Final Report of Geotechnical Engineering Investigation
For Miscellaneous Structures
WEKIVA PARKWAY (SR 429) – SECTION 7A
From 0.2 Miles West of Longwood-Markham Road
to 0.1 Miles East of Orange Boulevard
Seminole County, Florida
Financial Project ID 240200-2-52-01
GEC Project No. 3520G

July 13, 2017

AECOM
315 East Robinson Street, Suite 245
Orlando, Florida 32801

Attention: Mr. Steve Noppinger, P.E.
Project Manager

Subject: Final Report of Geotechnical Engineering Investigation for Miscellaneous Structures
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From 0.2 Miles West of Longwood-Markham Road
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Dear Mr. Noppinger:

Geotechnical and Environmental Consultants, Inc. (GEC) is pleased to provide this Final Report of Geotechnical Engineering Investigation for Miscellaneous Structures for the above-referenced project. The purpose of this investigation was to evaluate soil and groundwater conditions at proposed miscellaneous structure locations proposed along the project alignment. Proposed miscellaneous structure improvements include cantilever and truss sign structures, mast arm signal poles, ITS CCTV poles, toll gantries and associated facilities and box culverts. This report includes our geotechnical engineering recommendations for design and construction of these improvements.

GEC appreciates the opportunity to work with AECOM and the Florida Department of Transportation (FDOT) District 5 on this project. Should there be any questions regarding the contents of this report, or if we may be of further assistance, please do not hesitate to contact us.

Very truly yours,

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
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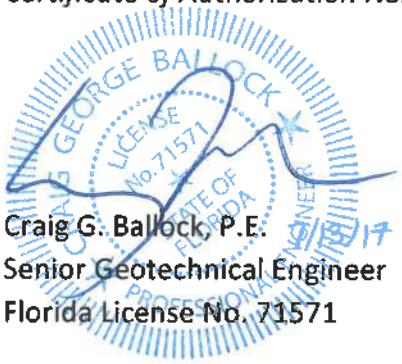
Orlando, Florida 32814
Certificate of Authorization No. 5882



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1.0 SITE AND PROJECT DESCRIPTION

The Wekiva Parkway (SR 429) Segment 7A project alignment… begins 0.2 miles west of Longwood-Markham Road (Station 954+00) and ends 0.1 miles east of Orange Boulevard (Station 1055+70)…

The Wekiva Parkway (SR 429) Segment 7A project alignment consists of an approximately 2-mile long portion of the Wekiva Parkway alignment that begins 0.2 miles west of Longwood-Markham Road (Station 954+00) and ends 0.1 miles east of Orange Boulevard (Station 1055+70) in Seminole County, Florida. The project alignment is depicted on excerpts of the U.S. Geological Survey (USGS) Sanford and Sanford SW, Florida Quadrangle Maps (**Figures 1A – 1B**) in the **Appendix**.

The project alignment of the proposed SR 429 generally follows the existing SR 46 alignment, which currently consists of a two-lane, undivided rural highway composed of two, 12-foot lanes and open swale drainage. The majority of the land use along the project alignment consists of rural residential dwellings with several plant nurseries located along the project alignment. The Wekiva River is located just to the west of the project alignment and several lakes, including Miranda Lake, Yankee Lake, Ross Lake, Sylvan Lake and Lake Markham, are located in the vicinity of the project alignment.

Based on our review of the project plans, we understand the following major project elements are proposed along the project alignment:

- An approximately 2-mile long portion of the Wekiva Parkway alignment that begins 0.2 miles west of Longwood-Markham Road (Station 954+00) and ends east of Orange Boulevard (Station 1055+70). The proposed roadway typical section in this area includes a four-lane divided (expandable to six-lane divided) section. The proposed roadway profile depicts all but about 1,000 feet (Station 993+00 to 1003+00) of high fill embankment ranging in height from 10 to 38 feet above existing grade.
- Two service road alignments (north and south of SR 429) to provide access to local traffic.
- MSE walls are proposed along the SR 429 mainline alignment in all areas of high fill with wall heights ranging from approximately 10 to 38 feet above existing grade.
- Six bridge sites including:
    - Wekiva Parkway over Longwood Markham Road (twin bridges)
    - Wekiva Parkway over Yankee Lake Road (twin bridges)
    - Wekiva Parkway over Lake Markham Road (twin bridges)
    - Wekiva Parkway over Glade View Drive (twin bridges)

    - Wekiva Parkway over Eastbound Frontage Road (twin bridges)
    - Wekiva Parkway over Orange Avenue & Orange Boulevard (twin bridges)
- Two toll facilities located on Ramp E and Ramp F, which include a toll gantry structure and associated support facilities.
- Seven cantilever sign structures and four truss sign structures.
- Four mast arm signal poles at the intersection of Orange Boulevard and SR 46.
- One, approximately 282-ft long, 9-ft by 2-ft box culvert structure.
- Seven CCTV pole structures associated with the project ITS.

