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 1

Segment 1: State Road 400 (SR 400)/Interstate 4 (I-4) from West of CR 532 (Osceola/Polk County Line) to West of SR 528 (Beachline Expressway)

Osceola County (92130) and Orange County (75280), Florida

March 18, 2016

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June 30, 2014
Revised August 22, 2014
Revised July 2, 2015
Revised March 18, 2016

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) PD&E STUDY FROM US 27 TO KIRKMAN ROAD AND FROM E OF SR 434 TO SR 472
SEGMENT 1: WEST OF CR 532 TO WEST OF SR 528
Osceola and Orange 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 includes the results from the additional ponds investigated (FPC 100, 101A, 103A, 103B, 105A, 114C and 138). 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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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 1 of the project is located in northwest Polk County, northwest Osceola County and southwest Orange County, Florida and is approximately 14 miles in length. The approximate Segment 1 project limits begin west of CR 532 (also known as Osceola Polk Line Road) and extends to west of SR 528. 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 the results of the geotechnical investigation and analyses at twenty-seven alternative stormwater pond locations (at which soil borings were requested) within Segment 1. We understand that the remaining pond alternatives did not require borings or seasonal high groundwater tables due to existing ponds and/or permit.

The Segment 1 project alignment is bordered mainly by sections of undeveloped land consisting of pine flatwoods and palmetto bushes. Many of the ponds are located in areas around I-4 roadway/ramps and thus natural drainage patterns may have already been affected. 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** through **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 1 are depicted on the USGS Intercession City, Lake Jessamine and Windermere, Florida Quadrangle maps shown on **Figures 1A** through **1B.** Review of the USGS Quadrangle maps indicates that the natural ground surface elevation for the Segment 1 ponds range from approximately +100 to +135 feet NGVD at the south and north ends of the segment, and from +85 to +95 feet NGVD toward the center of the segment.

2.2 NRCS Soil Survey Review

The Natural Resources Conservation Service (NRCS) (formerly SCS) Soil Surveys of Polk, Osceola and Orange County, Florida were 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** through **1B** in the **Appendix**. The NRCS soil units at the project site are summarized in **Table 1** below:

Table 1A
Polk County NRCS Soil Survey Review

Map Symbol	Soil Name	Depth (in)	Soil Description	AASHTO Soil Classification	Seasonal High Groundwater Depth (ft)	Hydrologic Group
3	Candler sand, 0 to 5 percent slopes	0 - 63 63 - 80	Sand, fine sand Sand, fine sand	A-3 A-2-4, A-3	> 6.0	A
15	Tavares fine sand, 0 to 5 percent slopes	0 - 8 8 - 80	Fine sand Sand, fine sand	A-3 A-3	3.5 - 6.0	A

Table 1B
Osceola County NRCS Soil Survey Review

Map Symbol	Soil Name	Depth (in)	Soil Description	AASHTO Soil Classification	Seasonal High Groundwater Depth (ft)	Hydrologic Group
1	Adamsville sand	0 - 4 4 - 80	Sand Sand	A-2-4, A-3 A-2-4, A-3	2.0 - 3.5	A
7	Candler sand, 0 to 5 percent slopes	0 - 62 62 - 80	Sand Sand, fine sand	A-3 A-2-4, A-3	> 6.0	A
8	Candler sand, 5 to 12 percent slopes	0 - 59 59 - 80	Sand, fine sand Sand, fine sand	A-3 A-2-4, A-3	> 6.0	A
15	Hontoon Muck	0 - 70	Muck	A-8	+2.0 - 0.0	A/D
16	Immokalee fine sand	0 - 37 37 - 47 47 - 80	Fine sand Fine sand Fine sand	A-3 A-2-4 A-3	0.5 - 1.5	A/D
22	Myakka fine sand	0 - 27 27- 37 37 - 70 70 - 82	Fine sand, sand Fine sand, sand, loamy fine sand Fine sand, sand Fine sand, sand, loamy fine sand	A-3 A-2-4, A-3 A-3 A-3, A-2-4	0.5 - 1.5	A/D
32	Placid fine sand, depressional	0 - 24 24 - 80	Fine sand Fine sand, sand	A-2-4, A-3 A-3, A-2-4	+2.0 - 0.0	A/D
37	Pompano fine sand, depressional	0 - 80	Fine sand	A-3	+2.0 - 0.0	A/D
38	Riviera fine sand	0 - 2 24 - 38 38 - 61 61 - 80	Fine sand, sand Sandy clay loam, sandy loam Sandy clay loam, fine sandy loam, sandy loam Loamy sand, sand, fine sand	A-2-4, A-3 A-2-4 A-2-4, A-2-6 A-3, A-2-4	0.0 - 1.0	C/D

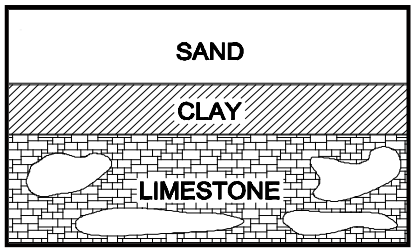
Table 1C
Orange County NRCS Soil Survey Review

Map Symbol	Soil Name	Depth (in)	Soil Description	AASHTO Soil Classification	Seasonal High Groundwater Depth (ft)	Hydrologic Group
3	Basinger fine sand, depressional	0 - 7 7 - 80	Fine sand Fine sand, sand	A-3 A-3, A-2-4	+2.0 - 0	A/D
7	Candler-Urban land complex, 0 to 5 percent slopes	0 - 4 4 - 67 67 - 80	Fine sand Fine sand, sand Fine sand, sand	A-3 A-3 A-2-4, A-3	> 6.0	A
20	Immokalee fine sand	0 - 35 35 - 67 67 - 80	Fine sand, sand Fine sand, sand Fine sand, sand	A-3 A-3, A-2-4 A-3	1.0 - 5.0	B/D
34	Pomello fine sand, 0 to 5 percent slopes	0 - 40 40 - 55 55 - 80	Fine sand, sand Fine sand, sand Fine sand, sand	A-3 A-3, A-2-4 A-3	3.5 - 5.0	A
37	St. Johns fine sand	0 - 24 24 - 44 44 - 80	Fine sand, sand Fine sand, sand Fine sand, sand	A-3 A-3, A-2-4 A-3	1.0 - 3.5	B/D
42	Sanibel muck	0 - 11 11 - 80	Muck Fine sand, sand, mucky fine sand	A-8 A-3	+1.0 - 0	A/D
43	Seffner fine sand	0 - 80	Fine sand, sand	A-3, A-2-4	3.0 - 5.0	A/D
44	Smyrna fine sand	0 - 27 27 - 80	Fine sand, sand Fine sand, sand	A-3, A-2-4 A-3	1.0 - 3.5	A/D
54	Zolfo fine sand	0 - 80	Fine sand	A-3, A-2-4	3.5 - 5.0	A

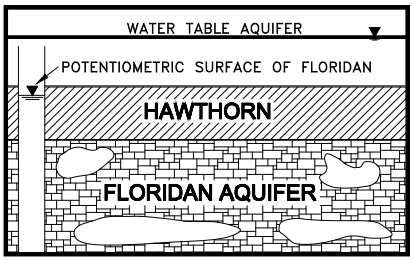
Based on review of the NRCS soil survey maps, the majority of the soils within the area of the proposed ponds in Segment 1 are characterized as sands with variable silt content (A-3, A-2-4). However, the NRCS depicts Hontoon muck (Soil Unit 15) and Sanibel muck (Soil Unit 42) within some of the pond footprints. These soil units contains high organic content soils, classified as A-8 in AASHTO, from the ground surface to depths of greater than 6 feet below the existing ground surface. For the majority of the soils within the pond footprints the soil survey lists seasonal high water table levels at depths ranging from 2 feet above the ground surface to 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.

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

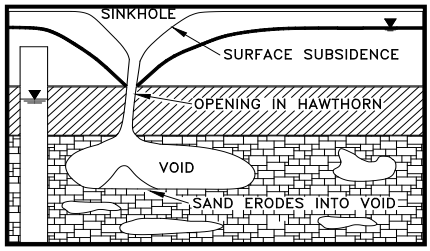


Central Florida geologic conditions can generally be described in terms of three basic sedimentary layers. The upper layer is primarily comprised of sands containing varying amounts of silt and clay. These sands are underlain by a layer of clay, clayey sand, phosphate and limestone which is locally referred 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 an area of low to moderate recharge 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 low to moderate 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 +60 to +105 feet NGVD. Ground surface elevations vary approximately between +85 and +135 feet NGVD; therefore, artesian flow conditions may exist, especially in lower-lying areas and if underlying confining layer(s) are penetrated during construction. No artesian conditions were encountered in any of our borings performed.

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 locations requested by HNTB. The subsurface exploration for this study generally consisted of performing at least 2 auger borings at each of the proposed pond locations requested by HNTB. Due to project schedule constraints at several ponds, hand auger borings and laboratory permeability tests were conducted (instead of machine auger borings and field permeability tests) to aid the drainage engineer during the preliminary design of the PD&E study. Several pond "footprints" were moved slightly after we drilled our borings.

The approximate locations of the borings performed for this study are shown on **Figures 2A** through **2O** in the **Appendix**. These locations were not surveyed, but rather by using a handheld, sub-meter accuracy global positioning satellite (GPS) unit (Trimble Geo XH Series). Although these locations are given only approximately, the methods used to locate them are, in GEC's opinion, sufficient to meet the intent of our study. If greater accuracy is desired, a registered Professional Land Surveyor should be retained to survey these locations.

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 Hand Auger Borings

Our engineering technician performed standard barrel manual auger borings in general accordance with ASTM D-4700, by manually turning a 3-inch diameter, 6-inch long sampler into the soil until it was full. He then retrieved the sampler and visually examined and classified the soil. This procedure was repeated until the desired termination depth was achieved. A field manual auger boring log was completed by the technician that described the soils penetrated, recorded depth to groundwater, if encountered, and described other details of the boring, methods used, and selected other site conditions at the time of drilling. Our technician collected representative samples for further visual examination and classification in our laboratory.

3.3 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.

3.4 Manual Muck Probes

Manual muck probes were performed by pushing a slender metal rod into the surficial soil and evaluating the relative resistance of the soil to manual penetration. Highly organic soils, such as muck and/or peat, are characteristically very soft and will easily yield to the manual probe. Manual probes, however, cannot detect peat or muck layers which are present beneath layers of sand or dense soils which cannot be penetrated by the probe. The probes can also penetrate to some extent in very loose sands which may be present beneath peat or muck layers. No soil samples are obtained for visual examination or laboratory testing when using this exploratory technique. The soil type being penetrated is inferred solely by evaluating the relative resistance of the soil to penetration. These limitations can lead to some under-estimation or over-estimation of peat or muck layer thicknesses. The probe data presented in this report should be evaluated with these limitations in mind.

