to thicknesses greater than 100 feet. The groundwater hydrogeology of Central Florida can be described in terms of the nature and relationship of the three basic geologic strata. The near-surface sand stratum is fairly permeable and comprises the water table (unconfined) aquifer.



The limestone formation, known as the Floridan aquifer, is highly permeable due to the presence of large interconnected channels and cavities throughout the rock. The Floridan aquifer is the primary source of drinking water in Central Florida. These two permeable strata are separated by the relatively low permeability clays of the Hawthorn formation. The amount of groundwater flow between the two aquifer systems is dependent on the thickness and consistency of the Hawthorn clay confining beds which, as previously stated, varies widely throughout Central Florida.

The geology and hydrogeology described above can be conducive to collapses of the ground surface resulting in circular depressions known as "sinkholes." Sinkholes usually occur due to the downward movement of the near surface sands through openings in the Hawthorn formation into the limestone cavities. This process can be likened to the movement of sand through an hourglass. Sinkholes are most likely to occur in areas where the Hawthorn formation is thin or absent, allowing free downward movement of sands into the limestone.



Groundwater also flows freely from the surficial aquifer into the Floridan aquifer in areas where the Hawthorn formation is thin or breached. This phenomenon is called recharge. Therefore, high recharge areas are typically prone to sinkhole activity. An evaluation of sinkhole risk would include performing deep borings to evaluate the nature and thickness of the surficial sands and Hawthorn formation.

No method of geological, geotechnical, or geophysical exploration is known that can accurately predict the occurrence of sinkholes. It is common geotechnical practice in Central Florida to make a qualitative prediction of sinkhole risk on the basis of local geological conditions in the vicinity of a particular site.

Based on the U.S. Geological Survey Map entitled "Recharge and Discharge Areas of the Floridan Aquifer in the St. Johns River Water Management District and Vicinity, Florida," 1984, the project lies in a known high recharge area, and therefore, we can conclude based solely on this data that it also lies in an area where the relative risk of sinkhole formation is high compared to the overall risk across Central Florida.

2.4 Potentiometric Surface

The potentiometric level of the Floridan Aquifer in the vicinity of the project alignment ranges from about +35 to +38 feet NGVD at the south end of the project site and from +32 to +35 at the north end of the project. Ground surface elevations at the south end of the project vary approximately between +60 and +75 feet NGVD and between +31 and +35 feet NGVD at the north end; therefore, excavations (especially at the north end of the project) may be impacted by artesian flow conditions if underlying confining layer(s) are penetrated during construction.

3.0 Subsurface Exploration

In addition to consulting the sources of information previously discussed for regional and site-specific soils data, GEC conducted a subsurface exploration to evaluate soil and groundwater conditions at the pond and swale locations provided to us by HNTB. The subsurface exploration for this study generally consisted of performing 2 machine auger borings to a depth of 20 feet below the existing ground surface, along with one field permeability test at each of the proposed pond locations as well as borings and field permeability tests at the swale location requested by HNTB.

The borings were not surveyed in the field but were established in the field using project plans and a handheld, sub-meter accuracy, Global Positioning Satellite (GPS) unit (Trimble Geo7X) and should be considered approximate. Although these boring locations are, therefore, given only approximately, the methods used to locate them are, in GEC's opinion, sufficient to meet the intent of this study. The boring locations are indicated on the Boring Location Plan sheets, **Figures 2** through **4** in the **Appendix**.

3.1 Machine Auger Borings

Machine auger borings were performed in general accordance with ASTM Procedure D-4700. Machine auger borings were performed by hydraulically turning continuous flight, solid-stem, auger into the ground in 5-foot increments until the desired boring termination depth was achieved. The auger flights were retrieved in 5-foot increments, without further rotation of the auger, and the retrieved soil was examined by our technician prior to collection of representative samples. A field auger boring log was prepared that detailed the soils penetrated, records the groundwater depth at the time of drilling, if encountered, and includes other details of the boring, methods used, and selected other boring and/or site conditions at the time of drilling. The samples were placed in sealed jars and transported to GEC's laboratory for further examination and limited laboratory testing as needed.

3.2 Field Permeability Tests

Constant or falling head permeability tests were performed in the field at this site. The field permeability tests were performed by driving a 3-inch diameter casing into the ground to the desired test depth and washing the soil out of the casing with water. The casing was backfilled with quartz gravel to 24 inches above the bottom of the casing and was then raised a distance of 18 inches.

When a constant head permeability test was conducted, water was added to the casing to achieve a stable water level. Once the water level stabilized, the flow required to maintain the stable water level over time was measured.

When a falling head permeability test was conducted, water was added to the casing to achieve a stable water level. Once the water level stabilized, the water source was taken away and the drop in water level in the casing with respect to time was recorded.

These relationships were used to calculate the permeability of the soil. Field permeability tests and calculations were performed in general conformance with NAVFAC DM-7.1-108.

3.3 Groundwater Measurement

A GEC engineering technician measured the depth to the groundwater in the boreholes at the time of drilling and again after approximately 24 hours. Once the groundwater measurements were recorded, the boreholes were backfilled with soil cuttings to prevailing ground surface.