The approximate miscellaneous structure locations are shown on excerpts of the U.S. Geological Survey (USGS) Florida Quadrangle maps on **Figures 1A** and **1B** in the **Appendix**. A summary of the proposed miscellaneous structures is presented **Table 6** in the **Appendix**.

This report describes our exploration procedures, exhibits the data obtained and presents our conclusions and recommendations regarding the geotechnical engineering aspects of the miscellaneous structures improvements, including toll facilities, mast arm signal poles, sign structures, box culverts and CCTV poles. Geotechnical recommendations and the results of the geotechnical investigations for the bridge and wall structures proposed along the project alignment are submitted under separate cover.

2.0 REVIEW OF AVAILABLE DATA

To obtain general information on soil and groundwater conditions in the project area, GEC reviewed available data including USGS Quadrangle Maps, the Natural Resources Conservation Service (NRCS) Soil Survey of Seminole County and other published sources. A summary of this information is presented in the following report sections.

2.1 USGS Quadrangle Maps

Based on our review of the USGS Sanford and Sanford Southwest, Florida Quadrangle maps and the project plans, the existing ground surface elevations along the project alignment typically range from approximate elevation +34 to +74 feet NAVD88. In addition, the quadrangle map indicates that portions of the project alignment were historically used for citrus groves and that the proposed alignment crosses in the vicinity of several topographically lower swamp features near the proposed Glade View Drive bridge site.

…several circular depression features and circular lakes, indicative of relic sinkholes… are… in the vicinity of the project alignment.

Also of note are several circular depression features and circular lakes, indicative of relic sinkholes, which are depicted on the quadrangle map in the vicinity of the project alignment. The Wekiva River is located just to the west of the project alignment and several lakes, including Miranda Lake, Yankee Lake, Ross Lake, Sylvan Lake and Lake Markham, are located in the vicinity of the project alignment.

The project alignment and proposed miscellaneous structure locations are depicted on an excerpt of the U.S. Geological Survey (USGS) Sanford and Sanford Southwest, Florida Quadrangle Maps (**Figures 1A – 1B**) in the **Appendix.**

Based on our review of the project cross-sections at our boring locations, the approximate existing ground surface elevations at the proposed miscellaneous structure locations are summarized in **Table 7** in the **Appendix**.

2.2 NRCS Soil Survey Review

The Natural Resources Conservation Service (NRCS) Soil Survey of Seminole County was reviewed to obtain near-surface soils information in the vicinity of the proposed miscellaneous structure sites. According to the NRCS map, the soils in the vicinity of the proposed miscellaneous structure sites are summarized below. The NRCS Soil Survey map of the project area is shown on **Figures 2A** and **2B** in the **Appendix**.

Table 1
NRCS Soil Survey Classifications

Unit No.	Soil Name	Depth (inches)	Soil Description	Unified Soil Classification Symbol	Depth to Seasonal High Groundwater (feet)
2	Adamsville fine sand	0 – 4 4 – 80	Fine sand Fine sand, sand	SP-SM SP, SP-SM	2.0 – 3.5
	Sparr fine sand	0 – 41 41 – 43 43 – 72 72 – 80	Fine sand, sand Sandy loam, sandy clay loam Sandy clay, sandy clay loam Sandy loam, sandy clay loam	SP-SM, SM SM, SC-SM, SM SC-SM, SC SM, SC-SM, SC	1.5 – 3.5