3.5 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-T 088)	52
Percent Fines (FM 1-T 88)	4
Natural Moisture Content (FM 1-T 265)	15
Atterberg limits (FM 1 -T 89/90)	5
Organic Content (FM 1-T 267)	9
Laboratory Soil Permeability (FM 1-T 215)	10

The results of our testing are summarized on the **Pond Soil Survey Sheet** (**Figure 3**) and the summary of Laboratory Testing Results (**Table 5**) in the **Appendix.** Constant head laboratory soil permeability tests were conducted on soil samples from some pond borings. The results of the permeability tests are shown in the Summary of Permeability Test Results **Table 4** later in this report.

5.0 Description of Subsurface Conditions

The results of our borings are presented on the **Auger Boring Results For Ponds** sheets (**Figures 4** through **8**). 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 **Table 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 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

Stratum No.	Soil Description	AASHTO Classification
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 to sandy clay to sandy silt	A-2-6, A-7-6, A-4
4	Dark brown mucky fine sand to organic clay	A-8
5	Light brown sandy clay	A-7-6

The auger borings conducted in the ponds typically encountered sand with varying amounts of silt content (Strata 1 and 2; A-3, A-2-4) to the typical boring termination depths of 5 to 20 feet below the existing ground surface.

However, boring PB-2 encountered mucky fine sand to organic clay (Strata 4; A-8) from 17 feet to the extended boring termination depth of 25 feet below the existing ground surface. Borings PB-19, PB-21, PB-27, PB-28, PB-30, PB-32, PB-35, PB-36, PB-44, PB-45, PB-47, PB-48, PB-50, PB-53, PB-64, PB-65 and PB-66 encountered mucky fine sand to organic clay (Strata 4; A-8) from the ground surface to depths ranging from 0.5 to 4 feet below the ground surface. Some of the manual borings could not be advanced more than several feet below the encountered groundwater table due to limitations involved with manual auger borings. In borings PB-19, PB-21 PB-32, PB-35 and PB-36 the manual auger was not able to determine the vertical limits of the encountered muck so manual probes were performed in the bottom of the auger boring to provide approximate vertical limits of the muck (A-8). Additionally, several borings (PB-40, PB-41, PB-47 to PB-50, PB-62 and PB-63) encountered layers of clayey fine sand to sandy clay to sandy silt (Strata 3 and 5: A-2-6, A-7-6, A-4) at varying depths.

Please refer to the **Auger Boring Results For Ponds** sheets (**Figures 4** through **8**) for detailed soil and groundwater information at a specific boring location.

5.2 Groundwater Levels

Groundwater levels were typically measured at least 24 hours after completion of the borings. Encountered groundwater depths at the pond boring locations generally ranged from 0.5 to 15.5 feet below the existing ground surface. However, groundwater was encountered from the ground surface to approximately 0.5 to 2 feet above the natural ground surface in borings PB-19, PB-21, PB-32, PB-35, PB-36, PB-65 and PB-66 (Ponds FPC 105, 133, 135 and 138). Borings PB-23 to 26 (Pond 105C) did not encounter groundwater to the boring termination depths of 20 feet and borings PB-39, PB-40, PB-41 (Pond 142B), PB-51, PB-52 (Pond FPC 103) and PB-74 (Pond FPC 101A) did not encounter groundwater to the boring termination depths of 10 to 16 feet.

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 above the ground surface, indicated by "AGS" shown adjacent to the boring profile, to approximately 12.5 feet below the existing ground surface. Our encountered and estimated seasonal high groundwater levels are presented on the **Auger Boring Results For Ponds** sheets (**Figures 4** through **8**) and **Table 6 i**n 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 and Treatment Swales

The pond borings generally encountered fine sands with varying amounts of silt (A-3, A-2-4) to the typical boring termination depths (5 to 20 feet deep). 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. However, the mucky fine sand to organic clay (Stratum 4: A-8) encountered in the auger borings are not suitable for use as roadway embankment. The clayey fine sand to sandy clay soils (Strata 3 and 5: A-2-6, A-7-6) have limitations for their use in accordance with Index 505. 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 field and laboratory permeability tests at the proposed pond locations. The following table summarizes the result of our permeability tests.

Table 4
Summary of Permeability Tests Results

Pond No.	Boring No.	Depth (ft)	Encountered Water Table (ft)	Soil Type (AASHTO)	Horizontal Permeability, K (ft/day)	Permeability Type	Soil Stratum No.
FPC 100	PB-68	5 - 10	1.8	A-3	22.8	Constant Head**	1
FPC 100	PB-71	3 - 6	3.3	A-3	14.9	Constant Head**	1
FPC 101	PB-1	6 - 8	4.8	A-3	3.4	Falling Head	1
FPC 101A	PB-73	3 - 6	6.3	A-3	15.1	Constant Head**	1
101C2	PB-4	7 - 9	4.4	A-3	1.5	Falling Head	1
101C1	PB-5	7 - 9	4.7	A-2-4	0.3	Constant Head	2
FPC 102	PB-54	1 - 3	1.8	A-3	9.5	Constant Head**	1
FPC 103	PB-52	7 - 9	*GNE @ 10	A-3	10.7	Constant Head**	1
FPC 103A	PB-55	4 - 6	12.0	A-2-4	0.2	Falling Head	2
FPC 103B	PB-58	8 - 10	9.5	A-3	71.4	Falling Head	1

Pond No.	Boring No.	Depth (ft)	Encountered Water Table (ft)	Soil Type (AASHTO)	Horizontal Permeability, K (ft/day)	Permeability Type	Soil Stratum No.
FPC 105A	PB-60	7 - 9	10.8	A-3	89.5	Falling Head	1
FPC 105A	PB-62	10 - 12	15.5	A-3	46.2	Falling Head	1
FPC 114C	PB-75	5 - 7	4.3	A-2-4	0.5	Constant Head	2
FPC 114C	PB-77	4 - 6	4.7	A-3	5.1	Falling Head	1
FPC 138	PB-65	0.5 - 1.5	0.0	A-3	3.3	Constant Head**	1
141	PB-7	8 - 10	3.5	A-3	5.3	Falling Head	1
141A	PB-9	8 - 10	4.0	A-3	28.0	Falling Head	1
142A	PB-18	3 - 5	3.7	A-3	8.0	Falling Head	1
105C	PB-23	12 - 14	*GNE @ 20	A-3	57.0	Falling Head	1
FPC 132	PB-27	1.5 - 2.5	2.2	A-3	3.9	Constant Head**	1
132	PB-29	0 - 3.5	3.4	A-3	4.5	Constant Head**	1
133	PB-31	0 - 3	1.3	A-3	8.3	Constant Head**	1
134	PB-33	0 - 4	2.0	A-2-4	1.3	Constant Head**	2

* GNE @ 20 denotes that groundwater was not encountered to the boring termination depth indicated.

** Laboratory permeability test

Soil Stratum 1 (A-3) had measured permeabilities generally ranging from 1.5 to 89.5 feet per day, while Soil Stratum 2 (A-2-4) had measured permeabilities ranging from 0.2 to 1.3 feet per day. These permeability tests should be used to aid in evaluating the ponds' suitability during the PD&E Study. During final design, additional testing and evaluation will be necessary for final stormwater pond design.

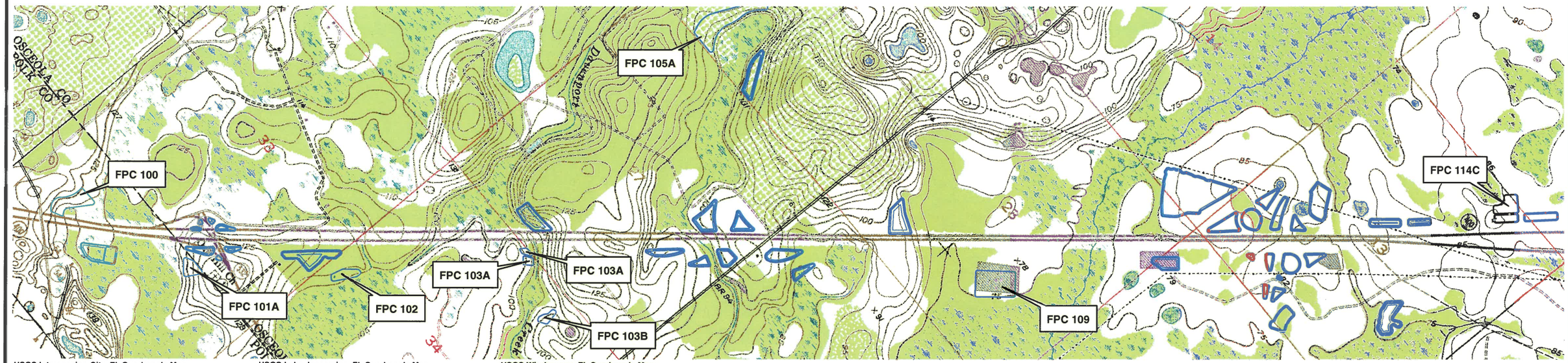
7.0 Use of This Report

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.