4.0 Laboratory Testing

Selected soil samples retrieved from the borings were tested in accordance with Florida Standard Testing Methods (FM). Florida Standard Testing Methods are adaptations of recognized standard methods, e.g., ASTM and AASHTO, which have been modified to accommodate Florida's geological conditions. The laboratory testing program for this project is summarized on the following table:

Table 2
Summary of Laboratory Testing Program

Type of Test	Number of Tests
Grain size analysis (FM 1 - T88)	8
Natural Moisture Content (FM 1-T 265)	2
Atterberg limits (FM 1 - T89/90)	2
Laboratory Soil Permeability (FM 1-T215)	2
Organic Content (FM 1-T267)	1

The results of our testing are summarized on the Pond Soil Survey Sheet (**Figure 5**) and the summary of Laboratory Testing Results (**Table 5**) in the **Appendix.** Soil from boring PB-3, sampled from a depth of 7 to 9 feet below the existing ground surface, was submitted to a constant head laboratory soil permeability test.

5.0 Description of Subsurface Conditions

The results of our borings are presented on the **Pond Auger Boring Results** sheet (**Figure 6**). The soils encountered in the auger borings were classified using the AASHTO Soil Classification System (A-3, A-2-4, etc.). All soils were described using the ASTM soil descriptions (e.g., sand with silt). GEC based the soil classifications on visual examination and the limited laboratory test results shown on **Figure 5**.

The boring logs indicate subsurface conditions only at the specific boring locations at the time of our field exploration. Subsurface conditions, including groundwater levels, at other locations of the project site may differ from conditions we encountered at the boring locations. Moreover, conditions at the boring locations can change over time. Groundwater levels fluctuate seasonally, and soil conditions can be altered by earthmoving operations.

The depths and thicknesses of the subsurface strata indicated on the boring logs were interpolated between samples obtained at different depths in the borings. The actual transition between soil layers may be different than indicated. *These stratification lines were used for our analytical purposes and actual earthwork quantities measured during construction should be expected to vary from quantities calculated based on the information in this report.*

5.1 Pond Auger Boring Results

The soil description and stratum numbers used for the pond auger borings are summarized as follows:

Table 3
Soil Stratigraphy

Stratum No.	Soil Description	AASHTO Classification
1	Light brown to brown to light gray to gray fine sand and fine sand with silt	A-3
2	Brown to dark brown to dark gray fine sand with silt to silty fine sand, occasional trace organic material	A-2-4
3	Light brown clayey fine sand	A-2-6
4	Dark brown mucky fine sand	A-8

The auger borings conducted in ponds FPC 300-A, FPC 300-B, and 303-B2 and swale 313A typically encountered sand with varying amounts of silt content (Strata 1 and 2; A-3, A-2-4) to the boring termination depths of 10 to 20 feet below the existing ground surface. However, boring SW-1 encountered a layer of organic sandy clay (A-8) from 1 to 1.5 feet below the existing ground surface. Please refer to the **Pond Auger Boring Results** sheet (**Figure 6**) for detailed soil and groundwater information at a specific boring location.

5.2 Groundwater Levels

Groundwater levels were measured at least 24 hours after completion of the borings. Encountered groundwater depths at the pond boring locations range from 13.1 to 18.9 feet below the existing ground surface. However, groundwater was not encountered in borings PB-3, PB-4 and PB-5, indicated by "GNE" shown adjacent to the boring profiles. Encountered groundwater depths at the swale boring locations range from 1.7 to 3.2 feet below the existing ground surface.

Groundwater levels can vary seasonally and with changes in subsurface conditions between boring locations. Alterations in surface and/or subsurface drainage brought about by site development can also affect groundwater levels. *Therefore, groundwater depths measured at different times or at different locations on the site can be expected to vary from those measured by GEC during this investigation.*

For purposes of this report, estimated seasonal high groundwater levels are defined as groundwater levels that are anticipated at the end of the wet season during a “normal rainfall” year under pre-development site conditions. We define a “normal rainfall” year as a year in which rainfall quantity and distribution were at or near historical averages.

We estimate that seasonal high groundwater depths, in the borings where groundwater was encountered, will range from 10 to approximately 15 feet below the existing ground surface for the pond borings, and from 0.5 to 1.2 feet below the existing ground surface for the swale borings. Our encountered and estimated seasonal high groundwater levels are presented on the **Pond Auger Boring Results** sheet (**Figure 6**) and **Table 6** in the **Appendix**.

6.0 Preliminary Geotechnical Recommendations

The preliminary analyses and recommendations contained in this report are based in part on the data obtained from a limited number of soil samples and groundwater measurements obtained from widely-spaced borings. The investigation methods used indicate subsurface conditions only at the specific boring locations, only at the time they were performed, and only to the depths penetrated. Borings cannot be relied upon to accurately reflect the variations that usually exist between boring locations and these variations may not become evident until construction. These recommendations are provided to aid in alignment selection and preliminary construction costs. A final geotechnical engineering evaluation will be required after the alignment, ponds and typical section have been selected.

6.1 Stormwater Ponds

The pond borings generally encountered fine sands with varying amounts of silt (A-3, A-2-4) to the boring termination depths of 10 to 20 feet below the existing ground surface. The majority of the soils encountered in the pond borings appear suitable for use as roadway embankment in accordance with Index 505 of the FDOT Standard. Sands excavated below the water table will need to be dried to moisture content near optimum to achieve the required degree of compaction.

GEC performed one permeability test at each of the proposed pond or swale locations. The following table summarizes the result of our field and laboratory permeability tests.