Unit No.	Soil Name	Depth (inches)	Soil Description	Unified Soil Classification Symbol	Depth to Seasonal High Groundwater (feet)
6	Astatula fine sand, 0 to 5 percent slopes	0 – 80	Fine sand, sand	SP, SP-SM	> 6.0
	Apopka fine sand, 0 to 5 percent slopes	0 – 64 64 – 80	Fine sand Sandy clay loam, sandy loam, sandy clay	SP, SP-SM SC-SM, SC	
10	Basinger soil, depressional	0 – 6 6 – 80	Mucky fine sand Fine sand, sand	SP, SP-SM SP, SP-SM	+2.0 – 0.0
	Hontoon soil, depressional	0 – 80	Muck	PT	
	Samsula soil, depressional	0 – 30 30 – 80	Muck Fine sand, loamy sand	PT SP, SP-SM, SM	
13	Eaugallie fine sand	0 – 18 18 – 30 30 – 45 45 – 64 64 – 80	Fine sand Fine sand, sand Fine sand, sand Sandy loam, sandy clay loam Sand, loamy sand	SP, SP-SM SP-SM, SM SP, SP-SM SM, SC-SM, SC SP-SM, SM	0.5 – 1.5
	Immokalee fine sand	0 – 42 42 – 62 62 – 80	Fine sand, sand Fine sand, sand Fine sand, sand	SP, SP-SM SP-SM, SM SP, SP-SM	
20	Myakka fine sand	0 – 28 28 – 45 45 – 80	Fine sand, sand Fine sand, sand, loamy fine sand Fine sand, sand	SP, SP-SM SP-SM, SM SP, SP-SM	0.5 – 1.5
	EauGallie fine sand	0 – 18 18 – 30 30 – 41 41 – 60 60 – 80	Fine sand Fine sand, sand Fine sand, sand Sandy clay loam, sandy loam Loamy sand, sand	SP, SP-SM SP-SM, SM SP, SP-SM SM, SC-SM, SC SP-SM, SM	
27	Pomello fine sand, 0 to 5 percent slopes	0 – 31 31 – 40 40 – 80	Fine sand Fine sand, sand Fine sand, sand	SP, SP-SM SP-SM, SM SP, SP-SM	2.0 – 3.5
31	Tavares fine sand, 0 to 5 percent slopes	0 – 80	Fine sand, sand	SP, SP-SM	3.5 – 6.0
	Millhopper fine sand, 0 to 5 percent slopes	0 – 45 45 – 54 54 – 80	Fine sand Sandy loam, loamy fine sand Sandy clay loam, sandy loam	SP-SM, SM SM SM, SC-SM, SC	

The NRCS soil types depicted by the NRCS at the proposed miscellaneous structure sites are summarized in **Table 7** in the **Appendix**. In general, the NRCS soil survey map depicts sandy soils with seasonal high groundwater levels ranging from 0.5 to greater than 6.0 feet below the natural ground surface. The soils classifying as SP, SP-SM and SM can be treated as Select (S) soil types and are generally appropriate for use as fill material to support structures, roadways and embankments. However, the clayey soils classifying as SC and SC-SM have limited suitability for use as fill material.

At the CD-2 box culvert site and the ITS Pole 4 location the NRCS soil survey map depicts Basinger, Samsula and Hontoon soils, depressional (10).

At the CD-2 box culvert site and the ITS Pole 4 location the NRCS soil survey map depicts Basinger, Samsula and Hontoon soils, depressional (10). This soil type contains high organic content soils that are generally classified as PT in the USCS and can have severe limitations for roadway construction. In addition, the NRCS predicts seasonal high groundwater levels for this soil type to range from 2 feet above the existing ground surface to at the existing ground surface.

Information contained in the NRCS Soil Survey is very general and may be outdated. It may not therefore 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 soils and groundwater data collected as part of this study should be considered a more accurate representation of soil conditions along the project alignment.

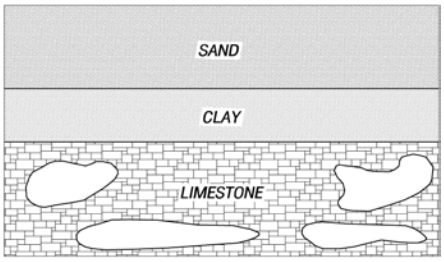
2.3 USGS Potentiometric Map Data

GEC reviewed the September 2008 USGS Map, "Potentiometric Surface of The Upper Floridan Aquifer in the St. Johns River Water Management District and Vicinity, Florida," to evaluate the potentiometric surface elevation of the Floridan Aquifer at the proposed miscellaneous structure locations. **Table 7** in the **Appendix** summarizes the anticipated maximum elevation of the potentiometric surface at the proposed miscellaneous structure locations.

…artesian flow conditions are not anticipated at the proposed miscellaneous structure sites.

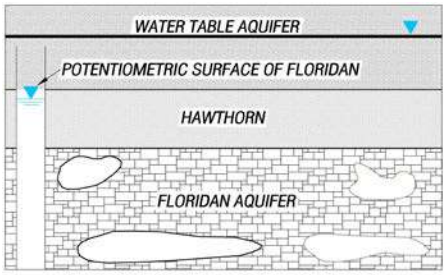
Since the existing ground surface elevations at the proposed miscellaneous structure sites are above the predicted potentiometric surface, artesian flow conditions are not anticipated at the proposed miscellaneous structure sites. Artesian conditions were not encountered at any of the boring locations.