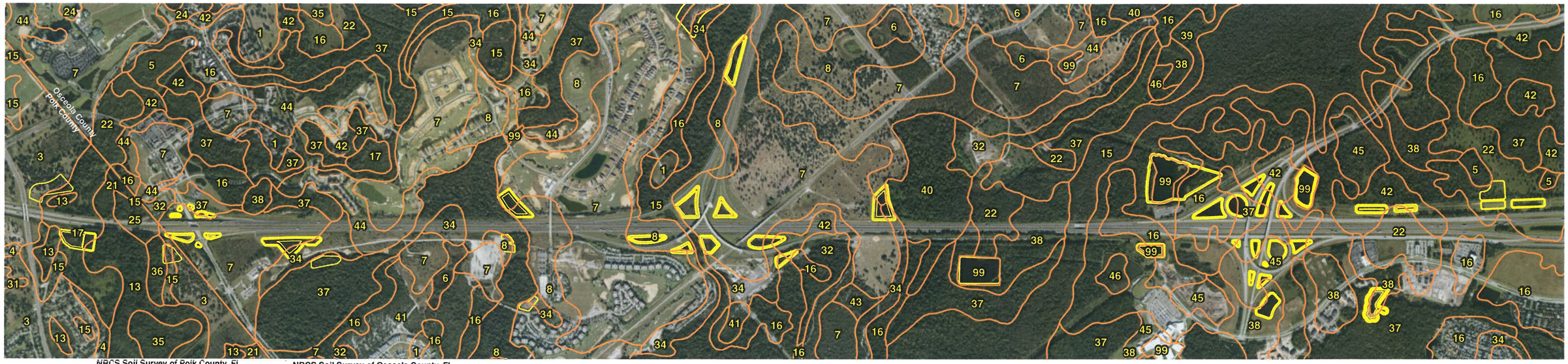


USGS Intercession City, FL Quadrangle Map
Sections: 27, 33
Township: 25 South
Range: 27 East

Sections: 28, 32, 33
Township: 24 South
Range: 28 East

USGS Lake Jessamine, FL Quadrangle Map
Sections: 11, 14, 22
Township: 24 South
Range: 28 East

USGS Windermere, FL Quadrangle Map
Section: 22
Township: 24 South
Range: 28 East



NRCS Soil Survey of Polk County, FL
Polk County Map Unit Legend
3 - Candler sand, 0 to 5 percent slopes
15 - Tavares fine sand, 0 to 5 percent slopes

NRCS Soil Survey of Osceola County, FL
Osceola County Map Unit Legend
1 - Adamsville sand
7 - Candler sand, 0 to 5 percent slopes
8 - Candler sand, 5 to 12 percent slopes
15 - Hontoon muck
16 - Immokalee fine sand
22 - Myakka fine sand
32 - Placid fine sand, depressional
37 - Pompano fine sand, depressional
38 - Riviera fine sand
44 - Tavares fine sand, 0 to 5 percent slopes
99 - Water

NRCS Soil Survey of Orange County, FL
Orange County Map Unit Legend
3 - Basinger fine sand, depressional
7 - Candler-Urban land complex, 0 to 5 percent slopes
20 - Immokalee fine sand
34 - Pomello fine sand, 0 to 5 percent slopes
37 - St. Johns fine sand
42 - Sanibel muck
43 - Seffner fine sand
44 - Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes
54 - Zolfo fine sand

0 1,000 2,000
Feet

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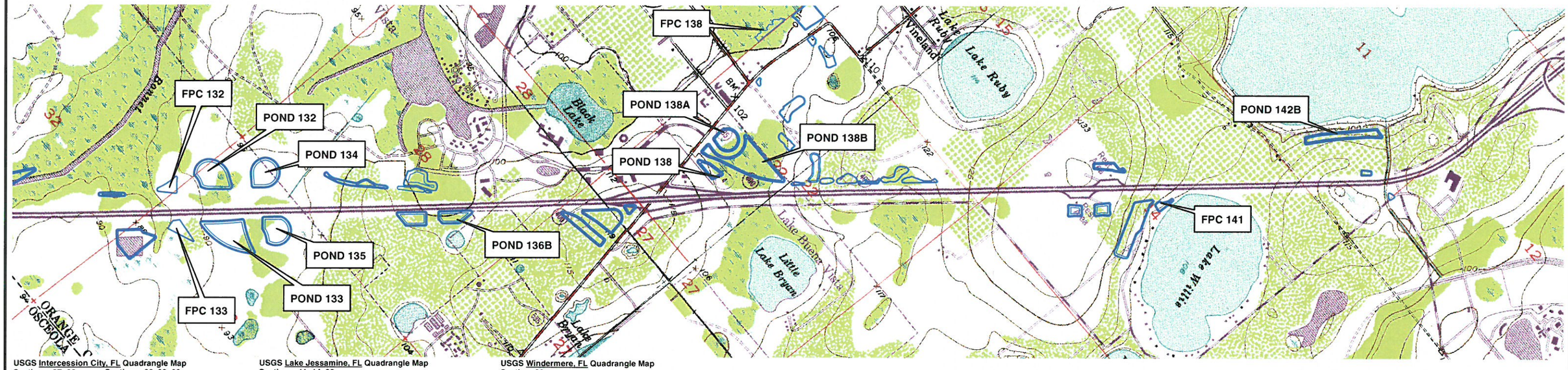
J:\D109\3492G Segment 1 Pond\6-30-15 PONDS\3492Gquad03.mxd 3/9/2016

FIGURE 1A - USGS QUADRANGLE AND NRCS SOIL SURVEY MAPS



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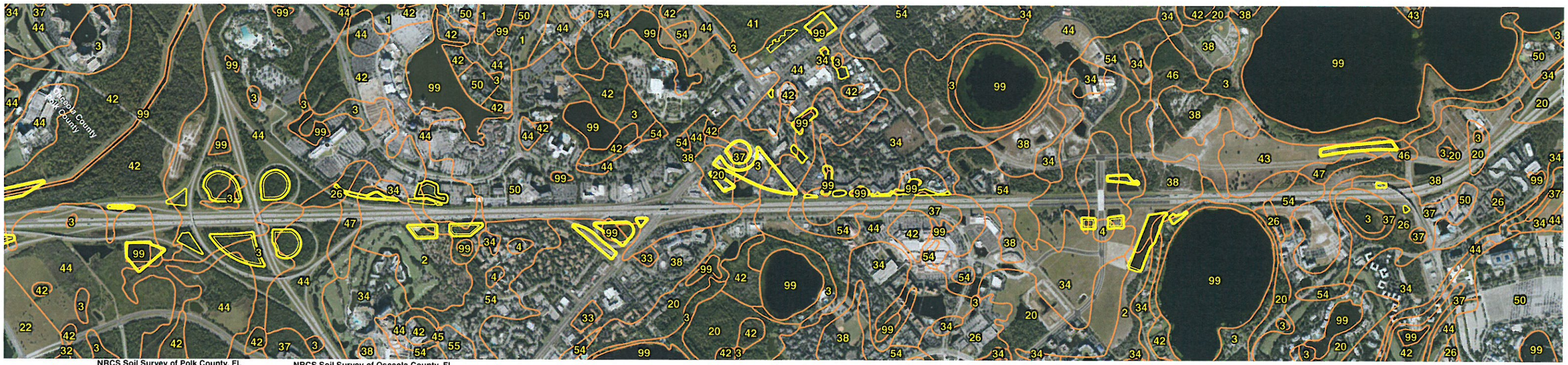
Range: 28 East

USGS Windermere, FL Quadrangle Map
Section: 22
Township: 24 South
Range: 28 East



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Polk County Map Unit Legend
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NRCS Soil Survey of Osceola County, FL
Osceola County Map Unit Legend
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NRCS Soil Survey of Orange County, FL
Orange County Map Unit Legend
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20 - Immokalee fine sand
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37 - St. Johns fine sand
42 - Sanibel muck
43 - Seffner fine sand
44 - Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes
54 - Zolfo fine sand

0 1,000 2,000
Feet

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FIGURE 1B - USGS QUADRANGLE AND NRCS SOIL SURVEY MAPS

APPROXIMATE AUGER BORING LOCATION

N W E S

0 150 300
Feet

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FIGURE 2A - BORING LOCATION PLAN

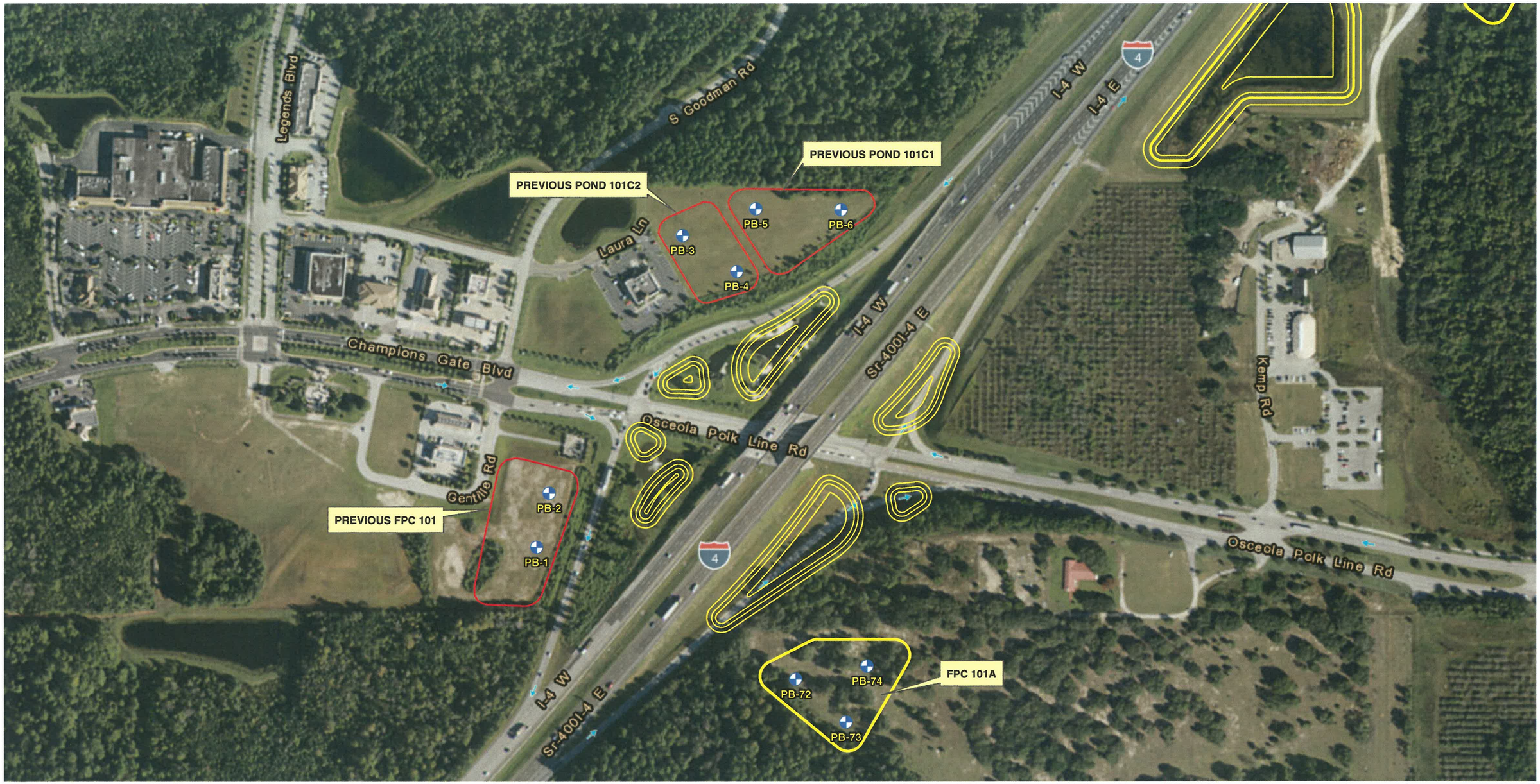

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FIGURE 2B - BORING LOCATION PLAN

