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 4: State Road 400 (SR 400)/Interstate 4 (I-4) from East of SR 15-600/US 17-92 (Seminole/Volusia County Line) to ½ Mile East of SR 472

Volusia County (79110), Florida

December 15, 2015

Geotechnical and Environmental Consultants, Inc.
919 Lake Baldwin Lane
Orlando, FL 32814

HNTB Corporation
610 Crescent Executive Court
Suite 400
Lake Mary, FL 32746

4 EXPRESS

April 25, 2014
Revised January 13, 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) PD&E STUDY FROM US 27 TO KIRKMAN ROAD AND FROM E OF SR 434 TO SR 472
SEGMENT 4
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 minor updates to pond shapes. No new ponds or new borings are included. 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

V. Eugene Williford IV, E.I. 12/15/15
Geotechnical Engineer

CHRISTOPHER PAUL MEYER LICENSE No. 49328 STATE OF FLORIDA PROFESSIONAL ENGINEER

Christopher P. Meyer, P.E. 12/15/15
Geotechnical Services Manager
Florida License No. 49328

VEW/CPM/dbj

TABLE OF CONTENTS

APPENDIX

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 4 of the project is located in southwest Volusia County, Florida and is approximately 14 miles in length. The approximate Segment 4 project limits begin east of US 17/92 and extend to east of SR 44. 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 two long treatment swales and nineteen requested alternative stormwater pond locations within Segment 4. We understand there are additional stormwater ponds in Segment 4; however, the remaining ponds were either existing ponds or already had sufficient groundwater data for the PD&E evaluation.

The Segment 4 project alignment is bordered by mostly residential construction along with spare commercial buildings. However, there are sections of undeveloped land consisting of pine flatwoods and palmetto bushes. It also passes across a low-lying wetland area at the extreme northern portion of Lake Monroe. 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 1** and **2**.

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 and swale locations for Segment 4 are depicted on the USGS Sanford and Orange City, Florida Quadrangle maps shown on **Figure 1**. Review of the USGS Sanford and Orange City, Florida Quadrangle maps indicates that the natural ground surface elevation for the swales range from +0 to +5 feet NGVD while the ground surface for the ponds Segment 4 ranges from approximately +20 at the south end of the segment to +75 feet NGVD at the north end of the segment. According to the quadrangle maps, the 2 swales also pass through a low-lying wetland feature at the north edge of Lake Monroe.

2.2 NRCS Soil Survey Review

The Natural Resources Conservation Service (NRCS) (formerly SCS) Soil Survey of Volusia 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 **Figure 2** in the **Appendix**. The NRCS soil units at the project site are summarized in **Table 1** below:

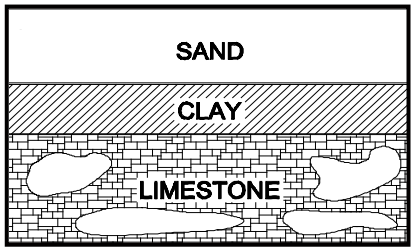
Table 1
Volusia County NRCS Soil Survey Review

Map Symbol	Soil Name	Depth (in)	Soil Description	AASHTO Soil Classification	Seasonal High Groundwater Depth (ft)	Hydrologic Group
4	Astatula fine sand, 0 to 8 percent slopes	0 - 95	Fine sand	A-3	> 6.0	A
5	Astatula fine sand, 8 to 17 percent slopes	0 - 80	Fine sand	A-3	> 6.0	A
10	Bluff sandy clay loam	0 - 14 14 - 68 68 - 99	Sandy clay loam Sandy clay loam, sandy clay Clay, sandy clay	A-6, A-7 A-7, A-6 A-7, A-6	0.0 - 0.5	D
13	Cassia fine sand	0 - 28 28 - 36 36 - 80	Fine sand Sand, fine sand, loamy sand Sand, fine sand	A-3 A-2-4, A-3 A-3	1.5 - 3.5	C
29	Immokalee sand	0 - 34 34 - 43 43 - 85	Fine sand, sand Fine sand, sand Fine sand, sand	A-3 A-2-4, A-3 A-3	0.0 - 0.5	B/D
37	Orsino fine sand, 0 to 5 percent slopes	0 - 30 30 - 80	Fine sand Sand, fine sand	A-3 A-3	3.5 - 5.0	A
42	Paola fine sand, 0 to 8 percent slopes	0 - 26 26 - 80	Fine sand, sand Sand, fine sand	A-3 A-3	> 6.0	A
50	Pomona fine sand, depressional	0 - 53 53 - 61 61 - 70	Sand, fine sand Fine sandy loam, sandy clay loam Sand	A-2-4, A-3 A-2, A-4, A-6 A-4, A-6, A-2	+2.0 - 0.0	B/D
54	Quartzipsamments, gently sloping	0 - 80	Fine sand	A-3	> 6.0	A
60	Smyrna fine sand	0 - 17 17 - 27 27 - 80	Fine sand Sand, fine sand, loamy fine sand Sand, fine sand	A-2-4, A-3 A-2-4, A-3 A-3	0.0 - 1.0	A/D
63	Tavares fine sand, 0 to 5 percent slopes	0 - 80	Fine sand	A-3	3.5 - 6.0	A
73	Wabasso fine sand	0 - 24 24 - 35 35 - 39 39 - 80	Fine sand, sand Fine sand, loamy fine sand, sand Fine sand, sand Sandy clay loam, fine sandy loam, sandy loam	A-3 A-2-4, A-3 A-3 A-2-4, A-2-6	0.0 - 1.0	B/D

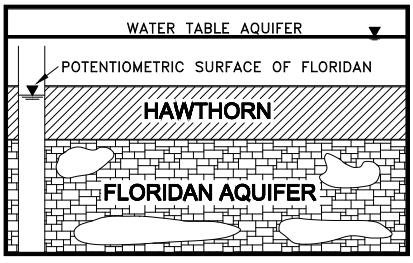
Based on review of the NRCS soil survey map, the soils within the area of the proposed ponds in Segment 4 are characterized as sands with variable silt content (A-3, A-2-4, A-2-6). However, the soils within the proposed treatment swales are characterized as clayey soils (A-6, A-7). For the majority of the soils within the pond and treatment swale footprints the soil survey lists seasonal high water table levels at depths ranging from 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

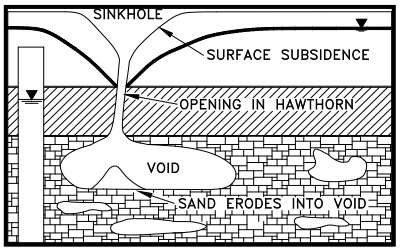


Central Florida geologic conditions can generally be described in terms of three basic sedimentary layers. The upper layer is primarily comprised of sands containing varying amounts of silt and clay. These sands are underlain by a layer of clay, clayey sand, phosphate and limestone which is locally referred 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 high 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 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 +20 to +35 feet NGVD. Ground surface elevations vary approximately between +0 and +75 feet NGVD; therefore, artesian flow conditions may exist, especially in lower-lying areas and 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 auger borings at approximate 2,000-foot intervals within the treatment swales and a minimum of 2 auger borings at each of the proposed pond locations requested by HNTB. GEC also performed laboratory and field permeability tests at the proposed treatment swale and pond locations.

The approximate locations of the borings performed for this study are shown on **Figures 3** through **10** 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 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.

3.2 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.

3.3 Field Permeability Tests

Constant and 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 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)	39
Percent Fines (FM 1-T 88)	3
Organic Content (FM 1-T 267)	3
Natural Moisture Content (FM 1-T 265)	9
Atterberg limits (FM 1 -T 89/90)	6
Laboratory Soil Permeability (FM 1-T 215)	18

The results of our testing are summarized on the Pond and Swale Soil Survey Sheet (**Figure 11**) and the summary of Laboratory Testing Results (**Table 5**) in the **Appendix.** Soil samples from multiple pond and swale borings were submitted to constant head laboratory soil permeability tests. 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** sheets (**Figures 12** through **14**). 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 and treatment swale 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 to sandy clay to sandy silt	A-2-6, A-7-6, A-4, A-6
4	Dark brown mucky fine sand to organic clay	A-8
5	Light brown sandy clay	A-7-6

The auger borings conducted in ponds typically encountered sand with varying amounts of silt content (Strata 1 and 2; A-3, A-2-4) to the boring termination depths of 1.5 to 20 feet below the existing ground surface. However, borings PB-1, PB-2 and PB-40 encountered a layer of clayey fine sand (Strata 3; A-2-6, A-6) from approximately 2 to 8 feet and 18 to 20 feet below the existing ground surface. Borings PB-21, PB-24 and PB-25 encountered mucky fine sand (Strata 4; A-8) at depths ranging from the ground surface to 2.5 feet below the existing ground surface.

The auger borings conducted in the treatment swales typically encountered a 0.5 to 1-foot thick layer of mucky fine sand to organic clay (A-8) underlain by clayey fine sand to sandy clay to sandy silt (Strata 3 and 5; A-2-6, A-7-6, A-4) to the boring termination depths of 2 to 4 feet below the existing ground surface. Several borings in swale 401-B (SB-2, 4 and 5) and one boring in swale 401-A (SB-7) encountered sands (A-3, A-2-4) below the surficial organic layer.