Table 4
Summary of Permeability Tests Results

Pond/Swale No.	Boring No.	Depth (ft)	Encountered Water Table (ft)	Soil Type (AASHTO)	Horizontal Permeability, K (ft/day)	Perm Type
FPC 300-B	PB-1	7 - 9	13.4	A-2-4	4.8	Falling Head
FPC 300-A	PB-3	7 - 9	GNE*	A-3	30.5	Constant Head
303-B2	PB-5	12 - 14	GNE*	A-3	2.2	Falling Head
313A	SW-2	2 - 4	1.7	A-3	0.6	Constant Head
313A	SW-3	3 - 5	1.7	A-3	8.1	Falling Head
313A	SW-4	2 - 4	3.2	A-3	0.9	Constant Head

* GNE: Groundwater not encountered to the boring termination depth.

7.0 Use of This Report

GEC has prepared this preliminary report for the exclusive use of HNTB, and FDOT, and for specific application to our client's project. GEC will not be held responsible for any third party's interpretation or use of this report's subsurface data or engineering analysis without our written authorization.

The sole purpose of the borings performed by GEC at this site was to obtain indications of subsurface conditions as part of a geotechnical exploration program. GEC has not evaluated the site for the potential presence of contaminated soil or groundwater, nor have we subjected any soil samples to analysis for contaminants.

GEC has strived to provide the services described in this report in a manner consistent with that level of care and skill ordinarily exercised by members of our profession currently practicing in Central Florida. No other representation is made or implied in this document.

The preliminary conclusions or recommendations of this report should be disregarded if the nature, design, or location of the facilities is changed. If such changes are contemplated, GEC should be retained to review the new plans to assess the applicability of this report in light of proposed changes.