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FIGURE 2C - BORING LOCATION PLAN

APPROXIMATE AUGER BORING LOCATION

N W E S

0 150 300
Feet

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FIGURE 2D - BORING LOCATION PLAN

APPROXIMATE AUGER BORING LOCATION

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FIGURE 2E - BORING LOCATION PLAN

APPROXIMATE AUGER BORING LOCATION

N
W E
S

0 150 300
Feet

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FIGURE 2F - BORING LOCATION PLAN

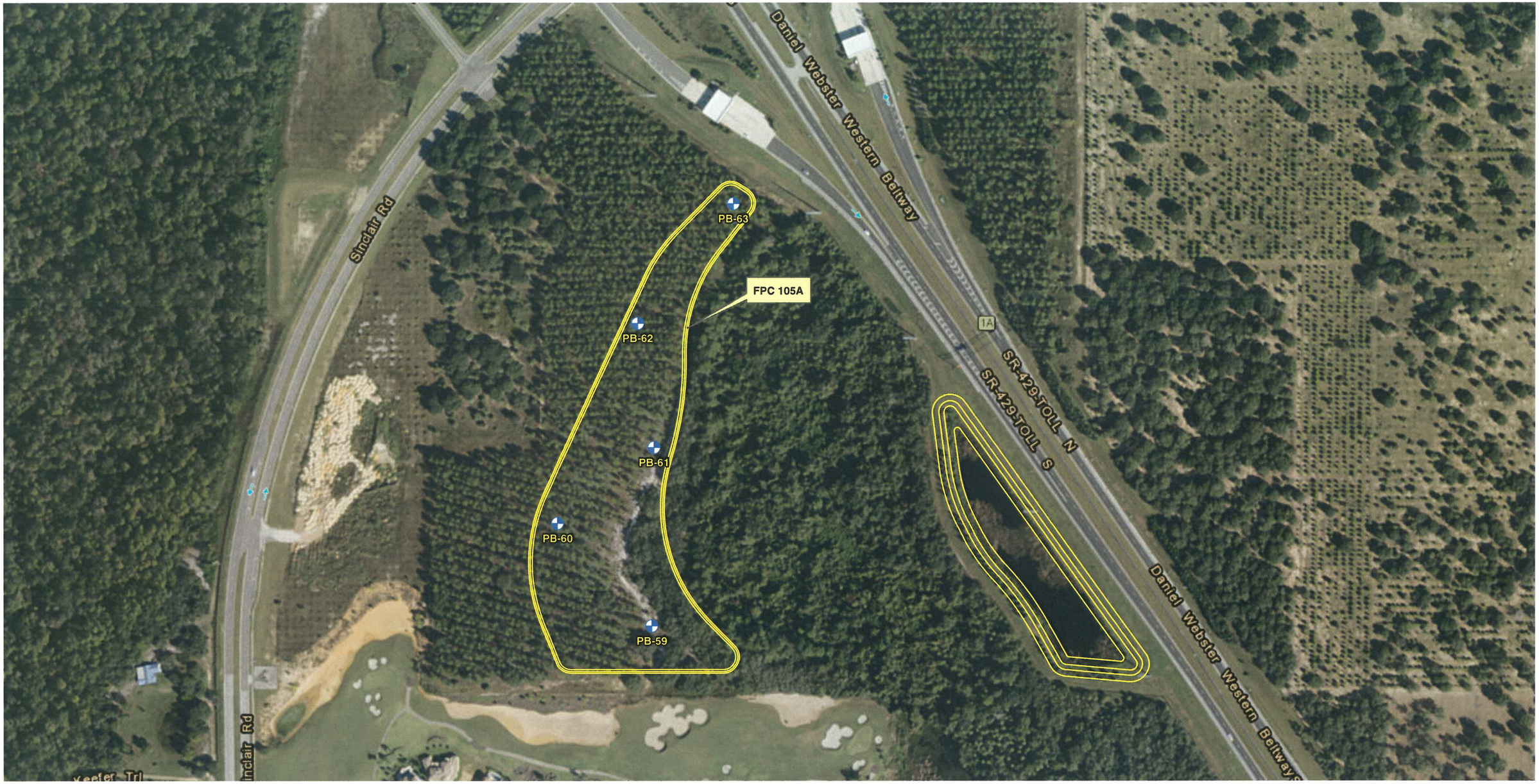

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FIGURE 2G - BORING LOCATION PLAN

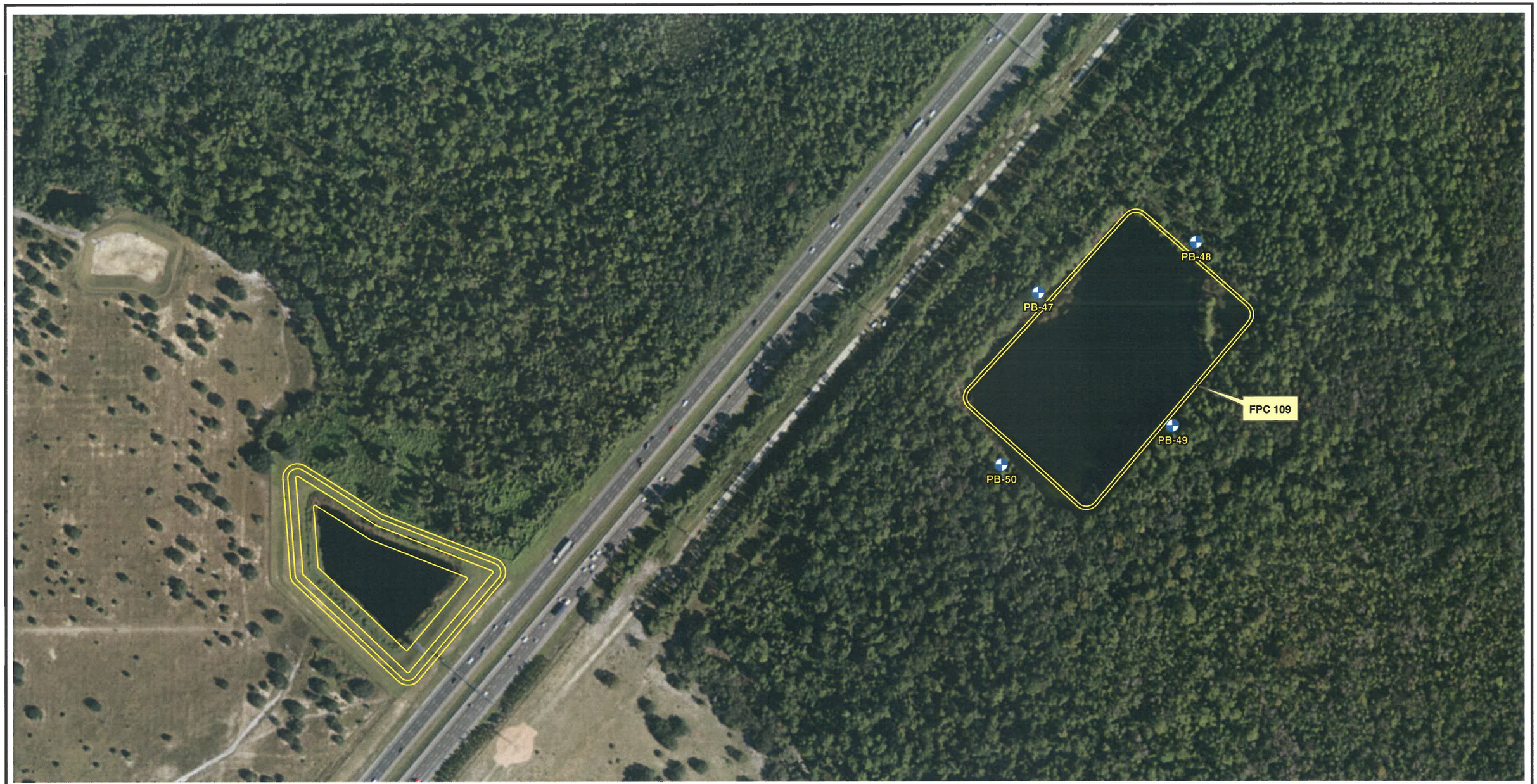

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FIGURE 2H - BORING LOCATION PLAN