Please refer to the **Auger Boring Results** sheets (**Figures 12** through **14**) 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 swale boring locations generally ranged from 0.1 to 0.7 feet below the existing ground surface. However, groundwater was encountered approximately 1.5 feet above the natural ground surface in boring SB-9. Encountered groundwater depths at the pond boring locations generally ranged from 0.1 to 11.0 feet below the existing ground. Borings PB-11 and 12 (Pond 403) encountered 0.6 to 1.0 foot of standing water. Borings PB-17 to 20 and PB-29 to PB-49 (Ponds 410B, 412, 408B, 408-D1, B, B1, C and 415) did not encounter groundwater to the boring termination depths of 10 to 20 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 8.0 feet below the existing ground surface. Our encountered and estimated seasonal high groundwater levels are presented on the **Auger Boring Results** sheets (**Figures 12** through **14**) 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 swale borings typically encountered mucky sands, clayey sands and sandy clays (A-8, A-2-6, A-7-6) from ground surface to the termination depths of the hand auger borings (2 to 5 feet deep). The pond borings generally encountered fine sands with varying amounts of silt (A-3, A-2-4) to the boring termination depths (1.5 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 (A-8) encountered in the swale borings and the clayey fine sand to sandy clay (A-2-6, A-6) encountered in the swale borings and one pond boring (PB-2) are not suitable for use as roadway embankment. 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 at least one permeability test at each of the proposed pond locations and 2 permeability tests at each of the long swale locations. The following table summarizes the result of our 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)	Permeability Type	Soil Stratum No.
401-B	SB-2	0.5 - 2	0.6	A-3	6.4***	Constant Head	1
	SB-4	0.5 - 2.5	0.6	A-3	4.6***	Constant Head	1
401-A	SB-8	0 - 4	0.1	A-7-6	0.0***	Constant Head	5
	SB-10	1 - 4	0.6	A-2-6	0.1***	Constant Head	3
402B	PB-3	0 - 4	4.0	A-3	3.4***	Constant Head	1
	PB-4	0 - 1.5	0.4	A-3	8.7***	Constant Head	1
402C	PB-1	2 - 3.5	3.5	A-3	5.6***	Constant Head	1
	PB-2	8 - 9	3.7	A-2-4	1.2***	Constant Head	2

Pond/Swale No.	Boring No.	Depth (ft)	Encountered Water Table (ft)	Soil Type (AASHTO)	Horizontal Permeability, K (ft/day)	Permeability Type	Soil Stratum No.
402D	PB-6	1 - 4	3.1	A-3	9.2***	Constant Head	1
402E	PB-5	1 - 2	3.9	A-3	14.3***	Constant Head	1
402F	PB-24	3 -5	0.3	A-3	1.4	Constant Head	1
403	PB-7	0 - 1.5	0.2	A-3	8.8***	Constant Head	1
	PB-12	0 - 2.5	+1.0*	A-2-4	3.3***	Constant Head	2
406B	PB-14	6 - 10	7.5	A-3	12.5***	Constant Head	1
407C	PB-16	10 - 15	11.0	A-3	11.7***	Constant Head	1
408B	PB-29	10 - 12	GNE @ 20**	A-3	9.7	Falling Head	1
	PB-33	6 - 8	GNE @ 20**	A-3	3.8	Falling Head	1
408-D1	PB-34	10 - 12	GNE @ 20**	A-3	3.0	Falling Head	1
	PB-36	8 - 10	GNE @ 20**	A-3	4.6	Falling Head	1
409-B1	PB-9	3 - 4	6.8	A-3	7.2***	Constant Head	1
	PB-10	2 - 6	6.4	A-3	7.8***	Constant Head	1
410B	PB-17	5 - 10	GNE @ 15**	A-3	19.0***	Constant Head	1
412	PB-20	5 - 10	GNE @ 15**	A-3	12.8***	Constant Head	1
415	PB-48	8 - 10	GNE @ 20**	A-3	37.7	Falling Head	1
B	PB-39	10 - 12	GNE @ 20**	A-3	6.9	Falling Head	1
B1	PB-43	12 - 14	GNE @ 20**	A-3	34.5	Falling Head	1
C	PB-47	8 - 10	GNE @ 20**	A-3	26.8	Falling Head	1

* +1.0: Groundwater was encountered approximately 1.0 feet above the existing ground surface.

** GNE @ 15 denotes that groundwater was not encountered to the boring termination depth indicated.

*** Laboratory horizontal permeability test results.

Soil Stratum 1 (A-3) had measured permeabilities ranging from 1.4 to 37.7 feet per day, while Soil Stratum 2 (A-2-4) had measured permeabilities ranging from 1.2 to 3.3 feet per day. Soil Strata 3 and 5 (A-2-6 to A-7-6) had measured permeabilities ranging from 0 to 0.1 feet per day. Strata 3 and 5 should be treated as an aquitard in pond and swale design.

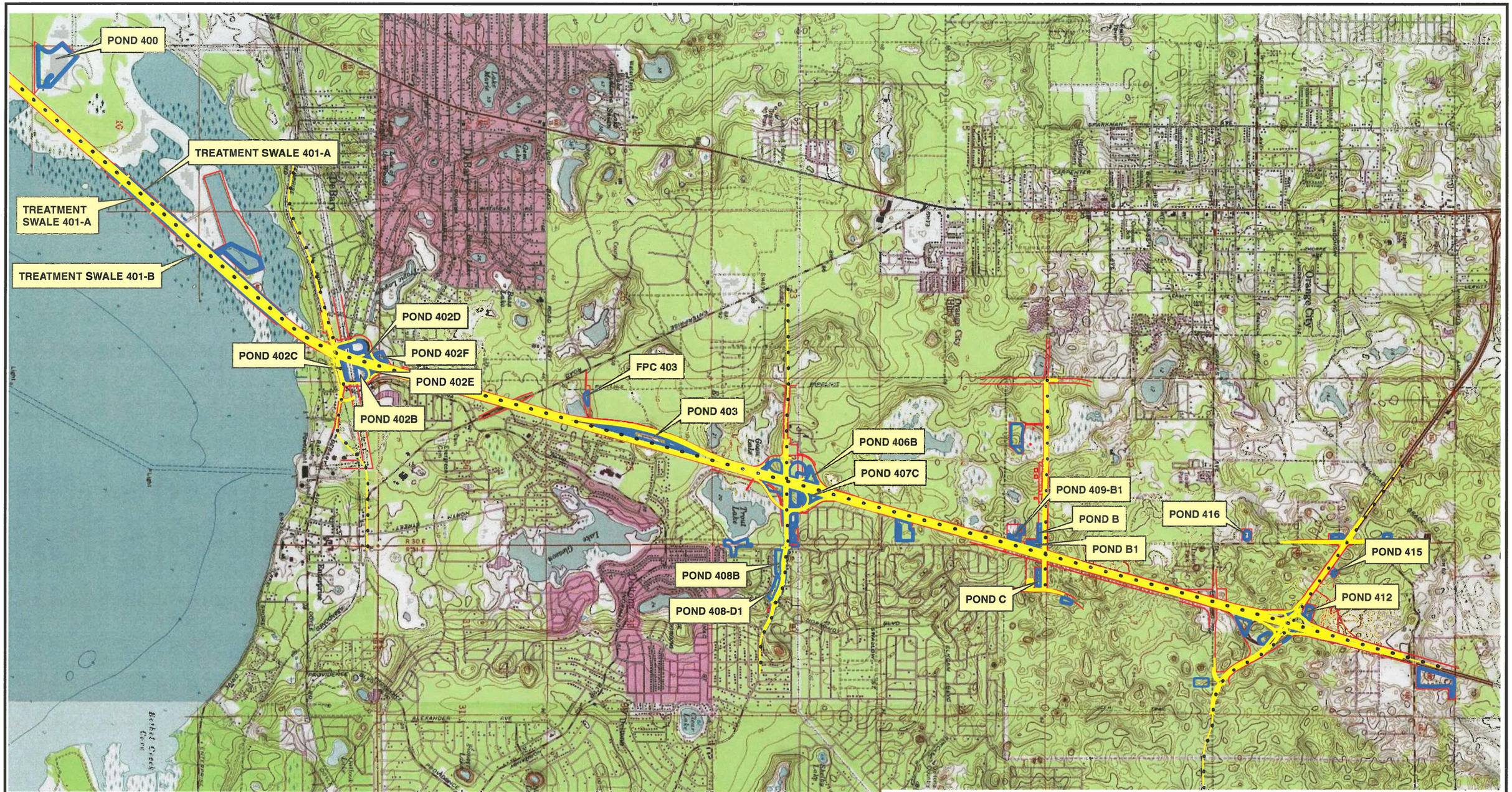
7.0 Use of This Report

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.