3.0 REGIONAL GEOLOGY

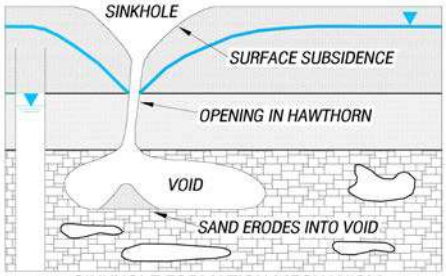


KARST GEOLOGY OF CENTRAL FLORIDA

Due to its prevalent geology, referred to as karst, Central Florida is prone to the formation of sinkholes, or large, circular depressions created by local subsidence of the ground surface. The nature and relationship of the three sedimentary layers typical of Central Florida geology cause sinkholes. The deepest, or basement, layer is a massive cavernous limestone formation known as the Floridan aquifer. The Floridan aquifer limestone is overlain by a silty or clayey sand, clay, phosphate, and limestone aquitard (or flow-retarding layer) ranging in thickness from nearly absent to greater than 100 feet and locally referred to as the Hawthorn formation. The Hawthorn formation is in turn overlain by a 40 to 70-foot thick surficial layer of sand, bearing the water table aquifer. The likelihood of sinkhole occurrence at a given site within the region is determined by the relationship among these three layers, specifically by the water (and soil)-transmitting capacity of the Hawthorn formation at that location.



CENTRAL FLORIDA AQUIFER SYSTEMS



SINKHOLE FORMATION MECHANISM

The water table aquifer is comprised of Recent and Pleistocene sands and is separated from the Eocene limestone of the Floridan aquifer by the Miocene sands, clays and limestone of the Hawthorn formation. Since the thickness and consistency of the Hawthorn layer is variable across Central Florida, the likelihood of groundwater flow from the upper to the lower aquifer (known as aquifer recharge) will also vary by geographical location. In areas where the Hawthorn formation is absent, water table groundwater (and associated sands) can flow downward to cavities within the limestone aquifer, like sand through an hourglass, recharging the Floridan aquifer, and sometimes causing the formation of surface sinkholes. This process of subsurface erosion associated with recharging the Floridan aquifer is known as raveling. Thus, in Central Florida, areas of effective groundwater recharge to the Floridan aquifer have a higher potential for the formation of surface sinkholes.

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.

…the relative risk of sinkhole formation ranges from low to high…

Based on our review of 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 alignment lies in a low to moderate recharge area between approximate stations 954+00 to 980+00 and a moderate to high recharge area between approximate stations 980+00 to 1114+56. We can conclude based solely on the available recharge data that the proposed miscellaneous structures are located in an area where the relative risk of sinkhole formation ranges from low to high compared to the overall risk across Central Florida.

4.0 SUBSURFACE EXPLORATION

GEC evaluated subsurface conditions at the proposed miscellaneous structure locations by performing Standard Penetration Test (SPT) borings or Cone Penetration Test (CPT) soundings at each of the proposed structure locations. The locations and depths of our borings are summarized in **Table 6** in the **Appendix.**

Boring and sounding locations were established in the field using project plans and a handheld, sub-meter accuracy, Global Positioning Satellite (GPS) unit (Trimble GeoXT 500 Series). Ground surface elevations at the boring locations were estimated from project cross-sections.

4.1 Standard Penetration Test Borings

SPT borings were drilled in general accordance with ASTM Procedure D-1586. The boreholes were advanced by the rotary wash method with bentonite-based mud used as the circulating fluid to stabilize the borehole. Casing was used as necessary to stabilize the borehole and prevent loose surficial sands from raveling into the lower more stable portions of the borehole. GEC's field crew obtained SPT samples continuously in the borings to a depth of 10 feet and at 5-foot depth intervals thereafter. However, some boring locations were hand augered to a depth of 6 feet to avoid damage to underground utilities. A GEC engineering technician monitored the drilling operation, and collected, examined and visually classified each sample. He then packaged representative portions of each sample for transport to our laboratory for further examination and laboratory testing.

4.2 Cone Penetration Test Soundings

The Cone Penetration Test (CPT) soundings were performed in general accordance with ASTM Specification D 5578. The cone penetrometer is pushed into the soil by means of a hydraulic thrust system at a constant rate of 24 to 48 inches per minute. The penetrometer tip has a cone angle of 60 degrees, a base diameter of 1.4 inches and a total area of 1.55 square inches. A friction sleeve with the same diameter as the base of the cone is located directly above the cone tip. Hollow push rods are used to advance the cone penetrometer in 3.3-foot (1 meter) increments. Point stress and local side friction are continuously measured during each 3.3-foot (1 meter) push by transducers located in the cone tip and friction sleeve. An electric cable threaded through the push rods transmits the transducer signals to a computer for data processing and recording. The resulting point stress and local friction CPT data are presented graphically in the **Appendix**.