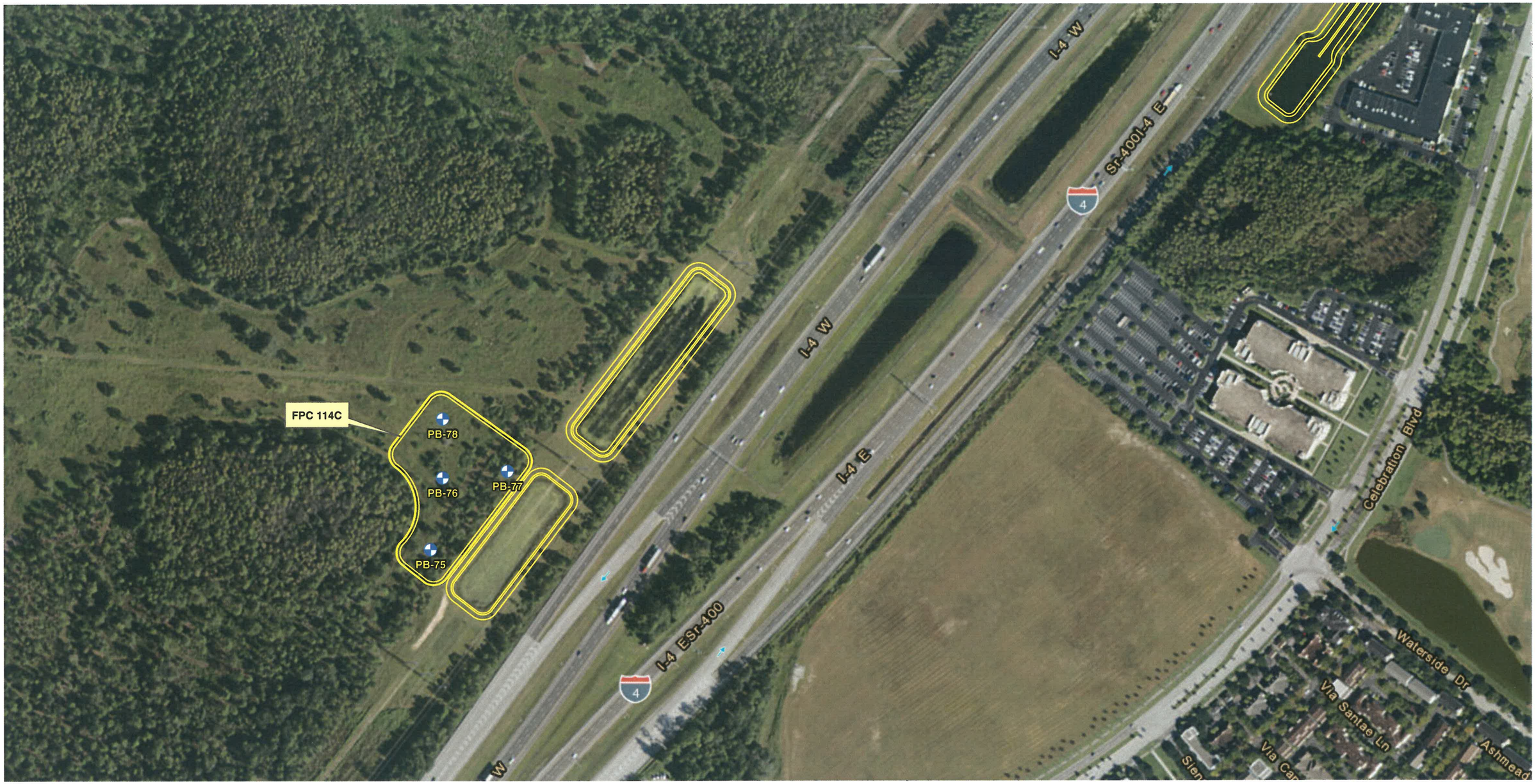

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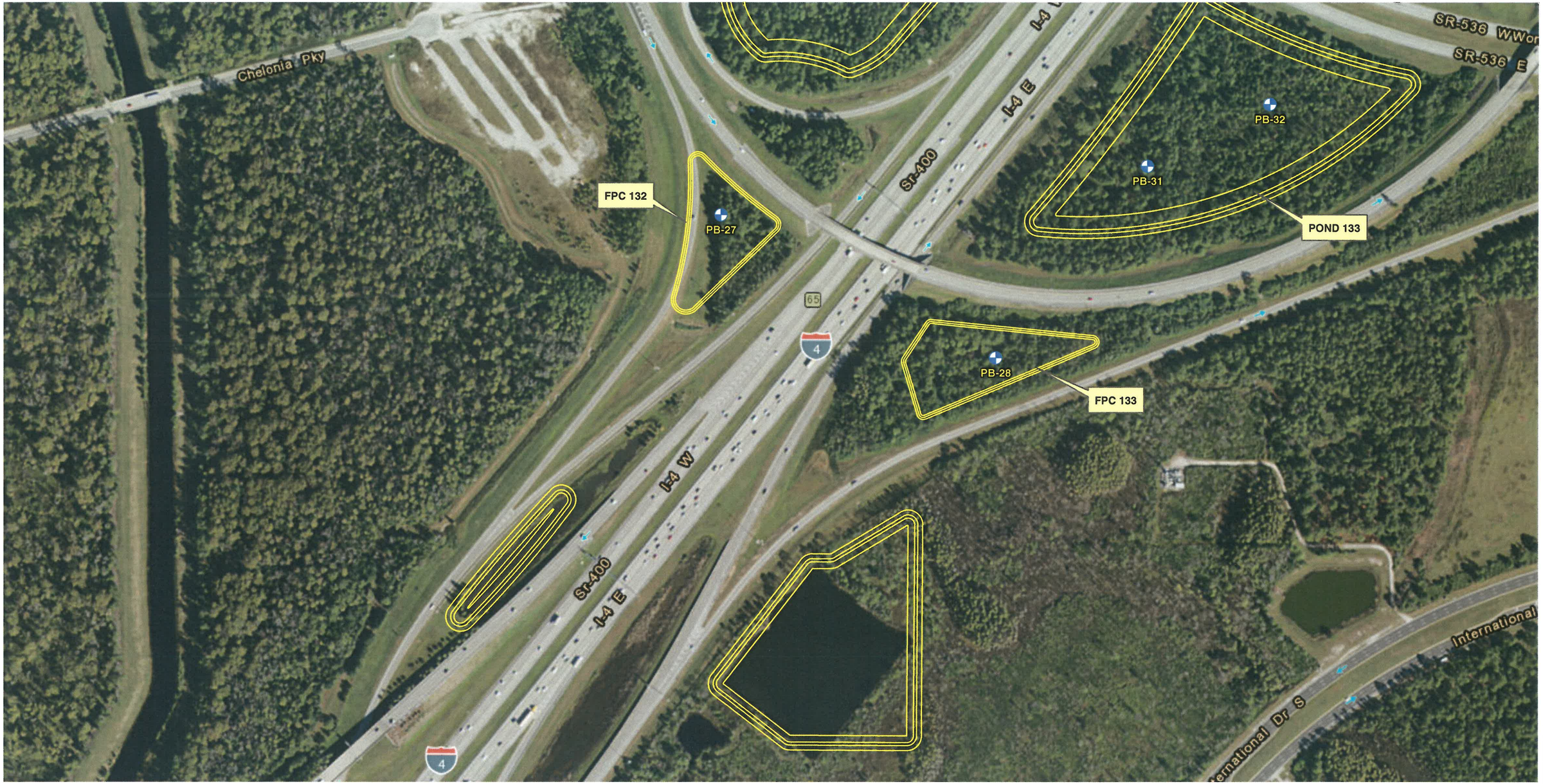
FIGURE 2I - BORING LOCATION PLAN



APPROXIMATE AUGER BORING LOCATION

N W E S

0 150 300
Feet

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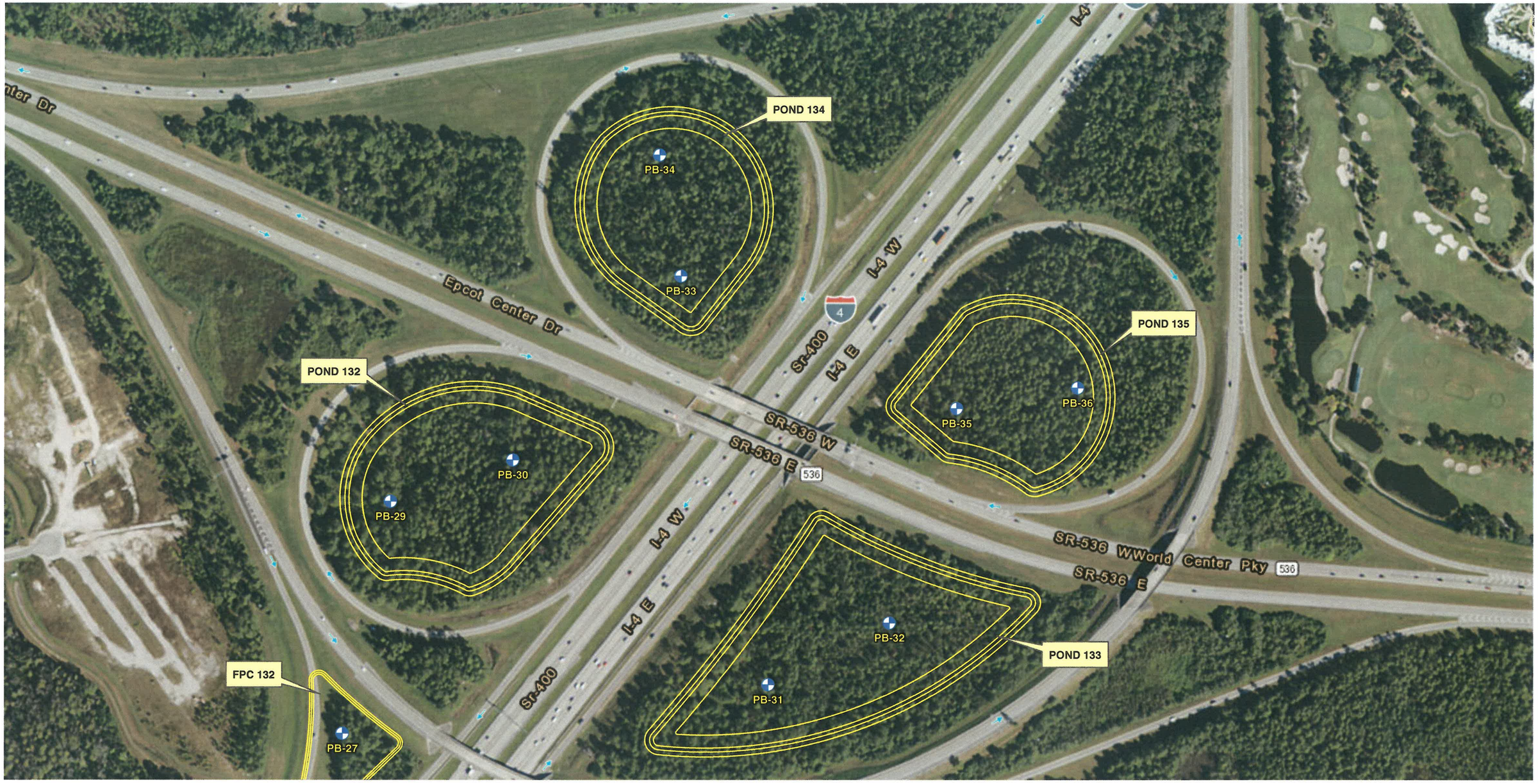
FIGURE 2J - BORING LOCATION PLAN



APPROXIMATE AUGER BORING LOCATION

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FIGURE 2K - BORING LOCATION PLAN

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FIGURE 2L - BORING LOCATION PLAN

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FIGURE 2M - BORING LOCATION PLAN

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FIGURE 2N - BORING LOCATION PLAN

POND 142B
PB-39
PB-40
PB-41
PREVIOUS POND 141A
PB-9
PB-11
PB-10
PREVIOUS POND 142A
PB-16
PB-18
PB-17

APPROXIMATE AUGER BORING LOCATION

N W E S

0 150 300
Feet

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FIGURE 2O - BORING LOCATION PLAN

DATE OF SURVEY: JUNE, AUGUST 2014, JULY 2015
SURVEY MADE BY: GEOTECHNICAL AND 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: POLK, OSCEOLA, ORANGE

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 - SEGMENT 1

	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	-	38	100	68-92	25-62	5-36	1-9	0	-	-	A-3	LIGHT BROWN TO BROWN TO LIGHT GRAY TO GRAY FINE SAND TO FINE SAND WITH SILT	0	-	-	-	-
2	1	3	3	11-18	10	97-100	52-92	36-61	20-37	11-29	2	20-26	8-9	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	-	3	17-24	3	100	87-91	65-68	31-38	24-28	3	30-34	12-17	A-2-6, A-7-6, A-4	LIGHT BROWN CLAYEY FINE SAND TO SANDY CLAY TO SANDY SILT	0	-	-	-	-
4	8	5-55	8	11-538	5	100	87-91	59-73	31-47	17-96	0	-	-	A-8	DARK BROWN MUCKY FINE SAND TO ORGANIC CLAY	0	-	-	-	-
5	0	-	0	-	0	-	-	-	-	-	0	-	-	A-7-6	LIGHT BROWN 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. STRATA 1 AND 2 SHALL BE TREATED AS SELECT (S) MATERIAL IN ACCORDANCE WITH FDOT INDEX NO. 505.
5. STRATUM 3 SHALL BE TREATED AS PLASTIC (P) MATERIAL IN ACCORDANCE WITH FDOT INDEX NO. 505.
6. STRATUM 4 SHALL BE TREATED AS MUCK (M) IN ACCORDANCE WITH FDOT INDEX NO. 505.
7. STRATUM 5 SHALL BE TREATED AS HIGH PLASTIC (H) MATERIAL IN ACCORDANCE WITH FDOT INDEX NO. 505.
8. STRATUM 2 MAY RETAIN EXCESS MOISTURE AND MAY BE DIFFICULT TO DRY AND COMPACT.