Prepared from:
USGS Sanford, FL Quadrangle Map
Sections: 2, 10, 11
Townships: 19 South
Range: 30 East

USGS Orange City, FL Quadrangle Map
Sections: 6, 13, 24, 25
Townships: 18 South
Range: 30 East

W S N E

0 1,500 3,000
Feet

Geotechnical and Environmental Consultants, Inc. (GEC)
919 Lake Baldwin Lane
Orlando, FL 32814
PH (407) 898-1818 FAX (407) 898-1837
Certificate of Authorization No. 00005882
CHRISTOPHER P. MEYER P.E. NO. 49328

J:\D106\3492G\12-14-15\3492Gquad.mxd 12/14/2015

FIGURE 1 - USGS QUADRANGLE MAP

NRCS Soil Survey of Volusia County, FL
Volusia County Map Unit Legend
4 - Astatula fine sand, 0 to 8 percent slopes
5 - Astatula fine sand, 8 to 17 percent slopes
10 - Bluff sandy clay loam
13 - Cassia fine sand
29 - Immokalee sand
37 - Orsino fine sand, 0 to 5 percent slopes
42 - Paola fine sand, 0 to 8 percent slopes
50 - Pomona fine sand, depressional
54 - Quartzipsamments, gently sloping
60 - Smyrna fine sand
63 - Tavares fine sand, 0 to 5 percent slopes
73 - Wabasso fine sand

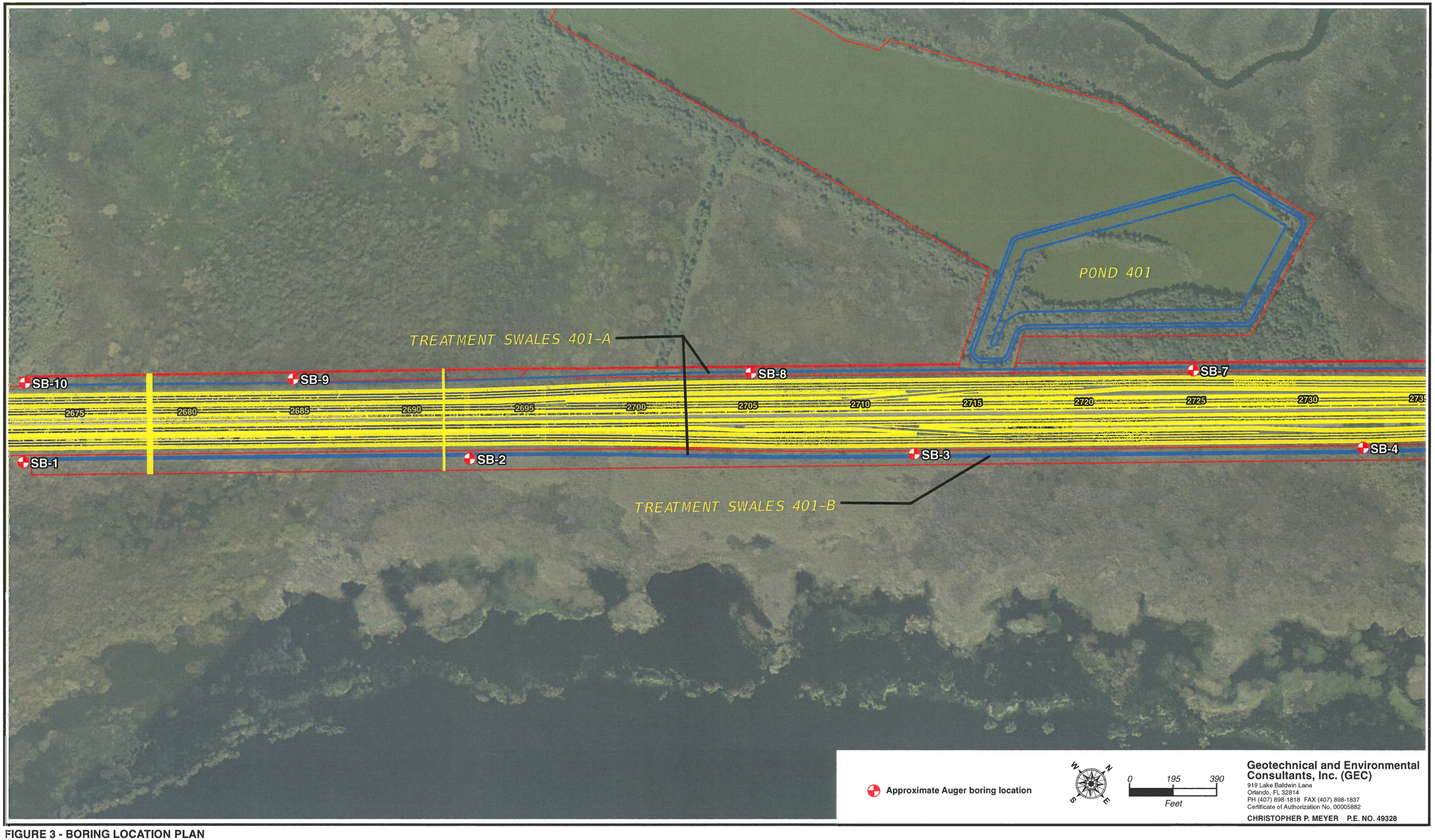
N W E S

0 1,500 3,000
Feet

Geotechnical and Environmental Consultants, Inc. (GEC)
919 Lake Baldwin Lane
Orlando, FL 32814
PH (407) 898-1818 FAX (407) 898-1837
Certificate of Authorization No. 00005882
CHRISTOPHER P. MEYER P.E. NO. 49328

J:\D106\3492G\12-14-15\3492Gsoils.mxd 12/14/2015

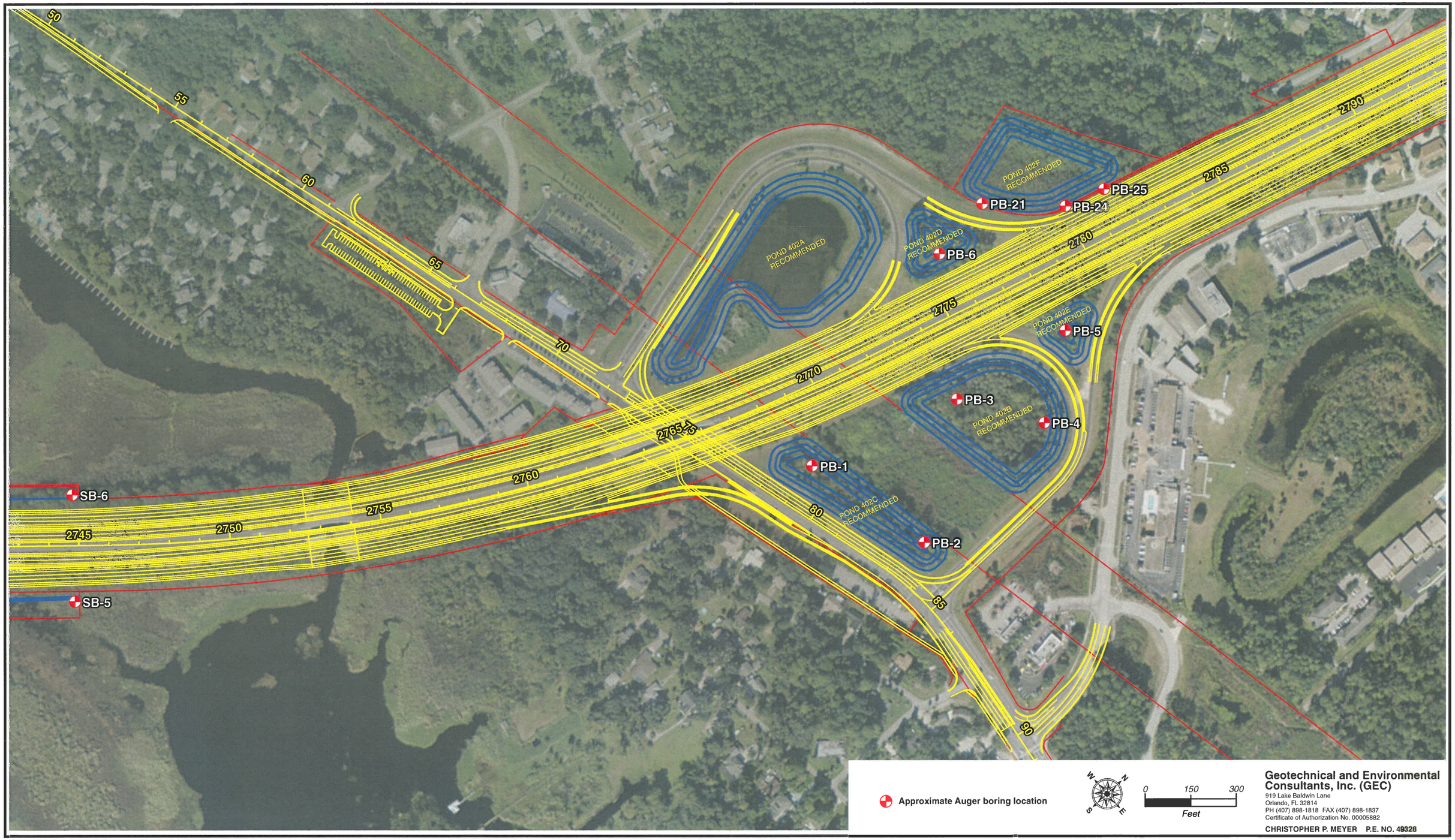
FIGURE 2 - NRCS SOIL SURVEY MAP



J:\D106\3492G\12-14-15\3492GA.mxd 12/14/2015

Geotechnical and Environmental Consultants, Inc. (GEC)
919 Lake Baldwin Lane
Orlando, FL 32814
PH (407) 898-1818 FAX (407) 898-1837
Certificate of Authorization No. 00005882
CHRISTOPHER P. MEYER P.E. NO. 49328