4.3 Groundwater Measurement

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

For SPT boring locations, which were grout-sealed upon completion, a GEC engineering technician performed a hand auger boring to a depth of 10 feet adjacent to the grouted borehole to obtain a stabilized groundwater depth. Once a 24-hour groundwater measurement was recorded, the hand auger boreholes were then backfilled with soil cuttings to prevailing ground surface. At some grouted SPT boring locations where groundwater was not encountered to a depth of 10 feet in adjacent hand auger borings a non-stabilized groundwater level measured at the time the borehole was drilled is indicated on the boring profiles.

4.4 Undisturbed Samples

Undisturbed samples of compressible soils at the proposed box culvert site were collected using a thin-walled “Shelby” tube sampler. The sampler was hydraulically pushed into the soil at the desired sample depth. After allowing the sampler to sit for a short period of time it was retrieved from the borehole where the soil at the top and bottom of the tube was sampled and classified. The 3-inch diameter tube was moisture sealed in the field immediately after sampling and returned to our laboratory for further examination and testing. The sample depth is noted on the Report of SPT Borings sheet in the **Appendix**.

5.0 LABORATORY TESTING

Selected soil and water samples retrieved from the boring locations 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 GEC laboratory has been reviewed by the Construction Materials Engineering Council (CMEC). The laboratory testing program for this project is summarized in **Table 2**:

Table 2
Summary of Laboratory Testing Program

Type of Test	Number of Tests
Percent Fines (FM 1-T88)	79
Grain Size Analysis (FM 1-T88)	3
Atterberg Limits (FM 1-T89/90)	11
Natural Moisture Content (FM 1-T265)	26
Organic Content (FM 1-T 267)	15
Corrosion Series (FM 5-550/551/552/553)	2
Hydrometer Analysis (ASTM D-422)	1
Unit Weight (ASTM D7263-09)	3
Specific Gravity (FM 1-T100)	3
Consolidation Test (ASTM D-2435)	3

The results of our laboratory tests are shown adjacent to the soil profiles on the Report of Boring Results sheets in the **Appendix**.

Corrosion series tests were performed on representative soil and water samples obtained at the box culvert structure location to evaluate the substructure environmental classification. In accordance with the FDOT Structure Design Guidelines and the results of our corrosion series test results, which are included in **Table 8** in the **Appendix**, the substructure environmental classification the culvert site is Moderately Aggressive for Steel and Slightly Aggressive for Concrete.

Three grain size analyses and one hydrometer analysis were performed on representative samples of surficial soils encountered at the pipe culvert outfall locations along the project alignment for erosion evaluation. The particle size distribution reports are included in the **Appendix**.

5.1 Consolidation Testing

A portion of the undisturbed samples obtained at the boring locations were sampled for one-dimensional consolidation testing in general accordance with ASTM-D2435. Undisturbed samples selected for testing are carefully trimmed and placed in the fixed ring consolidometer. A seating pressure of about 100 psf is applied and the sample is inundated in water. The sample submergence is maintained throughout the test.

The sample is then incrementally loaded and deflections are monitored. Each incremental load is maintained until internal pore pressures are dissipated as indicated by a flattening of the time-deflection curve. A rebound of the sample is provided at a selected load increment when the sample is unloaded and reloaded to obtain further details of the loading characteristics of the soil.

The data obtained during incremental loading is reduced and a semi-log plot of sample void ratio versus applied stress is created. A copy of this curve is included in the **Appendix** of this report. This curve is utilized to estimate the magnitude of settlement that will be induced by anticipated site loadings. The curve is also used to estimate the pre-consolidation pressure (P_C) and the over-consolidation ratio (OCR) of the soils tested. The results of our consolidation test and associated laboratory soil classification tests are summarized in the following table.

Table 3
Summary of Consolidation Test Results

Boring No.	USCS Soil Type	Test Depth (feet)	N-Value (blows/ft)	e_O	Overburden Pressure (tsf)	P_c (tsf)	OCR	C_c	C_r	C_v
BC-3	PT	30 – 32	4	3.87	0.95	1.79	1.88	0.80	0.20	1.3
MB-14	PT	50 – 52	2	1.90	1.2	1.35	1.13	0.34	0.04	1.1
MB-14	PT	35 – 37	3	3.60	0.95	1.86	1.96	0.75	0.08	0.9

6.0 DESCRIPTION OF SUBSURFACE CONDITIONS

The results of our borings and soundings are presented on Report of SPT Borings sheets in the **Appendix**. The boring logs describe the soil layers using the Unified Soil Classification System (USCS) symbol (e.g., SP-SM) and ASTM soil descriptions (e.g., sand with silt). We based our soil classifications and descriptions on visual examination and the limited laboratory testing shown adjacent to the boring profiles on the Report of SPT Borings sheets.