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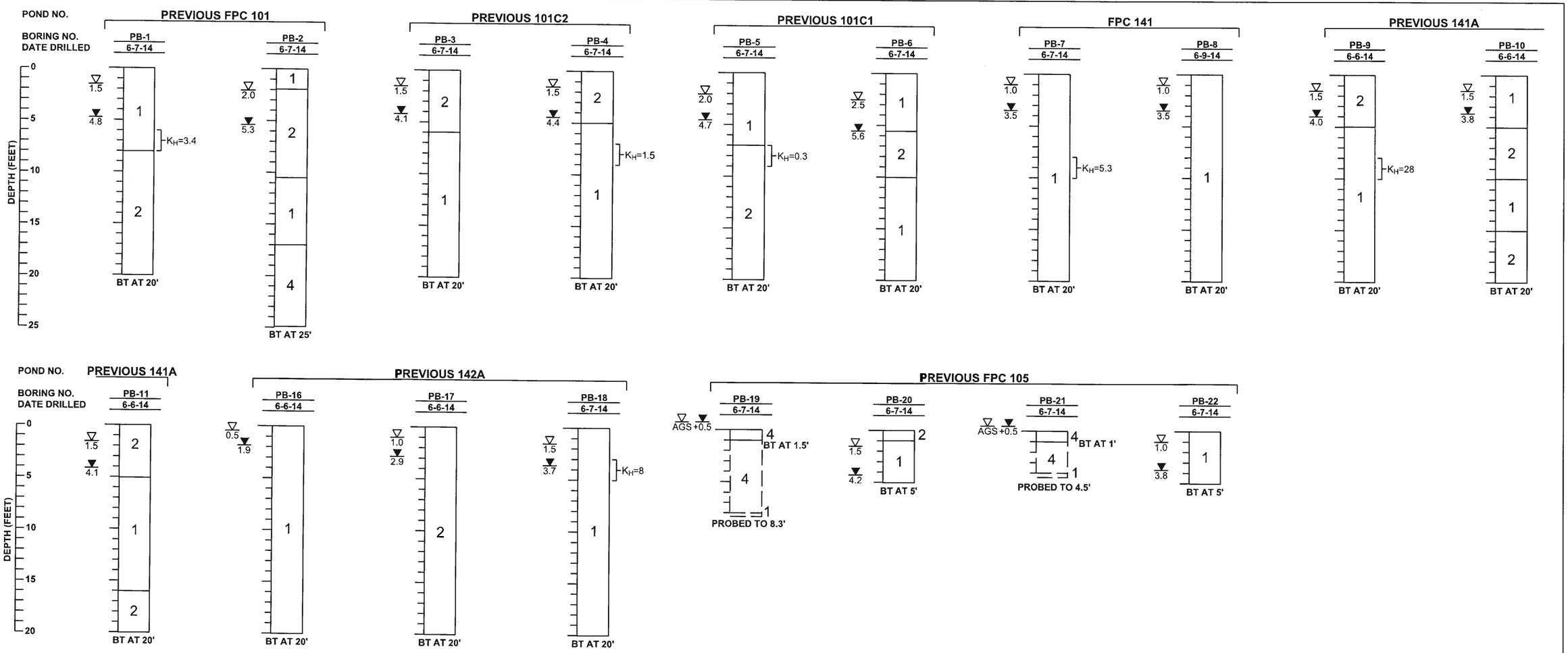
FIGURE 3 - POND SOIL SURVEY



LEGEND

- ▽ 1.5 — ESTIMATED SEASONAL HIGH GROUNDWATER DEPTH (FT.)
- AGS ▽ — ESTIMATED SEASONAL HIGH GROUNDWATER LEVEL ABOVE GROUND SURFACE
- ▼ 3.5 — ENCOUNTERED GROUNDWATER DEPTH (FT.) 24 HRS. AFTER DRILLING
- 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, A-7-6, A-4	LIGHT BROWN CLAYEY FINE SAND TO SANDY CLAY TO SANDY SILT
4	A-8	DARK BROWN MUCKY FINE SAND TO ORGANIC CLAY
5	A-7-6	LIGHT BROWN SANDY CLAY

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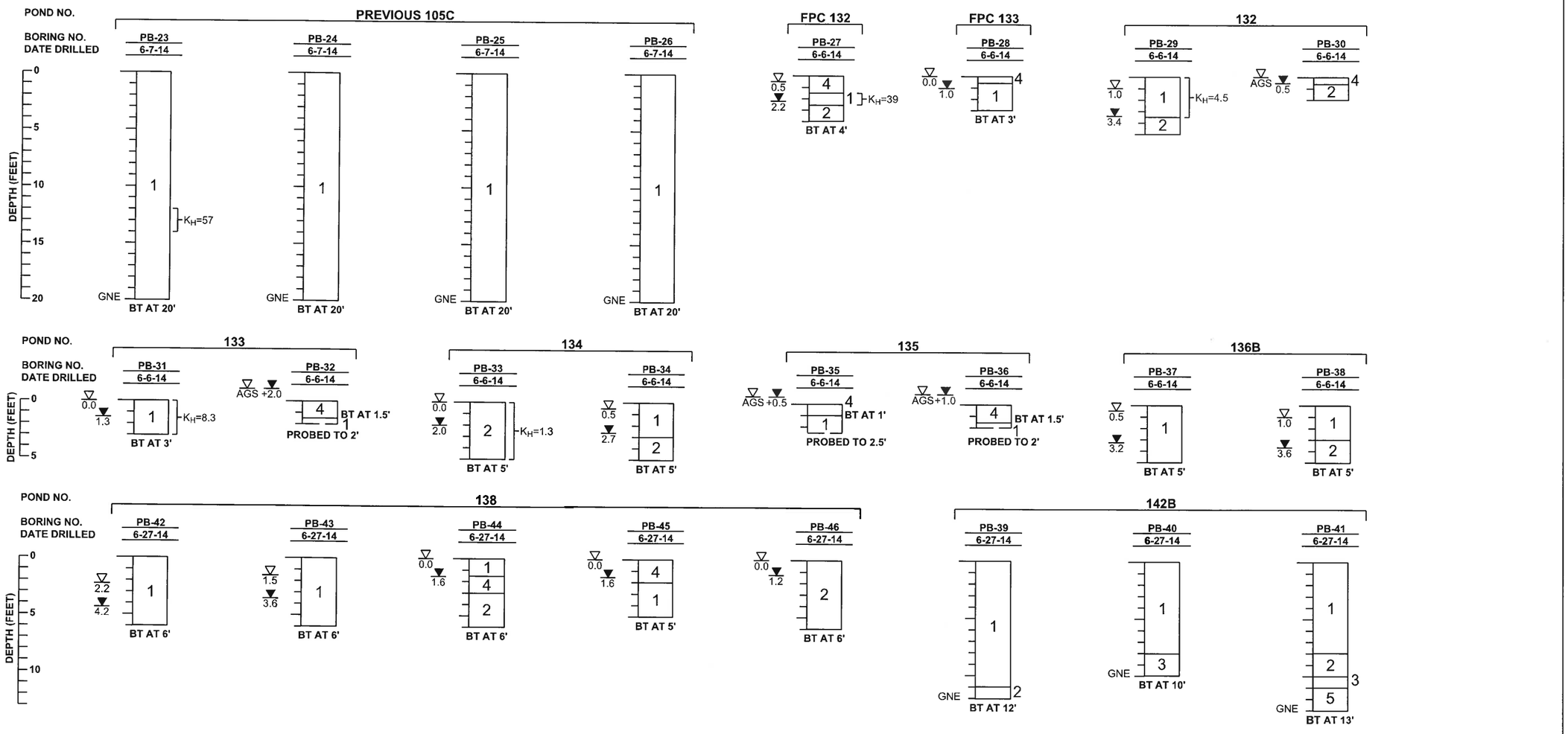
FIGURE 4 - AUGER BORING RESULTS FOR PONDS



LEGEND

- AGS ▽ ESTIMATED SEASONAL HIGH GROUNDWATER LEVEL ABOVE GROUND SURFACE
- 1.5 ▽ ESTIMATED SEASONAL HIGH GROUNDWATER DEPTH (FT.)
- +0.5 ▼ ENCOUNTERED GROUNDWATER DEPTH (FT.) ABOVE GROUND SURFACE
- 3.5 ▼ ENCOUNTERED GROUNDWATER DEPTH (FT.) 24 HRS. AFTER DRILLING
- 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, A-7-6, A-4	LIGHT BROWN CLAYEY FINE SAND TO SANDY CLAY TO SANDY SILT
4	A-8	DARK BROWN MUCKY FINE SAND TO ORGANIC CLAY
5	A-7-6	LIGHT BROWN SANDY CLAY