FIGURE 3 - BORING LOCATION PLAN

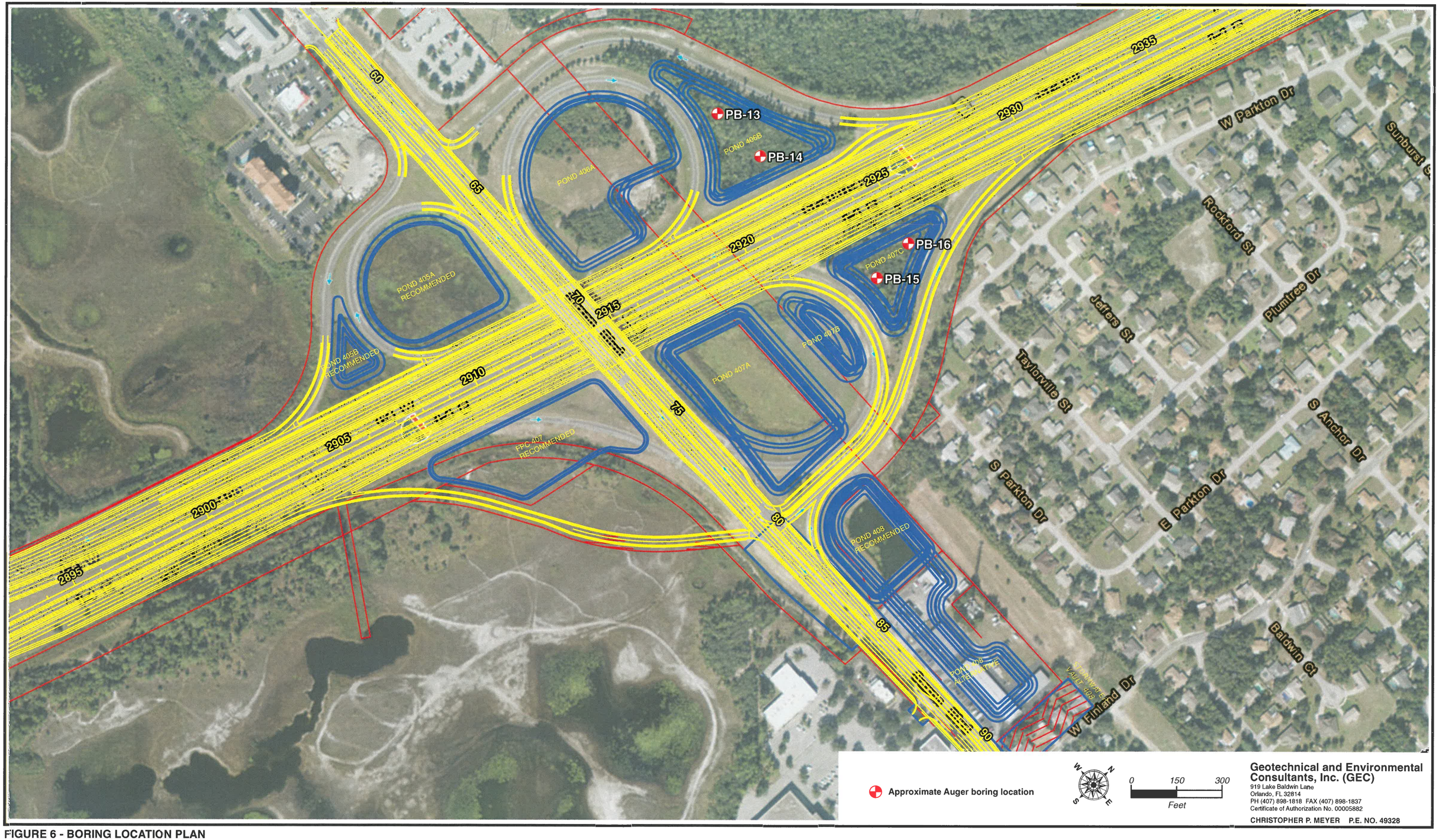


J:\D106\3492G\12-14-15\3492GB.mxd 12/15/2015

FIGURE 4 - BORING LOCATION PLAN

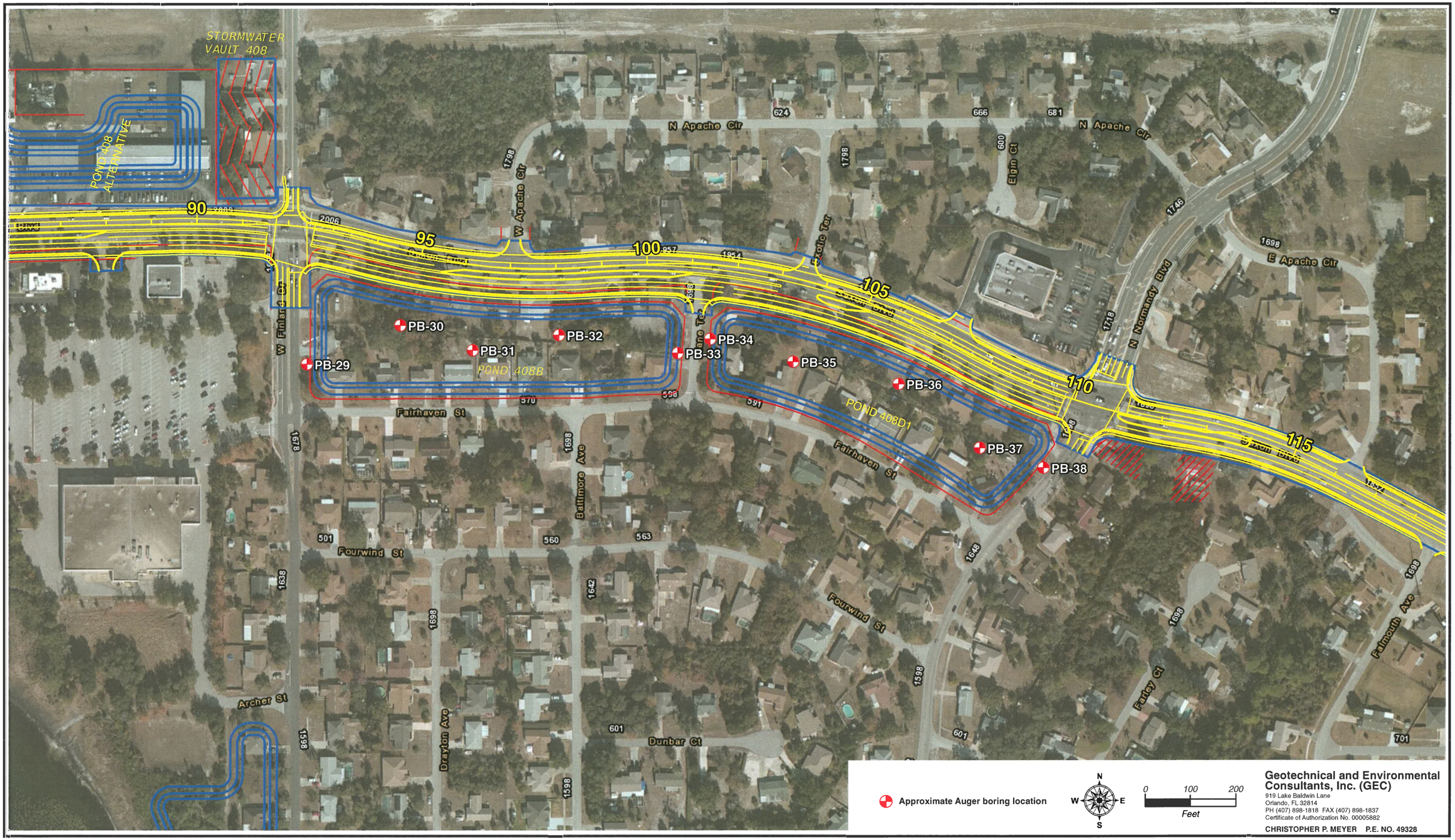
J:\D106\3492G\12-14-15\3492GC.mxd 12/15/2015