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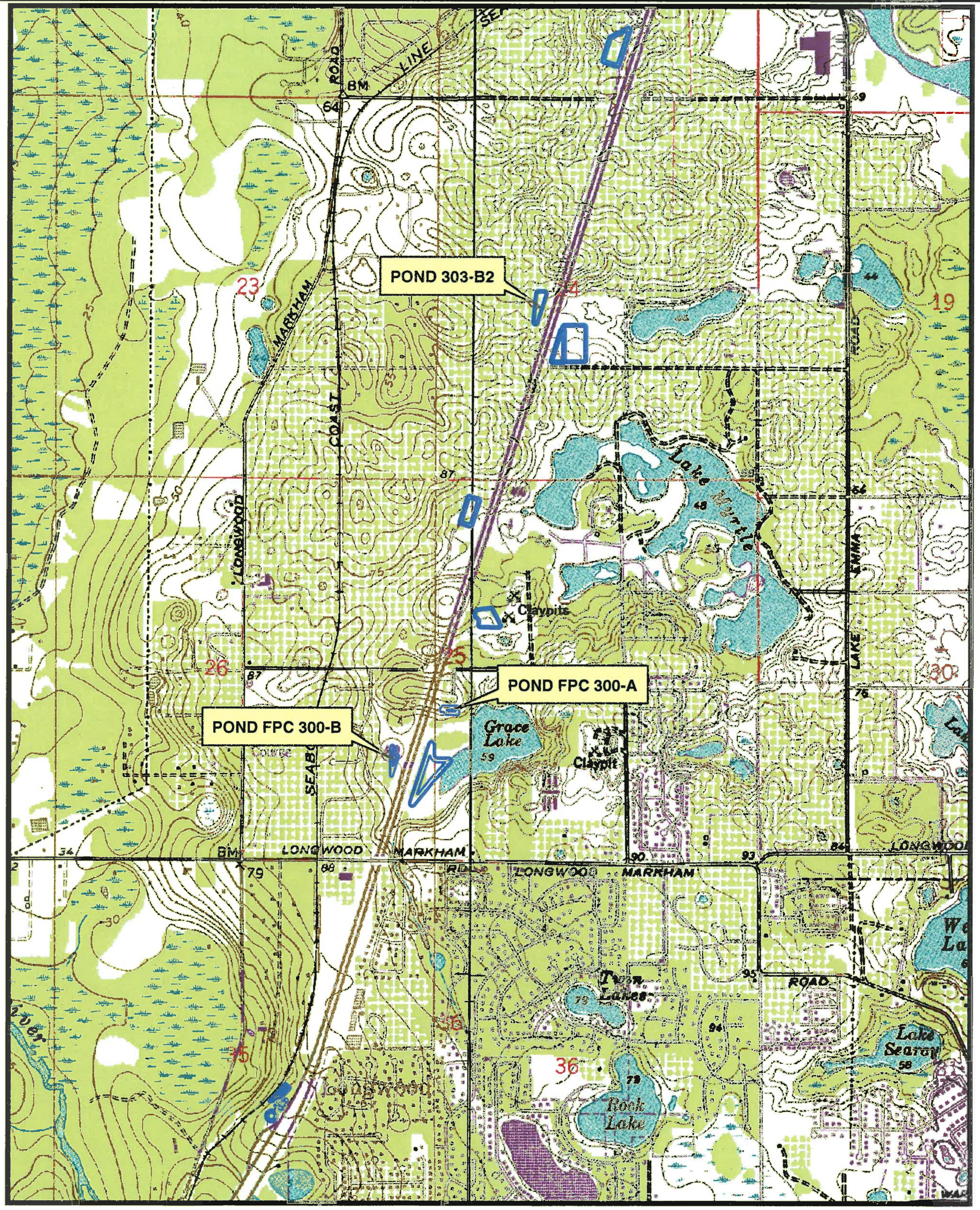
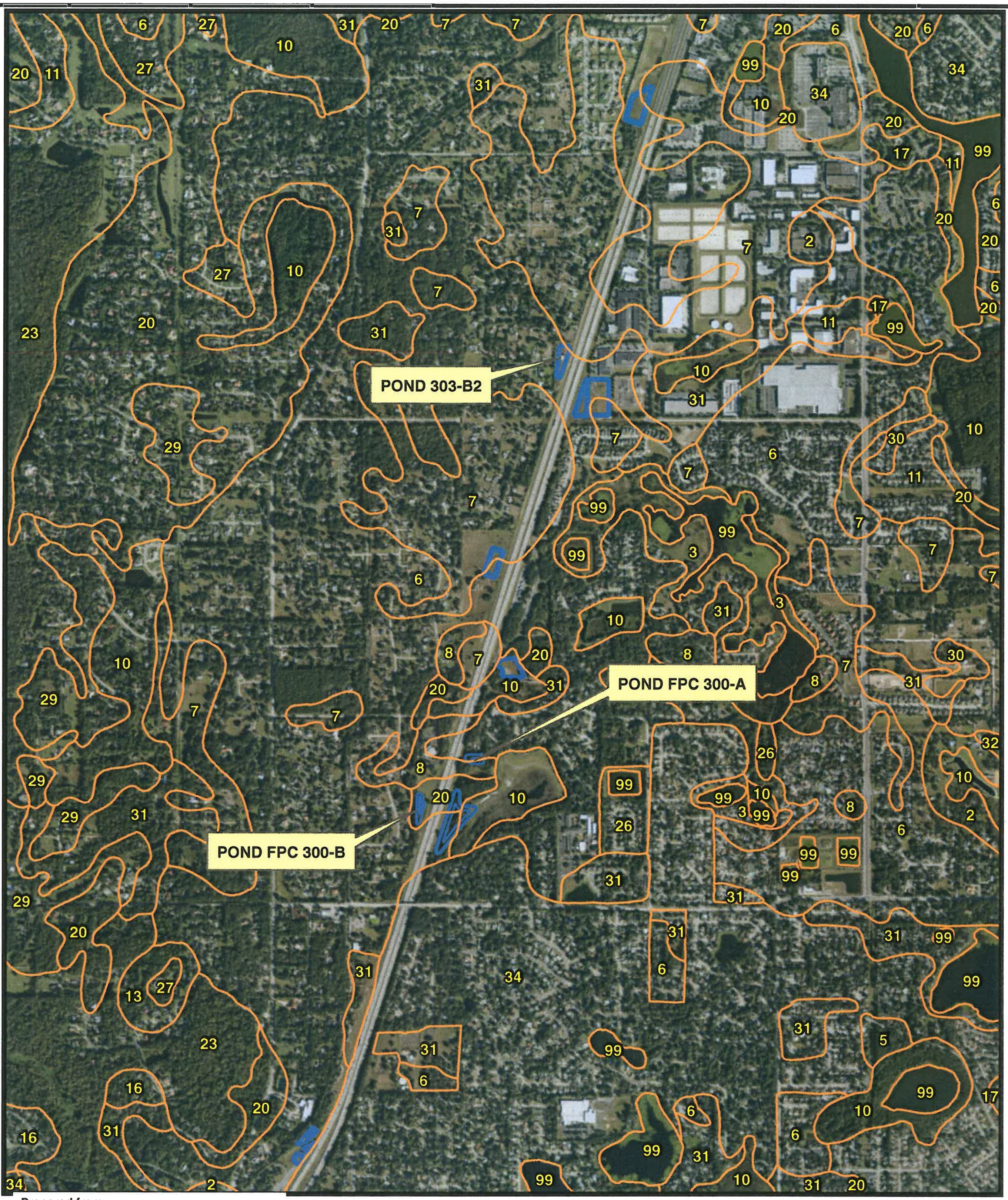


Prepared from:
USGS Forest City, FL Quadrangle Map
Sections: 25, 26
Township: 20 South
Range: 29 East

USGS Casselberry, FL Quadrangle Map
Section: 24
Township: 20 South
Range: 29 East



Prepared from:
NRCS Soil Survey of Seminole County, FL
Seminole County Map Unit Legend
6 - Astatula-Apopka fine sands, 0 to 5 percent slopes
7 - Astatula-Apopka fine sands, 5 to 8 percent
8 - Astatula-Apopka fine sands, 8 to 12 percent slopes
20 - Myakka and EauGallie fine sands