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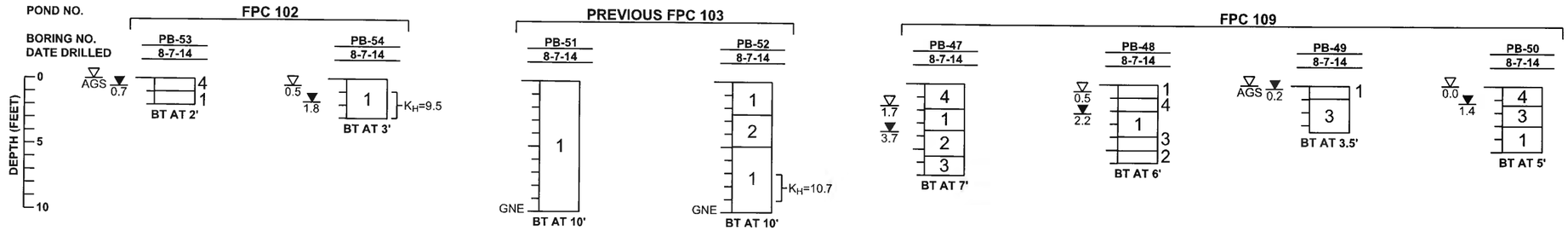
FIGURE 5 - AUGER BORING RESULTS FOR PONDS



LEGEND

- AGS ▽ ESTIMATED SEASONAL HIGH GROUNDWATER LEVEL ABOVE GROUND SURFACE
- 1.5 ▽ ESTIMATED SEASONAL HIGH GROUNDWATER DEPTH (FT.)
- +0.5 ▼ ENCOUNTERED GROUNDWATER DEPTH (FT.) ABOVE GROUND SURFACE
- 3.5 ▼ ENCOUNTERED GROUNDWATER DEPTH (FT.) 24 HRS. AFTER DRILLING
- 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, A-7-6, A-4	LIGHT BROWN CLAYEY FINE SAND TO SANDY CLAY TO SANDY SILT
4	A-8	DARK BROWN MUCKY FINE SAND TO ORGANIC CLAY
5	A-7-6	LIGHT BROWN SANDY CLAY

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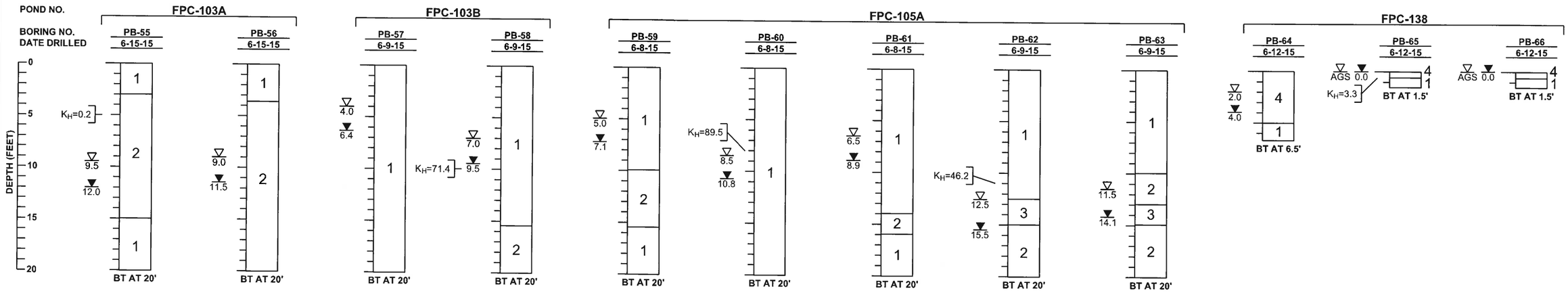
CHRISTOPHER P. MEYER PE NO. 49328

FIGURE 6 - AUGER BORING RESULTS FOR PONDS



LEGEND

- ▽ AGS — SEASONAL HIGH GROUNDWATER LEVEL AT OR ABOVE GROUND SURFACE
- ▽ 9.5 — ESTIMATED SEASONAL HIGH GROUNDWATER DEPTH (FT.)
- ▼ 12.0 — ENCOUNTERED GROUNDWATER DEPTH (FT.) AT TIME OF DRILLING BORING
- GNE — GROUNDWATER NOT ENCOUNTERED
- 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

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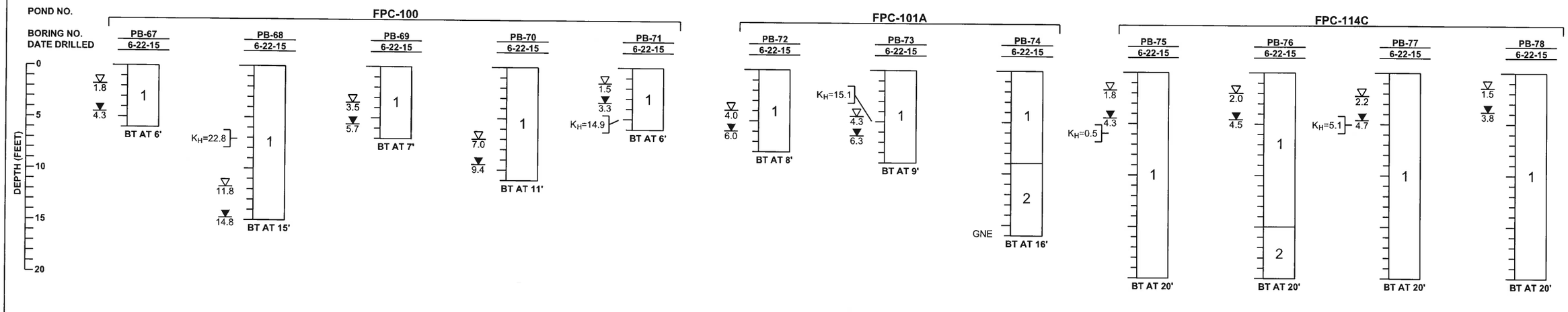
CHRISTOPHER P. MEYER PE NO. 49328

FIGURE 7 - AUGER BORING RESULTS FOR STORMWATER PONDS



LEGEND

- ▽ AGS — SEASONAL HIGH GROUNDWATER LEVEL AT OR ABOVE GROUND SURFACE
- ▽ 1.8 — ESTIMATED SEASONAL HIGH GROUNDWATER DEPTH (FT.)
- ▼ 2.5 — ENCOUNTERED GROUNDWATER DEPTH (FT.) AT TIME OF DRILLING BORING
- GNE — GROUNDWATER NOT ENCOUNTERED
- BT — BORING TERMINATED AT DEPTH INDICATED
- K_H= — HORIZONTAL PERMEABILITY RATE (FT./DAY)

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

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.

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FIGURE 8 - AUGER BORING RESULTS FOR STORMWATER PONDS

Table 5
Summary of Laboratory Test Results
SR 400 (I-4) PD&E Study – Segment 1
West of CR 532 to West of SR 528
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 100	1	PB-68	5 - 10	100	83	28	5	1	---	---	---	---	A-3
FPC 100	1	PB-71	3 - 6	100	78	32	8	3	---	---	---	---	A-3
Previous FPC 101	1	PB-1	6 - 8	100	81	61	22	4	---	---	---	---	A-3
FPC 101A	1	PB-73	5 - 9	100	71	44	11	3	---	---	---	---	A-3
Previous 101C2	1	PB-4	5 - 17	100	77	45	16	5	---	---	---	---	A-3
Previous 101C1	1	PB-5	5 - 10	100	78	46	15	5	---	---	---	---	A-3
Previous 101C1	1	PB-6	1.5 - 5	100	77	49	17	6	---	---	---	---	A-3
FPC 103A	1	PB-56	0 - 3.5	100	68	44	13	3	---	---	---	---	A-3
FPC 103B	1	PB-57	5 - 10	100	88	44	7	2	---	---	---	---	A-3
FPC 103B	1	PB-58	5 - 10	100	69	51	16	3	---	---	---	---	A-3
FPC 105A	1	PB-59	13.5 - 15.5	100	85	40	11	8	---	---	---	---	A-3
FPC 105A	1	PB-60	5 - 10	100	88	48	9	2	---	---	---	---	A-3
FPC 105A	1	PB-61	0 - 5	100	86	37	8	3	---	---	---	---	A-3
FPC 105A	1	PB-62	10 - 12	100	80	51	10	3	---	---	---	---	A-3
FPC 114C	1	PB-75	5 - 9	100	73	42	16	5	---	---	---	---	A-3
FPC 114C	1	PB-77	5 - 10	100	78	49	18	8	---	---	---	---	A-3
FPC 138	1	PB-65	0.5 - 1.5	100	83	41	15	7	---	---	---	---	A-3
FPC 138	1	PB-66	0.5 - 1.5	---	---	---	---	7	---	---	---	---	A-3
FPC 141	1	PB-7	5 - 10	100	83	25	8	5	---	---	---	---	A-3
FPC 141	1	PB-8	0 - 5	100	89	47	9	2	---	---	---	---	A-3
Previous 141A	1	PB-9	5 - 10	100	70	40	11	3	---	---	---	---	A-3
Previous 141A	1	PB-10	0 - 4	100	80	46	10	4	---	---	---	---	A-3
Previous 141A	1	PB-11	5 - 10	100	77	52	15	4	---	---	---	---	A-3
Previous 142A	1	PB-16	0 - 5	100	84	55	12	3	---	---	---	---	A-3
Previous 142A	1	PB-18	0 - 5	100	92	57	14	7	---	---	---	---	A-3
Previous FPC 105	1	PB-20	1 - 3	100	82	33	5	2	---	---	---	---	A-3
Previous FPC 105	1	PB-22	3 - 5	100	86	44	7	2	---	---	---	---	A-3
FPC 133	1	PB-28	0.5 - 3	100	87	59	33	8	---	---	---	---	A-3