FIGURE 5 - BORING LOCATION PLAN



J:\D106\3492G\12-14-15\3492GD.mxd 12/15/2015

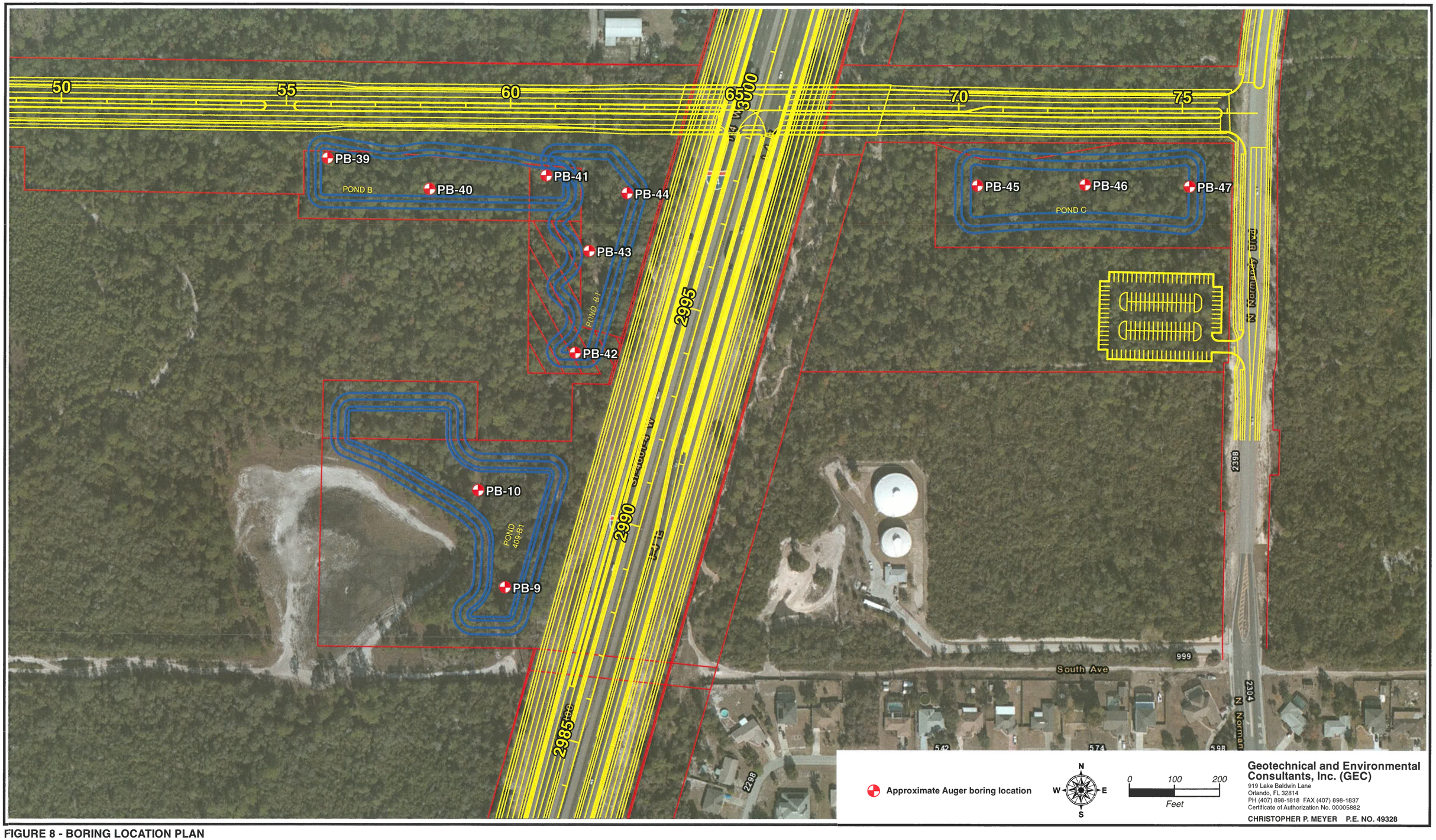
FIGURE 6 - BORING LOCATION PLAN



Geotechnical and Environmental Consultants, Inc. (GEC)
919 Lake Baldwin Lane
Orlando, FL 32814
PH (407) 898-1818 FAX (407) 898-1837
Certificate of Authorization No. 00005882
CHRISTOPHER P. MEYER P.E. NO. 49328

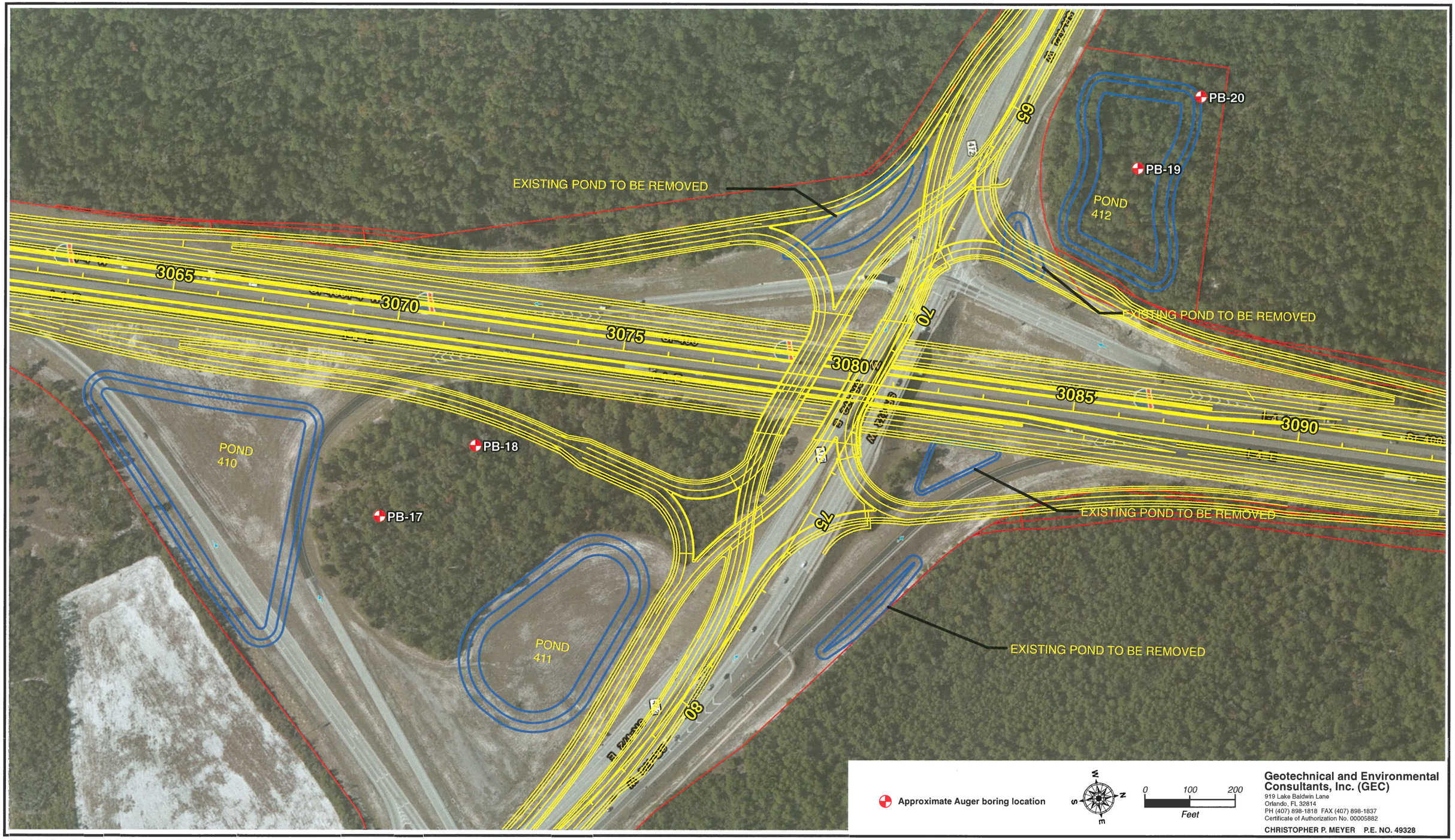
J:\D1061\3492G\12-14-15\3492GD2.mxd 12/15/2015