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.*

6.1 Toll Facilities - SPT Boring Results

In general, the SPT borings (TG-1 and TG-2) performed at the proposed Ramp F Toll site encountered loose to medium dense fine sand to fine sand with silt to silty fine sand (SP, SP-SM, SM) to a depth of 27 feet underlain by loose to very loose fine sand with silt to silty fine sand (SP-SM, SM) to a depth of 50 to 55 feet followed by very dense fine sand with silt with abundant shell (SP-SM) to very stiff sandy lean clay with some phosphate (CL) to the maximum boring termination depth of 60 feet below existing ground surface. At boring location TG-1, 100% loss of drilling fluid circulation occurred at a depth of 56 feet below existing ground surface.

In general, the SPT borings (TG-3 and TG-4) performed at the proposed Ramp E Toll site encountered loose to medium dense fine sand with silt to silty fine sand to clayey fine sand (SP-SM, SM, SC) to a depth of 18 feet underlain by medium dense to dense fine sand to fine sand with silt (SP, SP-SM) to a depth of 40 feet followed by firm fat clay with trace shell (CH) to a depth of 53 to 58 feet and dense to very dense fine sand with silt (SP-SM) to the maximum boring termination depth of 60 feet below existing ground surface..

Please refer to the Report of SPT Borings sheets in the **Appendix** for the specific subsurface profiles at the individual boring locations.

6.2 MASP, Signs & ITS Poles - SPT Boring and CPT Sounding Results

In general, the SPT borings and CPT soundings performed for the MASP, Signs and ITS Pole foundations typically encountered loose to medium dense fine sand to fine sand with silt to silty fine sand (SP, SP-SM, SM) with occasional layers of clayey fine sand and sandy clay (SC, CL, CH) to

the boring termination depths of 25 to 70 feet below existing ground surface. Notable exceptions to this generalized profile include:

- Sign No. 1 (Boring SB-1): Very loose fine sand with silt (SP-SM) was encountered at depths of 6 to 12 feet below existing ground surface.
- Sign No. 7 (Borings WB-74 & SB-8): Very loose fine sand with silt to silty fine sand (SP-SM, SM) was encountered at depths of 23 to 43 feet below existing ground surface.
- Sign No. 8 (Boring SB-9): Very loose silty fine sand (SM) was encountered at depths of 27 to 53 feet below existing ground surface.
- Sign No. 9 (Borings WB-93 & SB-10): Very loose silty fine sand to clayey fine sand (SM, SC) was encountered at depths of 35 to 60 feet below existing ground surface.
- MASP's A, B, C & D (SB-14 through SB-17): Very loose to loose fine sand with silt to silty fine sand (SP-SM, SM) at depths of 6 to 13 feet below existing ground surface.
- ITS Pole 5 (Boring SB-23): Very loose fine sand (SP) was encountered at depths of 0 to 6 feet below existing ground surface.
- ITS Pole 6 (Boring SB-24): Very loose fine sand (SP) was encountered at depths of 0 to 4 feet below existing ground surface.

Please refer to the Report of SPT Borings sheets and **Tables 9**, **10** and **12** in the **Appendix** for the specific subsurface profiles at the individual boring locations.

6.3 Box Culvert - SPT Boring Results

…the SPT borings performed for the southern half of the proposed box culvert (CD-2) encountered… layers of very soft to soft muck to sandy muck to mucky fine sand (PT) to a depth of 87 to 98 feet…

In general, the SPT borings (BC-1 and BC-2) performed for the northern half of the proposed box culvert (CD-2) encountered loose to medium dense fine sand, fine sand with silt and silty fine sand (SP, SP-SM, SM) to the maximum boring termination depth of 30 feet. However, the SPT borings (MB-14 and BC-3) performed for the southern half of the proposed box culvert (CD-2) encountered loose to medium dense fine sand to fine sand with silt (SP, SP-SM) to a depth of 27 to 32 feet underlain by layers of very soft to soft muck to sandy muck to mucky fine sand (PT) to a depth of 87 to 98 feet followed by loose to medium dense fine sand, fine sand with silt, silty fine sand and clayey fine sand (SP, SP-SM, SM, SC) to the maximum boring termination depth of 115 feet.

Please refer to the Report of SPT Borings sheets in the **Appendix** for the specific subsurface profiles at the individual boring locations.