N W E S

0 1,000 2,000
Feet

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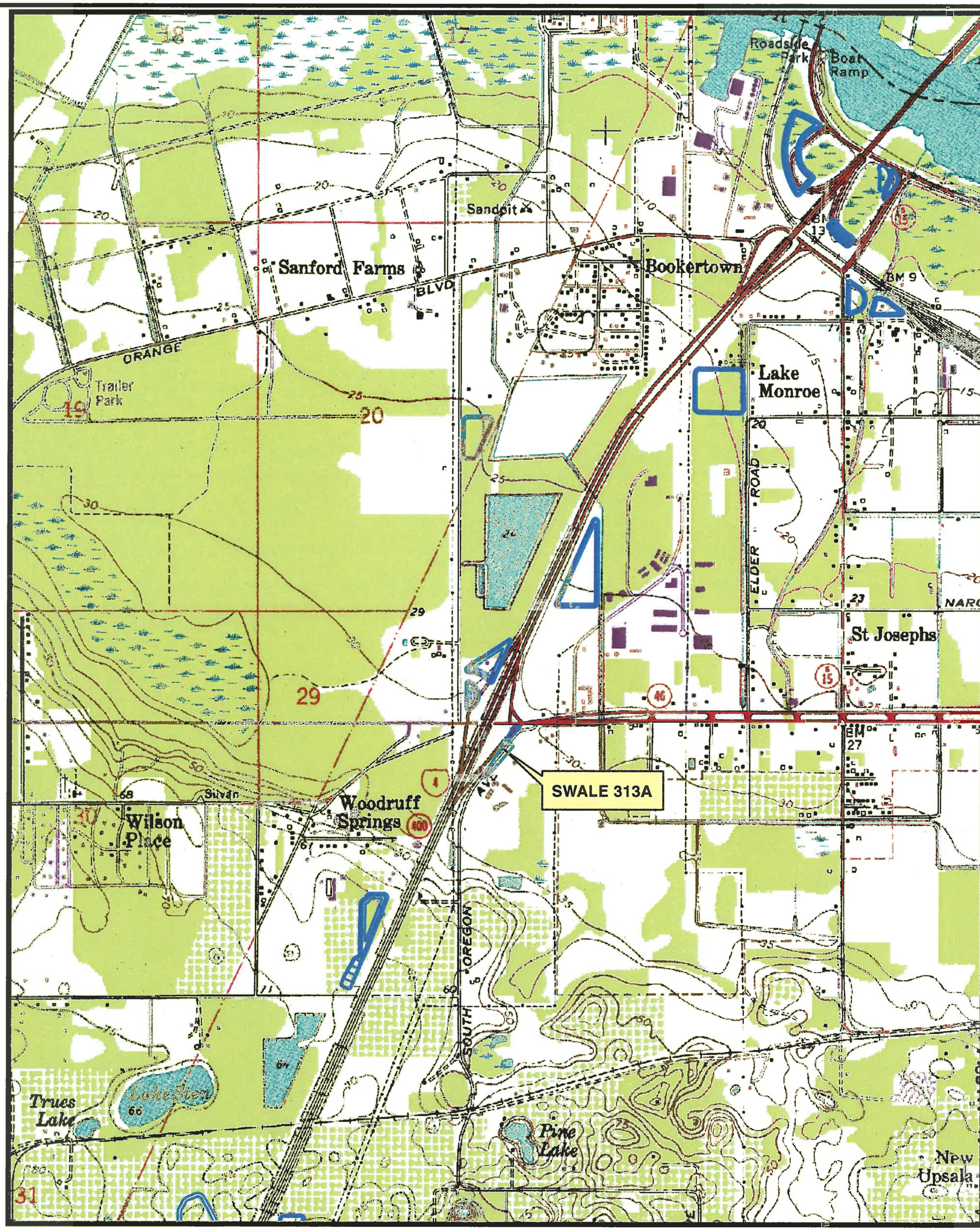
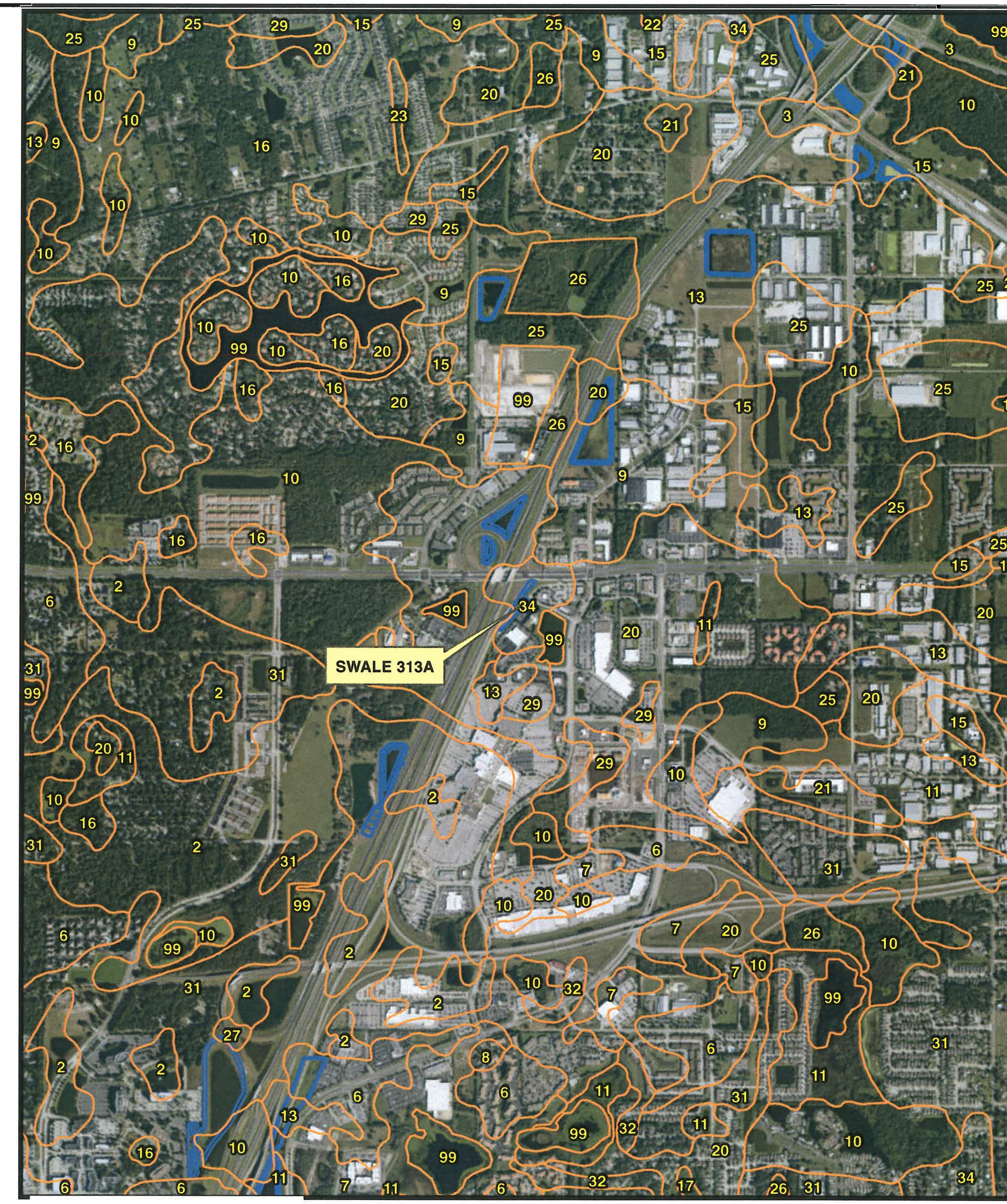
CHRISTOPHER P. MEYER P.E. NO. 49328