FIGURE 7 - BORING LOCATION PLAN



J:\D106\3492G\12-14-15\3492GE.mxd 12/15/2015

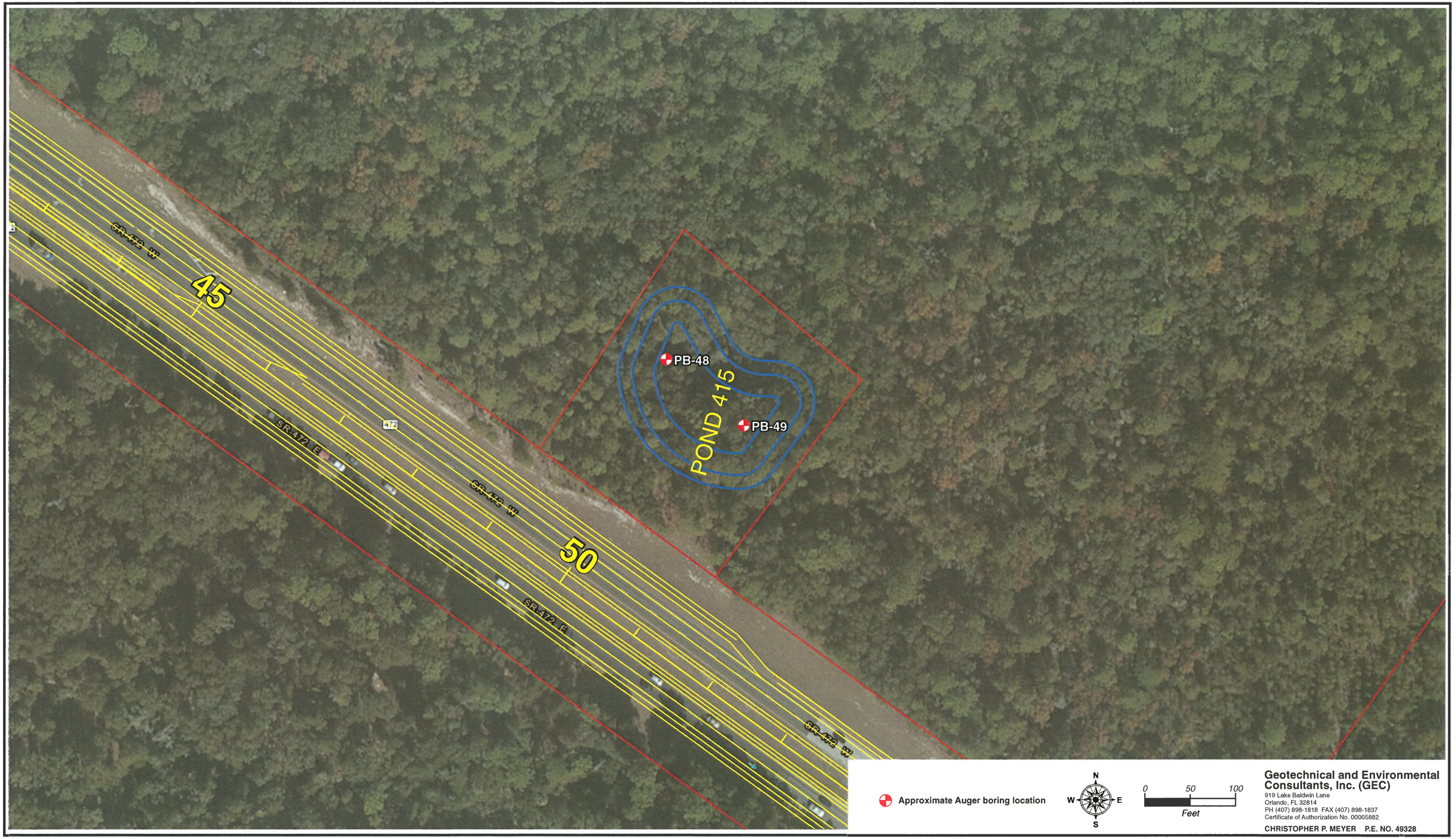
FIGURE 8 - BORING LOCATION PLAN



Geotechnical and Environmental Consultants, Inc. (GEC)
919 Lake Baldwin Lane
Orlando, FL 32814
PH (407) 898-1818 FAX (407) 898-1837
Certificate of Authorization No. 00005882
CHRISTOPHER P. MEYER P.E. NO. 49328

J:\D106\3492G\12-14-15\3492GF.mxd 12/14/2015

FIGURE 9 - BORING LOCATION PLAN



Geotechnical and Environmental Consultants, Inc. (GEC)
919 Lake Baldwin Lane
Orlando, FL 32814
PH (407) 898-1818 FAX (407) 898-1837
Certificate of Authorization No. 00005882
CHRISTOPHER P. MEYER P.E. NO. 49328

J:\D106\3492G\12-14-15\3492GG.mxd 12/14/2015

FIGURE 10 - BORING LOCATION PLAN

DATE OF SURVEY: MARCH, APRIL AND DECEMBER 2014
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: VOLUSIA

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 AND SWALES - SEGMENT 4

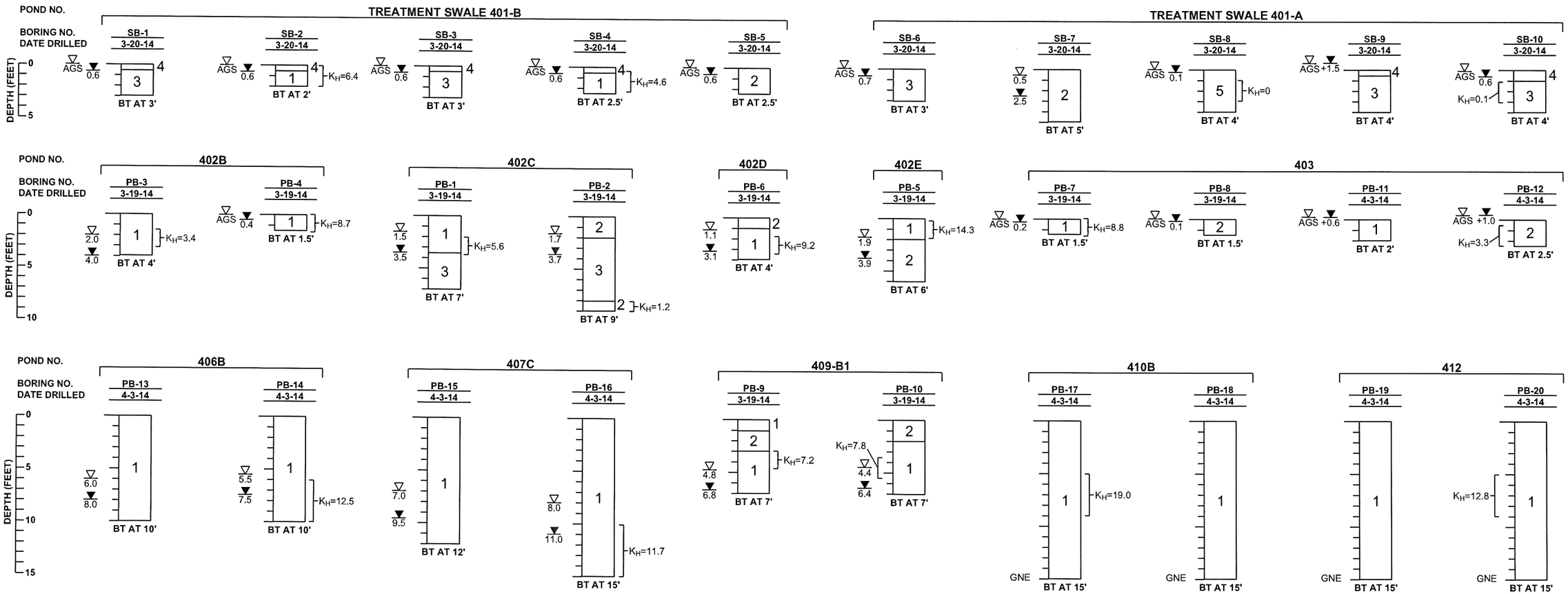
	ORGANIC CONTENT		MOISTURE CONTENT		SIEVE ANALYSIS RESULTS PERCENT PASS (%)						ATTERBERG LIMITS (%)					CORROSION TEST RESULTS				
STRATUM NO.	NO. OF TESTS	% ORGANIC	NO. OF TESTS	MOISTURE CONTENT	NO. OF TESTS	10 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTIC INDEX	AASHTO GROUP	DESCRIPTION	NO. OF TESTS	RESISTIVITY ohm-cm	CHLORIDE ppm	SULFATES ppm	pH
1	0	-	0	-	26	100	94-99	75-92	20-58	1-10	0	-	-	A-3	LIGHT BROWN TO BROWN TO LIGHT GRAY TO GRAY FINE SAND TO FINE SAND WITH SILT	0	-	-	-	-
2	0	-	2	16-21	7	100	93-100	82-94	29-71	10-26	2	NP-33	NP-14	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	27-46	5	97-100	90-100	85-98	63-85	33-52	3	30-47	15-31	A-2-6, A-7-6, A-4, A-6	LIGHT BROWN CLAYEY FINE SAND TO SANDY CLAY TO SANDY SILT	0	-	-	-	-
4	3	10-29	3	55-72	3	100	98-99	85-92	48-59	16-39	0	-	-	A-8	DARK BROWN MUCKY FINE SAND TO ORGANIC CLAY	0	-	-	-	-
5	0	-	1	35	1	100	93	82	67	50	1	54	31	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. 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. STRATUM 5 SHALL BE TREATED AS HIGH PLASTIC (H) MATERIAL IN ACCORDANCE WITH FDOT INDEX NO. 505.
9. STRATUM 2 MAY RETAIN EXCESS MOISTURE AND MAY BE DIFFICULT TO DRY AND COMPACT.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC. (GEC)
919 Lake Baldwin Lane
Orlando, FL. 32814
T 407-898-1818 F 407-898-1837
Certificate of Authorization No. 5882
CHRISTOPHER P. MEYER PE NO. 49328

FIGURE 11 - POND AND SWALE SOIL SURVEY



LEGEND

- ESTIMATED SEASONAL HIGH GROUNDWATER LEVEL ABOVE GROUND SURFACE (AGS)
- ESTIMATED SEASONAL HIGH GROUNDWATER DEPTH (FT.)
- 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)