6.4 Groundwater Levels

In general, encountered groundwater levels at the miscellaneous structure boring locations ranged from 4.3 to 24 feet below existing ground surface. **Table 7** in the **Appendix** provides a summary of encountered groundwater levels at miscellaneous structure boring locations.

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 along the project alignment can be expected to vary from those measured by GEC during this investigation.*

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

GEC estimated seasonal high groundwater levels for each boring location. **Table 7** in the **Appendix** provides a summary of estimated seasonal high groundwater levels at miscellaneous structure boring locations. The encountered and estimated seasonal high groundwater levels at the boring locations are presented on the Boring Results sheets in the **Appendix**.

7.0 ANALYSES AND RECOMMENDATIONS

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.

The 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.

7.1 Toll Gantry Foundations

…the soils appear appropriate for construction of drilled shaft foundations for support of the proposed toll gantry.

GEC understands the toll gantry foundations will be designed by AECOM using the computer program, FB-MultiPier, and the subsurface data and soil parameters provided in this report. Based on our boring results, the soils appear appropriate for construction of drilled shaft foundations for support of the proposed toll gantries. Recommended FB-MultiPier soil parameters for use in design of the drilled shafts are included in the **Appendix**.

The drilled shafts should be constructed in accordance with FDOT Standard Specifications - Section 455 and the Florida Turnpike Enterprise General Tolling Requirements (GTR). The drilled shaft foundations must be installed such that the soils on the sides and bottom of the shaft are relatively undisturbed. Intimate contact must be made between the concrete and surrounding soils. The use of surface casing and/or slurry may be required to facilitate installation and prevent collapses within the hole, especially below the groundwater level. Natural slurry is not allowed by the FDOT specifications and should not be relied upon to prevent caving of soils and maintaining an open hole. Cross-Hole Sonic Logging (CSL) tests are required at every drilled shaft.

Due to the presence of layers of dense material at the Ramp E Gantry, we recommend project plans include the following note for the shaft excavation:

Layers of dense sand may be encountered at this site. Such materials may make shaft excavation and/or temporary casing installation difficult. The Contractor shall expect to encounter these types of materials at the shaft location and shall use specialized equipment and/or procedures as necessary to facilitate shaft excavation and/or temporary casing installation. When temporary casing is used, the casing tip shall be reinforced and the casing thickness shall be adequate to prevent casing damage/deformation during installation through hard layers.

Shafts located adjacent to slopes steeper than 4:1 may need to be lengthened to account for reduced soil capacity. Shafts located in areas where fill is required to raise grades should be constructed after placement of fill soils to avoid settlement of the shaft, which may occur during fill placement.

Based on information provided by AECOM, we understand the following drilled shaft parameters are required to meet lateral stability and torsion requirements:

Table 4
Summary of Toll Gantry Drilled Shaft Parameters

Gantry	Boring No.	Upright	Shaft Diameter (feet)	Top of Shaft Elevation (ft NAVD88)	Bottom of Shaft Elevation (ft NAVD88)	Shaft Length (feet)
Ramp E	TG-4	LT	4.5	+72.3	+38.3	34.0
	TG-3	RT	4.5	+68.9	+34.9	34.0
Ramp F	TG-2	LT	4.5	+62.3	+28.3	34.0
	TG-1	RT	4.5	+61.8	+27.8	34.0

GEC analyzed axial capacity for 4.5-foot diameter drilled shafts for the Ramp E and F Toll Gantries using the FDOT computer program FB-Deep Version 2.04, which is based on FDOT Research Bulletin RB-121, and the drilled shaft dimensions provided by AECOM. The following table summarizes the results of our axial analyses for the toll gantry foundations:

Table 5
Summary of Toll Gantry Drilled Shaft Axial Capacity Analyses

Gantry	Upright	[1]Axial Service Load (tons)	[2]Allowable Skin Friction Q_S (tons)	Factory of Safety
Ramp E	LT	7.0	71.0	10.1
	RT	7.0	71.4	10.2
Ramp F	LT	7.0	69.9	10.0
	RT	7.0	87.6	12.5

1. Service loads provided by AECOM.
2. Based on factor of safety of 2.4.

Based on the results of the axial capacity analyses a minimum safety factor of 2.5 is provided for axial capacity of the deep foundations service load in accordance with the FTE GTR.