FIGURE 1A - USGS QUADRANGLE AND NRCS SOIL SURVEY MAPS



Prepared from:
USGS Sanford, FL Quadrangle Map
Section: 39
Township: 19 South
Range: 30 East



Prepared from:
NRCS Soil Survey of Seminole County, FL
Seminole County Map Unit Legend
20 - Myakka and EauGallie fine sands
34 - Urban land

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Feet

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FIGURE 1B - USGS QUADRANGLE AND NRCS SOIL SURVEY MAPS

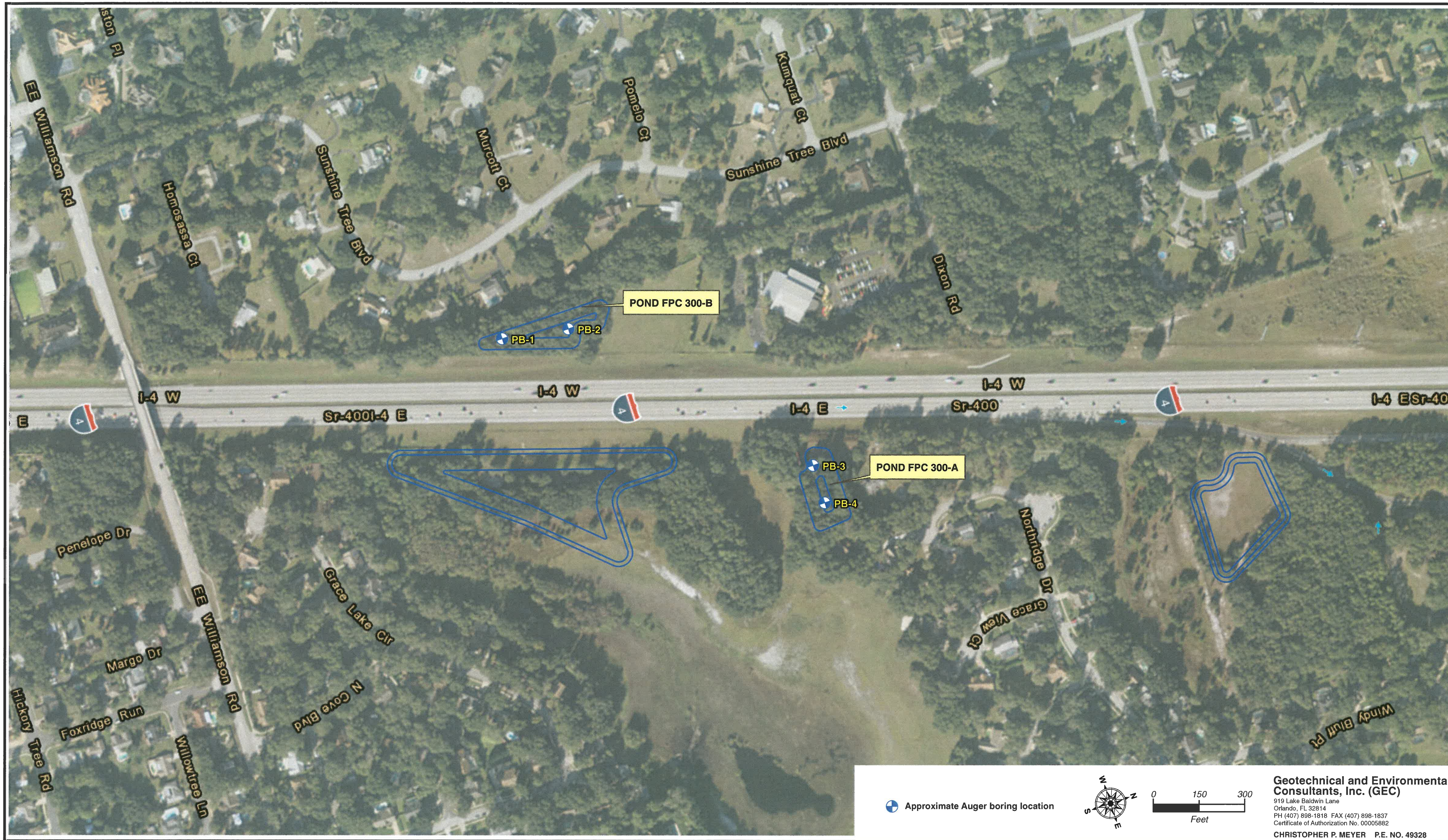

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FIGURE 2 - BORING LOCATION PLAN