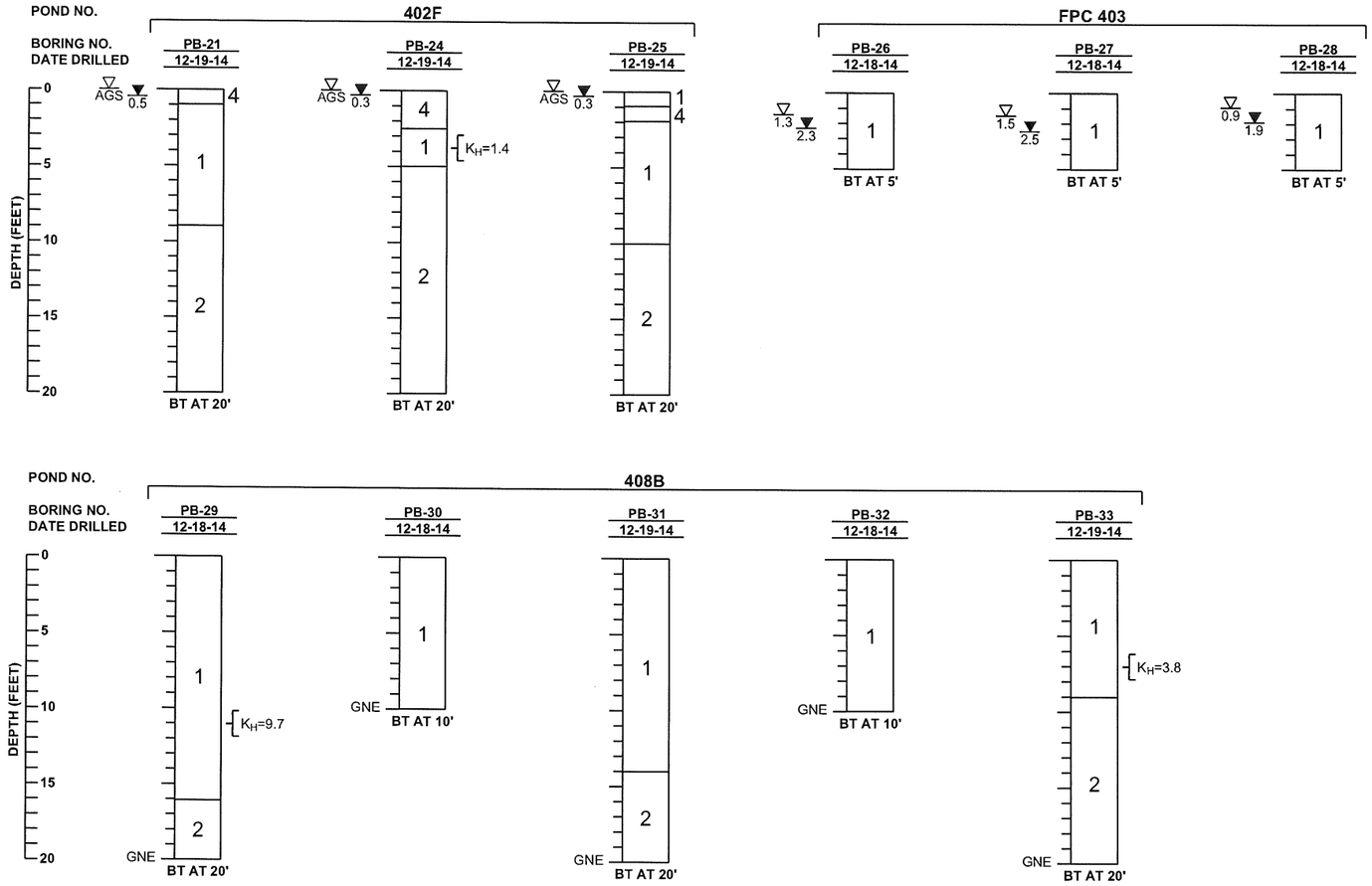
GENERAL NOTES

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, A-6	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

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC. (GEC)
919 Lake Baldwin Lane
Orlando, FL. 32814
T 407-898-1818 F 407-898-1837
Certificate of Authorization No. 5882
CHRISTOPHER P. MEYER PE NO. 49328

FIGURE 12 - AUGER BORING RESULTS FOR TREATMENT SWALES AND PONDS



LEGEND

- $\frac{\nabla}{AGS}$ ESTIMATED SEASONAL HIGH GROUNDWATER LEVEL ABOVE GROUND SURFACE
- $\frac{\nabla}{1.3}$ ESTIMATED SEASONAL HIGH GROUNDWATER DEPTH (FT.)
- $\frac{\blacktriangledown}{2.3}$ 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)

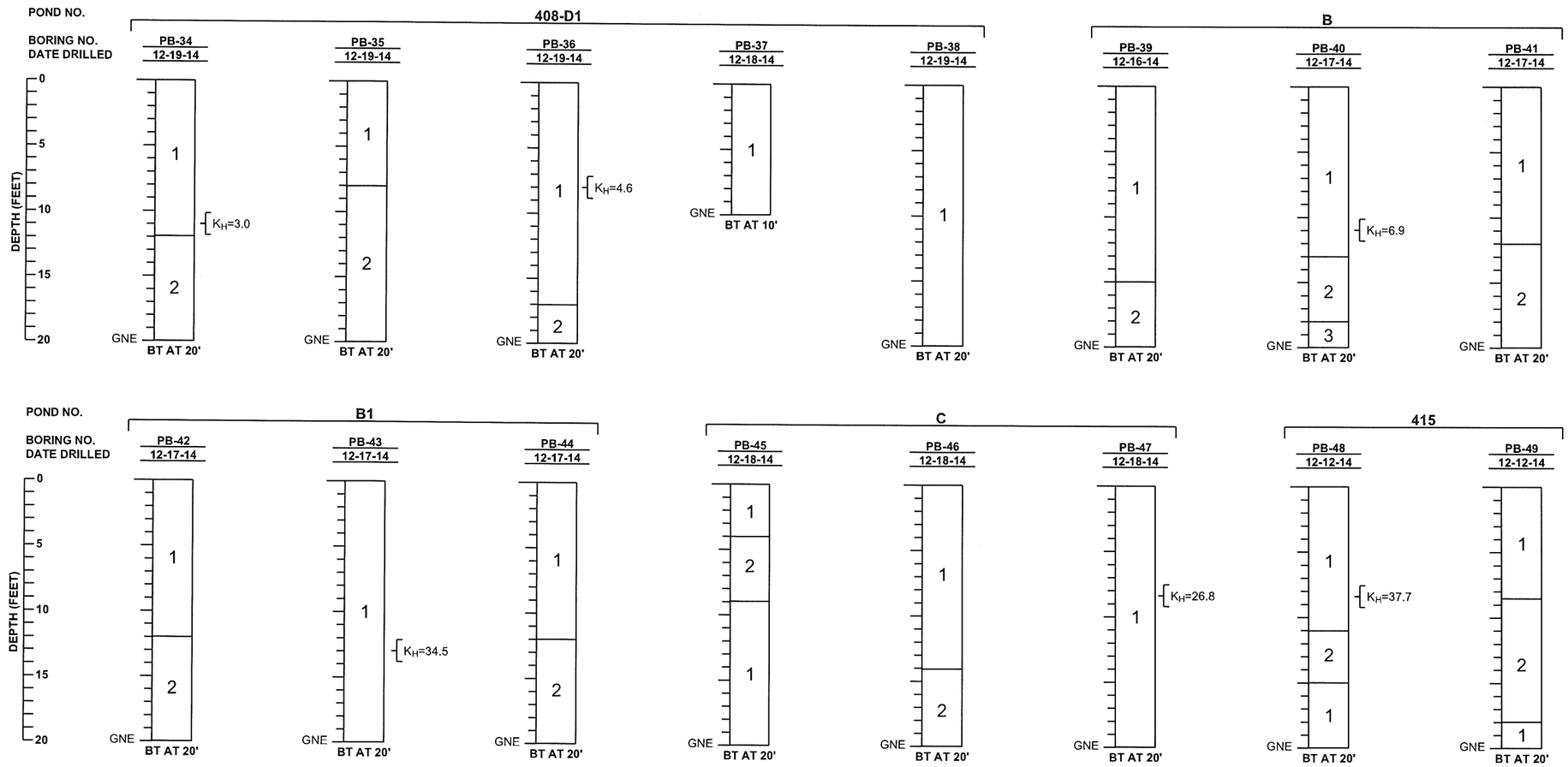
GENERAL NOTES

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, A-6	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

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC. (GEC)
919 Lake Baldwin Lane
Orlando, FL. 32814
T 407-898-1818 F 407-898-1837
Certificate of Authorization No. 5882
CHRISTOPHER P. MEYER PE NO. 49328

FIGURE 13 - AUGER BORING RESULTS FOR TREATMENT SWALES AND PONDS



LEGEND

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 BETWEEN 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, A-6	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

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC. (GEC)
919 Lake Baldwin Lane
Orlando, FL. 32814
T 407-898-1818 F 407-898-1837
Certificate of Authorization No. 5882
CHRISTOPHER P. MEYER PE NO. 49328