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		
Previous 105C	1	PB-23	10 - 15	100	88	49	9	4	---	---	---	---	A-3
Previous 105C	1	PB-24	0 - 5	100	83	36	7	3	---	---	---	---	A-3
Previous 105C	1	PB-25	15 - 20	100	83	28	6	3	---	---	---	---	A-3
Previous 105C	1	PB-26	5 - 10	100	87	32	5	2	---	---	---	---	A-3
FPC 132	1	PB-27	1.5 - 2.5	100	88	62	36	9	---	---	---	---	A-3
132	1	PB-29	0 - 3.5	100	83	52	29	8	---	---	---	---	A-3
133	1	PB-31	0 - 3	100	85	58	35	9	---	---	---	---	A-3
Previous FPC 103	1	PB-51	0 - 3	100	75	43	10	3	---	---	---	---	A-3
Previous FPC 103	1	PB-52	5 - 10	100	74	47	11	8	---	---	---	---	A-3
Previous FPC 102	1	PB-54	0 - 3	100	81	51	18	5	---	---	---	---	A-3
Previous FPC 101	2	PB-2	2 - 5	100	89	60	27	14	---	---	---	---	A-2-4
Previous 101C2	2	PB-3	0 - 5	100	81	60	25	11	---	---	---	---	A-2-4
FPC 103A	2	PB-55	3 - 6	100	52	40	27	20	---	---	---	---	A-2-4
141	2	PB-17	6 - 10	100	92	57	23	14	---	---	---	---	A-2-4
132	2	PB-30	0.5 - 2	100	87	61	37	11	---	---	---	---	A-2-4
134	2	PB-34	3 - 5	100	83	56	35	14	---	---	---	---	A-2-4
FPC 132	2	PB-27	2.5 - 4	---	---	---	---	29	11	20	9	---	A-2-4
134	2	PB-33	0 - 4	100	88	60	36	13	---	---	---	---	A-2-4
FPC 109	2	PB-47	3.5 - 5.5	100	89	60	32	21	18	---	---	3	A-2-4
Previous FPC-103	2	PB-52	2.5 - 5	97	53	36	20	17	12	26	8	---	A-2-4
Previous FPC 103	3	PB-49	1 - 3.5	100	91	65	38	28	24	34	17	---	A-2-6
FPC 105A	3	PB-62	12 - 15	100	88	68	32	24	17	30	12	---	A-2-6
FPC 105A	3	PB-63	13 - 15	100	87	67	31	24	17	30	12	---	A-2-6
Previous FPC 101	4	PB-2	17 - 20	---	---	---	---	22	23	---	---	5	A-8
FPC 105	4	PB-19	0.5 - 1.5	---	---	---	---	96	538	---	---	50	A-8
133	4	PB-32	0 - 0.5	---	---	---	---	---	422	---	---	55	A-8
135	4	PB-36	0 - 2.5	---	---	---	---	---	101	---	---	24	A-8
FPC 132	4	PB-27	0 - 1.5	---	---	---	---	---	52	---	---	14	A-8
FPC 109	4	PB-48	1 - 2	100	91	59	31	20	11	---	---	5	A-8
FPC 138	4	PB-64	0 - 3.5	100	87	67	40	17	11	---	---	7	A-8
FPC 138	4	PB-64	3.5 - 5	100	91	73	47	32	76	---	---	22	A-8

Table 6
Summary of Groundwater Tables and Permeability Results
SR 400 (I-4) PD&E Study – Segment 1
West of CR 532 to West of SR 528
FPID No. 432100-1-22-01
GEC Project No. 3492G

Pond 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)	Permeability Test Results		
							Horizontal Permeability Rate (ft/day)	Test Depth (ft)	Soil Type
FPC 100	PB-67	06/22/15	4.3	1.8	3	> 6.0	---	---	---
	PB-68	06/22/15	14.8	11.8	3	> 6.0	22.8****	5 - 10	A-3
	PB-69	06/22/15	5.7	3.5	3	> 6.0	---	---	---
	PB-70	06/22/15	9.4	7.0	3	> 6.0	---	---	---
	PB-71	06/22/15	3.3	1.5	3	> 6.0	14.9****	3 - 6	A-3
Previous FPC 101	PB-1	06/08/14	4.8	1.5	32	+2.0 - 0.0	3.4	6 - 8	A-3
	PB-2	06/08/14	5.3	2.0	32	+2.0 - 0.0	---	---	---
FPC 101A	PB-72	06/22/15	6.0	4.0	15	3.5 - 6.0	---	---	---
	PB-73	06/22/15	6.3	4.3	15	3.5 - 6.0	15.1****	3 - 6	A-3
	PB-74	06/22/15	GNE @ 16	---	3	> 6.0	---	---	---
Previous 101C2	PB-3	06/08/14	4.1	1.5	16	0.5 - 1.5	---	---	---
	PB-4	06/08/14	4.4	1.5	37	+2.0 - 0.0	1.5	7 - 9	A-3
Previous 101C1	PB-5	06/08/14	4.7	2.0	16	0.5 - 1.5	0.3	7 - 9	A-2-4
	PB-6	06/08/14	5.6	2.5	37	+2.0 - 0.0	---	---	---
FPC 102	PB-53	08/08/14	0.7	AGS	37	+2.0 - 0.0	---	---	---
	PB-54	08/08/14	1.8	6.5	37	+2.0 - 0.0	9.5****	1 - 3	A-3
Previous FPC 103	PB-51	08/08/14	GNE @10	---	8	> 6.0	---	---	---
	PB-52	08/08/14	GNE @ 10	---	8	> 6.0	10.7****	7 - 9	A-3
FPC 103A	PB-55	06/15/15	12.0	9.5	8	> 6.0	0.2	4 - 6	A-2-4
	PB-56	06/15/15	11.5	9.0	8	> 6.0	---	---	---
FPC 103B	PB-57	06/09/15	6.4	4.0	34	2.0 - 3.5	---	---	---
	PB-58	06/09/15	9.5	7.0	8	> 6.0	71.4	8 - 10	A-3
FPC 105A	PB-59	06/08/15	7.1	5.0	8	> 6.0	---	---	---
	PB-60	06/08/15	10.8	8.5	7	> 6.0	89.5	7 - 9	A-3
	PB-61	06/08/15	8.9	6.5	8	> 6.0	---	---	---
	PB-62	06/09/15	15.5	12.5	8	> 6.0	46.2	10 - 12	A-3
	PB-63	06/09/15	14.1	11.5	8	> 6.0	---	---	---
FPC 109	PB-47	08/08/14	3.7	1.7	22	0.5 - 1.5	---	---	---
	PB-48	08/08/14	2.2	0.5	38	0.0 - 1.0	---	---	---
	PB-49	08/08/14	0.2	AGS	38	0.0 - 1.0	---	---	---
	PB-50	08/08/14	1.4	0.0	38	0.0 - 1.0	---	---	---

Pond 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)	Permeability Test Results		
							Horizontal Permeability Rate (ft/day)	Test Depth (ft)	Soil Type
FPC 114C	PB-75	06/22/15	4.3	1.8	22	0.5 - 1.5	0.5	5 - 7	A-2-4
	PB-76	06/22/15	4.5	2.0	22	0.5 - 1.5	---	---	---
	PB-77	06/22/15	4.7	2.2	22	0.5 - 1.5	5.1	4 - 6	A-3
	PB-78	06/22/15	3.8	1.5	22	0.5 - 1.5	---	---	---
FPC 138	PB-64	06/12/15	4.0	2.0	44	1.0 - 3.5	---	---	---
	PB-65	06/12/15	0.0	AGS	44	1.0 - 3.5	3.3****	0.5 - 1.5	A-3
	PB-66	06/12/15	0.0	AGS	44	1.0 - 3.5	---	---	---
FPC 141	PB-7	06/08/14	3.5	1.0	3	+2.0 - 0.0	5.3	8 - 10	A-3
	PB-8	06/10/14	3.5	1.0	3	+2.0 - 0.0	---	---	---
Previous 141A	PB-9	06/07/14	4.0	1.5	43	1.5 - 3.5	28.0	8 - 10	A-3
	PB-10	06/07/14	3.8	1.5	34	2.0 - 3.5	---	---	---
	PB-11	06/07/14	4.1	1.5	34	2.0 - 3.5	---	---	---
Previous 142A	PB-16	06/07/14	1.9	0.5	3	+2.0 - 0.0	---	---	---
	PB-17	06/07/14	2.9	1.0	3	+2.0 - 0.0	---	---	---
	PB-18	06/07/14	3.7	1.5	3	+2.0 - 0.0	8.0	3 - 5	A-3
Previous FPC 105	PB-19	06/07/14	+0.5	AGS	15	+2.0 - 0.0	---	---	---
	PB-20	06/07/14	4.2	1.5	15	+2.0 - 0.0	---	---	---
	PB-21	06/07/14	+0.5	AGS	15	+2.0 - 0.0	---	---	---
	PB-22	06/07/14	3.8	1.0	15	+2.0 - 0.0	---	---	---
Previous 105C	PB-23	06/08/14	GNE @ 20	---	7	> 6.0	57.0	12 - 14	A-3
	PB-24	06/08/14	GNE @ 20	---	7	> 6.0	---	---	---
	PB-25	06/08/14	GNE @ 20	---	7	> 6.0	---	---	---
	PB-26	06/08/14	GNE @ 20	---	7	> 6.0	---	---	---
FPC 132	PB-27	06/07/14	2.2	0.5	44	0.5 - 1.5	3.9****	1.5 - 2.5	A-3
FPC 133	PB-28	06/07/14	1.0	0.0	44	0.5 - 1.5	---	---	---
132	PB-29	06/07/14	3.4	1.0	44	0.5 - 1.5	4.5****	0 - 3.5	A-3
	PB-30	06/07/14	0.5	AGS	3	+2.0 - 0.0	---	---	---
133	PB-31	06/07/14	1.3	0.0	44	0.5 - 1.5	8.3****	0 - 3	A-3
	PB-32	06/07/14	+2.0	AGS	3	+2.0 - 0.0	---	---	---
134	PB-33	06/07/14	2.0	0.0	44	0.5 - 1.5	1.3****	0 - 4	A-2-4
	PB-34	06/07/14	2.7	0.5	44	0.5 - 1.5	---	---	---
135	PB-35	06/07/14	+0.5	AGS	3	+2.0 - 0.0	---	---	---
	PB-36	06/07/14	+1.0	AGS	44	0.5 - 1.5	---	---	---
136B	PB-37	06/07/14	3.2	0.5	44	0.5 - 1.5	---	---	---
	PB-38	06/07/14	3.6	1.0	44	0.5 - 1.5	---	---	---
142B	PB-39	06/28/14	GNE @ 12’	---	43	1.5 - 3.5	---	---	---
	PB-40	06/28/14	GNE @ 10’	---	43	1.5 - 3.5	---	---	---
	PB-41	06/28/14	GNE @ 13’	---	43	1.5 - 3.5	---	---	---

Pond 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)	Permeability Test Results		
							Horizontal Permeability Rate (ft/day)	Test Depth (ft)	Soil Type
138	PB-42	06/28/14	4.2	2.2	20	0.5 - 1.0	---	---	---
	PB-43	06/28/14	3.6	1.5	20	0.5 - 1.0	---	---	---
	PB-44	06/28/14	1.6	0.0	3	+2.0 - 0.0	---	---	---
	PB-45	06/28/14	1.6	0.0	3	+2.0 - 0.0	---	---	---
	PB-46	06/28/14	1.2	0.0	44	0.5 - 1.5	---	---	---

* +0.5: Groundwater was encountered approximately 1.5 feet above the ground surface.

** GNE @ 20 denotes that groundwater was not encountered to the boring termination depth indicated.

*** AGS denotes the groundwater level is estimated to be above the existing ground surface. The height to which water may rise above the ground surface should be determined by the drainage engineer.

**** Constant head laboratory permeability test