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FIGURE 3 - BORING LOCATION PLAN

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FIGURE 4 - BORING LOCATION PLAN

DATE OF SURVEY: SEPTEMBER 2013, APRIL 2015
SURVEY MADE BY: GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS, INC.
SUBMITTED BY: CHRISTOPHER P. MEYER, P.E.

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

DISTRICT: 5
ROAD NO.: SR 400
COUNTY: SEMINOLE

FINANCIAL PROJECT ID : 432100-1-22-1
PROJECT NAME: SR 400 (I-4) PROJECT DEVELOPMENT AND ENVIRONMENTAL (PD&E) STUDY
CROSS SECTION SOIL SURVEY FOR THE DESIGN OF PONDS
STATIONS REFERENCE CENTERLINE OF CONSTRUCTION

	ORGANIC CONTENT		MOISTURE CONTENT		SIEVE ANALYSIS RESULTS PERCENT PASS (%)						ATTERBERG LIMITS (%)					CORROSION TEST RESULTS				
STRATUM NO.	NO. OF TESTS	% ORGANIC	NO. OF TESTS	MOISTURE CONTENT	NO. OF TESTS	10 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTIC INDEX	AASHTO GROUP	DESCRIPTION	NO. OF TESTS	RESISTIVITY ohm-cm	CHLORIDE ppm	SULFATES ppm	pH
1	0	-	0	-	5	100	94-99	46-84	8-36	4-7	0	-	-	A-3	LIGHT BROWN TO BROWN TO LIGHT GRAY TO GRAY FINE SAND TO FINE SAND WITH SILT	0	-	-	-	-
2	0	-	0	14	2	100	97-99	77-81	32-35	20-22	0	NP	NP	A-2-4	BROWN TO DARK BROWN TO DARK GRAY FINE SAND WITH SILT TO SILTY FINE SAND, OCCASIONAL TRACE ORGANIC MATERIAL	0	-	-	-	-
3	0	-	0	-	0	-	-	-	-	-	0	-	-	A-2-6	LIGHT BROWN CLAYEY FINE SAND	0	-	-	-	-
4	1	18	1	106	1	100	99	97	82	63	1	86	42	A-8	DARK BROWN MUCKY FINE SAND TO ORGANIC SANDY CLAY	0	-	-	-	-

NOTES
1. STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH BORING LOCATION ONLY. ANY STRATUM CONNECTING LINES THAT ARE SHOWN ARE FOR ESTIMATING EARTHWORK ONLY AND DO NOT INDICATE ACTUAL STRATUM LIMITS. SUBSURFACE VARIATIONS BETWEEN BORINGS SHOULD BE ANTICIPATED AS INDICATED IN SECTION 2-4 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION. FOR FURTHER DETAILS SEE SECTION 120-3.
2. WATER TABLE SHOWN AS ▼ WHERE ENCOUNTERED AT TIME OF SURVEY. ESTIMATED SEASONAL HIGH GROUNDWATER SHOWN AS ▽. ESTIMATED SEASONAL HIGH GROUNDWATER LEVEL AT OR ABOVE GROUND SURFACE SHOWN AS ▽ AGS.
3. THE SYMBOL "-" REPRESENTS AN UNMEASURED PARAMETER.
4. THE SYMBOL "NP" REPRESENTS NON-PLASTIC.
5. STRATA 1 AND 2 SHALL BE TREATED AS SELECT (S) MATERIAL IN ACCORDANCE WITH FDOT INDEX NO. 505.
6. STRATUM 3 SHALL BE TREATED AS PLASTIC (P) MATERIAL IN ACCORDANCE WITH FDOT INDEX NO. 505.
7. STRATUM 4 SHALL BE TREATED AS MUCK (M) IN ACCORDANCE WITH FDOT INDEX NO. 505.
8. STRATA 2 AND 3 MAY RETAIN EXCESS MOISTURE AND MAY BE DIFFICULT TO DRY AND COMPACT.

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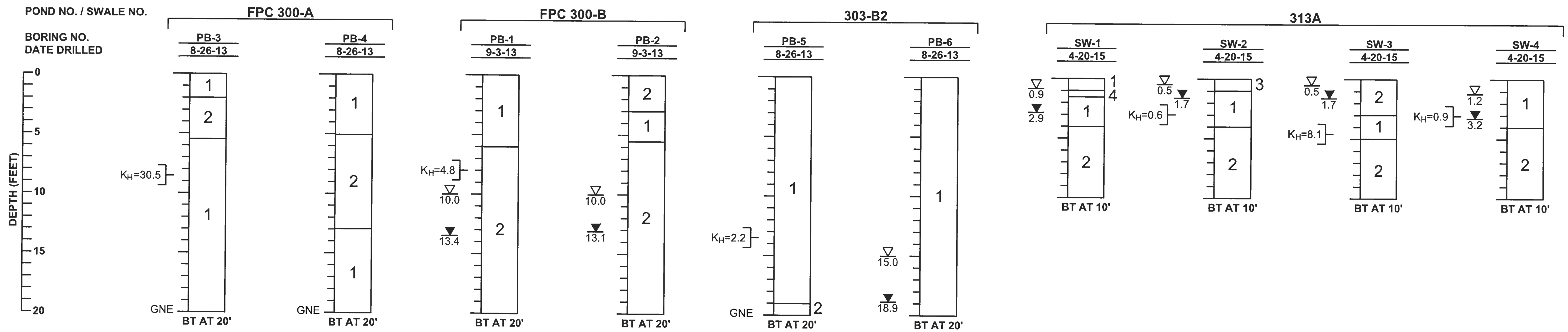
FIGURE 5 - POND SOIL SURVEY