FIGURE 14 - AUGER BORING RESULTS FOR TREATMENT SWALES AND PONDS

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		
401-B	1	SB-2	0.5 - 2	100	96	92	25	5	---	---	---	---	A-3
401-B	1	SB-4	0.5 - 2.5	100	99	91	38	10	---	---	---	---	A-3
402B	1	PB-3	0 - 4	100	95	83	36	3	---	---	---	---	A-3
402B	1	PB-4	0 - 1.5	100	96	82	30	3	---	---	---	---	A-3
402C	1	PB-1	2 - 3.5	100	94	82	40	4	---	---	---	---	A-3
402C	1	PB-2	0 - 2	---	---	---	---	9	---	---	---	---	A-3
402D	1	PB-6	1 - 4	100	98	85	33	2	---	---	---	---	A-3
402E	1	PB-5	1 - 2	100	98	89	34	3	---	---	---	---	A-3
403	1	PB-7	0 - 1.5	100	98	88	31	3	---	---	---	---	A-3
406B	1	PB-14	6 - 10	100	97	89	38	2	---	---	---	---	A-3
407C	1	PB-16	10 - 15	100	97	87	30	2	---	---	---	---	A-3
409-B1	1	PB-9	3 - 4	100	96	80	21	2	---	---	---	---	A-3
409-B1	1	PB-9	0 - 1	---	---	---	---	3	---	---	---	---	A-3
409-B1	1	PB-10	2 - 6	100	94	75	20	4	---	---	---	---	A-3
410B	1	PB-17	5 - 10	100	99	92	32	2	---	---	---	---	A-3
412	1	PB-20	5 - 10	100	97	86	34	1	---	---	---	---	A-3
402F	1	PB-24	2.5 - 5	100	98	88	43	6	---	---	---	---	A-3
402F	1	PB-25	5 - 10	100	98	81	24	9	---	---	---	---	A-3
408B	1	PB-29	10 - 15	100	97	84	29	4	---	---	---	---	A-3
408B	1	PB-33	5 - 10	100	96	82	28	6	---	---	---	---	A-3
408-D1	1	PB-36	5 - 10	100	98	87	30	3	---	---	---	---	A-3
B	1	PB-39	10 - 15	100	97	83	28	5	---	---	---	---	A-3
B1	1	PB-42	0 - 5	100	97	81	21	3	---	---	---	---	A-3
B1	1	PB-43	10 - 15	100	96	80	23	3	---	---	---	---	A-3
C	1	PB-47	5 - 10	100	97	82	58	3	---	---	---	---	A-3
415	1	PB-48	5 - 10	100	98	88	32	5	---	---	---	---	A-3
402C	2	PB-1	3.5 - 7	---	---	---	---	26	16	NP	NP	---	A-2-4
402C	2	PB-2	8 - 9	100	99	87	39	18	---	---	---	---	A-2-4

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		
403	2	PB-12	0 - 2.5	100	98	93	60	10	---	---	---	---	A-2-4
401-B	2	SB-5	0 - 2.5	100	100	94	29	11	---	---	---	---	A-2-4
401-A	2	SB-7	1 - 5	100	100	93	47	26	21	33	14	---	A-2-4
408-D1	2	PB-34	12 - 15	100	98	94	71	25	---	---	---	---	A-2-4
C	2	PB-45	4 - 9	100	93	82	44	14	---	---	---	---	A-2-4
401-B	3	SB-1	0.5 - 3	100	99	95	72	35	46	34	17	---	A-2-6
401-A	3	SB-6	0 - 3	97	90	85	63	52	---	---	---	---	A-4
401-A	3	SB-9	0.5 - 4	100	100	98	85	51	32	47	31	---	A-7-6
401-A	3	SB-10	1 - 4	100	96	91	73	33	---	---	---	---	A-2-6
B	3	PB-40	18 - 20	100	99	96	76	39	27	30	15	---	A-6
402F	4	PB-21	0 - 1	100	99	90	48	16	60	---	---	11	A-8
402F	4	PB-24	0 - 2.5	100	98	89	48	19	55	---	---	10	A-8
402F	4	PB-25	1 - 2	100	99	92	59	39	172	---	---	29	A-8
401-A	5	SB-8	0 - 4	100	93	82	67	50	35	54	31	---	A-7-6

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)	Permeability Test Results		
							Horizontal Permeability Rate (ft/day)	Test Depth (ft)	Soil Type
401-B	SB-1	03/21/14	0.6	AGS	10	0.0 - 0.5	---	---	---
	SB-2	03/21/14	0.6	AGS	10	0.0 - 0.5	6.4	0.5 - 2	A-3
	SB-3	03/21/14	0.6	AGS	10	0.0 - 0.5	---	---	---
	SB-4	03/21/14	0.6	AGS	10	0.0 - 0.5	4.6	0.5 - 2.5	A-3
	SB-5	03/21/14	0.6	AGS	10	0.0 - 0.5	---	---	---
401-A	SB-6	03/21/14	0.7	AGS	10	0.0 - 0.5	---	---	---
	SB-7	03/21/14	2.5	AGS	10	0.0 - 0.5	---	---	---
	SB-8	03/21/14	0.1	AGS	10	0.0 - 0.5	0.0	0 - 4	A-7-6
	SB-9	03/21/14	+1.5	AGS	10	0.0 - 0.5	---	---	---
	SB-10	03/21/14	0.6	AGS	10	0.0 - 0.5	0.1	1 - 4	A-2-6
402B	PB-3	03/19/14	4.0	2.0	54	> 6.0	3.4	0 - 4	A-3
	PB-4	03/19/14	0.4	AGS	54	> 6.0	8.7	0 - 1.5	A-3
402C	PB-1	03/19/14	3.5	1.5	54	> 6.0	5.6	2 - 3.5	A-3
	PB-2	03/19/14	3.7	1.7	54	> 6.0	1.2	8 - 9	A-2-4
402D	PB-6	03/19/14	3.1	1.1	54	> 6.0	9.2	1 - 4	A-3
402E	PB-5	03/19/14	3.9	1.9	54	> 6.0	14.3	1 - 2	A-3
402 F	PB-21	12/20/14	0.5	AGS	29	0.0 - 0.5	---	---	---
	PB-24	12/20/14	0.3	AGS	29	0.0 - 0.5	1.4	3 - 5	A-3
	PB-25	12/20/14	0.3	AGS	29	0.0 - 0.5	---	---	---
403	PB-7	03/19/14	0.2	AGS	42	> 6.0	8.8	0 - 1.5	A-3
	PB-8	03/19/14	0.1	AGS	42	> 6.0	---	---	---
	PB-11	04/03/14	+0.6	AGS	42	>6.0	---	---	---
	PB-12	04/03/14	+1.0	AGS	42	> 6.0	3.3	0 - 2.5	A-2-4
FPC 403	PB-26	12/19/14	2.3	1.3	37	3.5 - 5.0	---	---	---
	PB-27	12/19/14	2.5	1.5	37	3.5 - 5.0	---	---	---
	PB-28	12/19/14	1.9	0.9	37	3.5 - 5.0	---	---	---
406B	PB-13	04/03/14	8.0	6.0	42	>6.0	---	---	---
	PB-14	04/03/14	7.5	5.5	42	> 6.0	12.5	6 - 10	A-3
407C	PB-15	04/03/14	9.5	7.5	42	>6.0	---	---	---
	PB-16	04/03/14	11.0	8.0	42	> 6.0	11.7	10 - 15	A-3

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)	Permeability Test Results		
							Horizontal Permeability Rate (ft/day)	Test Depth (ft)	Soil Type
408 B	PB-29	12/19/14	GNE @ 20	---	42	> 6.0	9.7	10 - 12	A-3
	PB-30	12/19/14	GNE @ 10	---	42	> 6.0	---	---	---
	PB-31	12/20/14	GNE @ 20	---	42	> 6.0	---	---	---
	PB-32	12/19/14	GNE @ 10	---	42	> 6.0	---	---	---
	PB-33	12/20/14	GNE @ 20	---	42	> 6.0	3.8	6 - 8	A-3
408-D1	PB-34	12/20/14	GNE @ 20	---	42	> 6.0	3.0	10 - 12	A-3
	PB-35	12/20/14	GNE @ 20	---	42	> 6.0	---	---	---
	PB-36	12/20/14	GNE @ 20	---	42	> 6.0	4.6	8 - 10	A-3
	PB-37	12/19/14	GNE @ 10	---	42	> 6.0	---	---	---
	PB-38	12/20/14	GNE @ 20	---	42	> 6.0	---	---	---
409-B1	PB-9	03/19/14	6.8	4.8	42	> 6.0	7.2	3 - 4	A-3
	PB-10	03/19/14	6.4	4.4	13	1.5 - 3.5	7.8	2 - 6	A-3
410B	PB-17	04/03/14	GNE @ 15	---	63	> 6.0	19.0	5 - 10	A-3
	PB-18	04/03/14	GNE @ 15	---	63	>6.0	---	---	---
412	PB-19	04/03/14	GNE @ 15	---	4	>6.0	---	---	---
	PB-20	04/03/14	GNE @ 15	---	4	> 6.0	12.8	5 - 10	A-3
415	PB-48	12/13/14	GNE @ 20	---	63	> 6.0	37.7	8 - 10	A-3
	PB-49	12/13/14	GNE @ 20	---	4	> 6.0	---	---	---
B	PB-39	12/17/14	GNE @ 20	---	4	> 6.0	6.9	10 - 12	A-3
	PB-40	12/18/14	GNE @ 20	---	4	> 6.0	---	---	---
	PB-41	12/18/14	GNE @ 20	---	4	> 6.0	---	---	---
B1	PB-42	12/18/14	GNE @ 20	---	4	> 6.0	---	---	---
	PB-43	12/18/14	GNE @ 20	---	4	> 6.0	34.5	12 - 14	A-3
	PB-44	12/18/14	GNE @ 20	---	4	> 6.0	---	---	---
C	PB-45	12/19/14	GNE @ 20	---	5	> 6.0	---	---	---
	PB-46	12/19/14	GNE @ 20	---	4	> 6.0	---	---	---
	PB-47	12/19/14	GNE @ 20	---	4	> 6.0	26.8	8 - 10	A-3

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

** GNE @ 15 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.