LEGEND

- 10.0 ESTIMATED SEASONAL HIGH GROUNDWATER DEPTH (FT.)
- 13.4 ENCOUNTERED GROUNDWATER DEPTH (FT.) AT TIME OF DRILLING BORING
- GNE GROUNDWATER NOT ENCOUNTERED DURING DRILLING OF BORING
- BT BORING TERMINATED AT DEPTH INDICATED
- K_H= HORIZONTAL PERMEABILITY RATE (FT./DAY)

GENERAL NOTES

SUBSURFACE CONDITIONS SHOWN ON THE BORINGS REPRESENT THE CONDITIONS ENCOUNTERED AT THE BORING LOCATIONS. ACTUAL CONDITIONS BETWEN THE BORINGS MAY VARY FROM THOSE SHOWN. AASHTO SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

STRATUM NO.	AASHTO CLASSIFICATION	SOIL DESCRIPTION
1	A-3	LIGHT BROWN TO BROWN TO LIGHT GRAY TO GRAY FINE SAND TO FINE SAND WITH SILT
2	A-2-4	BROWN TO DARK BROWN TO DARK GRAY FINE SAND WITH SILT TO SILTY FINE SAND, OCCASIONAL TRACE ORGANIC MATERIAL
3	A-2-6	LIGHT BROWN CLAYEY FINE SAND
4	A-8	DARK BROWN MUCKY FINE SAND TO ORGANIC SANDY CLAY

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FIGURE 6 - POND AUGER BORING RESULTS

Table 5
Summary of Laboratory Test Results
SR 400 (I-4) PD&&E Study
From US 27 to Kirkman Road and From East of SR 434 to SR 472
FPID No. 432100-1-22-01
GEC Project No. 3492G

Pond/Swale Number	Stratum Number	Boring Number	Sample Depth (feet)	Percent Passing by Weight					Moisture Content (%)	Atterberg Limits		Organic Content (%)	AASHTO Class.
				#10 Sieve	#40 Sieve	#60 Sieve	#100 Sieve	#200 Sieve		Liquid Limit	Plasticity Index		
FPC 300-A	1	PB-3	7 - 9	100	94	46	8	4	---	---	---	---	A-3
303-B2	1	PB-5	10 - 15	100	99	70	18	5	---	---	---	---	A-3
313A	1	SW-2	1 - 4	100	99	88	36	6	---	---	---	---	A-3
313A	1	SW-3	3 - 4	100	98	89	35	6	---	---	---	---	A-3
313A	1	SW-4	1 - 4	100	98	86	28	7	---	---	---	---	A-3
FPC 300-B	2	PB-1	6 - 10	100	97	81	35	20	---	---	---	---	A-2-4
FPC 300-A	2	PB-3	3 - 5.5	100	99	77	32	22	14	NP	NP	---	A-2-4
313A	4	SW-1	1 - 1.5	100	99	97	82	63	106	86	42	18	A-8

Table 6
Summary of Groundwater Tables and Permeability Results
SR 400 (I-4) PD&&E Study
From US 27 to Kirkman Road and From East of SR 434 to SR 472
FPID No. 432100-1-22-01
GEC Project No. 3492G

Pond/Swale No.	Boring No.	Date of Groundwater Measurement	*Encountered Groundwater Depth (feet)	Estimated Seasonal High Groundwater Depth (feet)	NRCS Soil Survey Unit No.	NRCS Soil Survey Seasonal High Groundwater Depth Range (feet)	Field Permeability Test Results		
							Horizontal Permeability Rate (ft/day)	Test Depth (ft)	Soil Type
FPC 300-B	PB-1	09/03/13	13.4	10.0	20	0.5 - 1.5	4.8	7 - 9	A-2-4
	PB-2	09/03/13	13.1	10.0	20	0.5 - 1.5	---	---	---
FPC 300-A	PB-3	08/26/13	GNE @ 20	---	6	> 6	30.5	7 - 9	A-3
	PB-4	08/26/13	GNE @ 20	---	6	> 6	---	---	---
303-B2	PB-5	08/26/13	GNE @ 20	---	6	> 6	2.2	12 - 14	A-3
	PB-6	08/26/13	18.9	15.0	6	> 6	---	---	---
313A	SW-1	04/20/15	2.9	0.9	34	---	---	---	---
	SW-2	04/20/15	1.7	0.5	34	---	0.6	2 - 4	A-3
	SW-3	04/20/15	1.7	0.5	34	---	8.1	3 - 5	A-3
	SW-4	04/20/15	3.2	1.2	34	---	0.9	2 - 4	A-3

*   GNE: Groundwater not encountered to the boring termination depth.