7.2 Equipment Building and Toll Support Facilities Foundations

On the basis of the data obtained for this study, in our opinion the Ramp E and F toll sites can be made suitable for support of the proposed equipment buildings on a system of conventional shallow isolated spread footings and/or continuous strip footings and the proposed fuel tank, generator and transformer upon a slab-on-grade. This conclusion is contingent on the design Engineer's and contractor's adherence to the following recommendations:

- Use a maximum net soil bearing pressure of 2,500 pounds per square foot in footing design.
- Use minimum footing dimensions of 24 inches for isolated spread footings and 18 inches for strip footings even though the maximum net soil bearing pressure may not be fully developed in all cases.
- Design foundations so that all exterior footings bear at least 18 inches below finished exterior grades.
- Support slabs constructed on-grade on a compacted sand base.
- Prepare site and compact foundation subsoils in accordance with FDOT Standard Specifications.

Our analysis indicates that shallow foundations designed and constructed in accordance with the above recommendations, assuming footing loads no heavier than those typical for a one-story structure, will experience total settlements of less than 1 inch and differential settlements between footings less than 0.5 inches.

7.3 Sign & Mast Arm Signal Pole Drilled Shaft Foundations

GEC understands the cantilever and truss sign foundations and mast arm signal pole (MASP) foundations will be designed in accordance with FDOT Standard Index drawings. Soil parameters for use in design of the drilled shaft foundations are summarized in **Tables 9** and **10** in the **Appendix**.

The drilled shafts should be constructed in accordance with FDOT Standard Specifications - Section 455. The drilled shaft foundations must be installed such that the soils on the sides and bottom of the shaft are relatively undisturbed. Intimate contact must be made between the concrete and surrounding soils. The use of surface casing and/or slurry may be required to facilitate installation and prevent collapses within the hole, especially below the groundwater level. Natural slurry is not allowed by the FDOT specifications and should not be relied upon to prevent caving of soils and maintaining an open hole.

Shafts located adjacent to slopes steeper than 4:1 may need to be lengthened to account for reduced soil capacity. Shafts located in areas where fill is required to raise grades should be constructed after placement of fill soils to avoid settlement of the shaft, which may occur during fill placement.

7.4 Box Culvert Structure Foundations

…layers of deep buried organic soils are present beneath the southern half of the proposed CD-2 box culvert site.

As discussed in Section 6.3 of this report, layers of deep buried organic soils are present beneath the southern half of the proposed CD-2 box culvert site. Organic soil layers typically consisted of very soft to soft muck to sandy muck to mucky fine sand (PT) encountered at elevations ranging from +10 to -50 feet NAVD88 (depths ranging from 27 to 98 feet below existing ground surface) with organic contents ranging from 5 to 80 percent. These layers are soft and compressible and would cause significant post-construction settlement of the new roadway embankment and associated box culvert if left untreated.

…GEC recommends a program of special embankment construction with surcharging to facilitate embankment, bridge foundation, wall, and box culvert construction in this area.

Because of the depth of the organic soil layers, total demucking and traditional ground improvement techniques are not practical. Based on our discussions with the FDOT Geotechnical Department and evaluation of mitigation alternatives for the organic soil deposits at this site, GEC recommends a program of special embankment construction with surcharging to facilitate embankment, bridge foundation, wall, and box culvert construction in this area.

With the application of a surcharge program at the CD-2 box culvert site, the total long-term settlements after construction of the box culvert can be significantly reduced such that the culvert foundation can be constructed utilizing a shallow mat foundation system (the bottom of the culvert structure). The endwalls/wingwalls may be supported on spread footings. This recommendation is contingent on the application of the roadway embankment surcharge in this area. GEC's analyses and recommendations regarding the surcharge program in this area are included under separate cover in our Report of Geotechnical Engineering Investigation for Muck Surcharge.

After removal of the roadway embankment surcharge, the structure area and foundation subsoil should be prepared in accordance with the FDOT Design Standards and the FDOT Standard Specifications for Road and Bridge Construction. Any unsuitable (organic) soils, if encountered, within 5 feet laterally of the footing bottom should be removed.

Soil parameters for box culvert design are summarized in **Table 11** in the **Appendix**. These parameters are provided assuming the muck surcharge program is performed…

Soil parameters for box culvert design are summarized in **Table 11** in the **Appendix**. These parameters are provided assuming the muck surcharge program is performed at the proposed CD-2 box culvert site and that foundation and backfill soils are prepared in accordance with the FDOT Design Standards and the FDOT Standard Specifications for Road and Bridge Construction.

7.5 ITS CCTV Pole Foundations

GEC understands the ITS CCTV poles will be designed using subsurface data and soil strength parameters provided in this report. Based on our boring results, the soils appear appropriate for support of the CCTV pole foundations. Soil parameters for use in design of the CCTV pole foundations are summarized in **Table 12** in the **Appendix**.

8.0 USE OF THIS REPORT

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

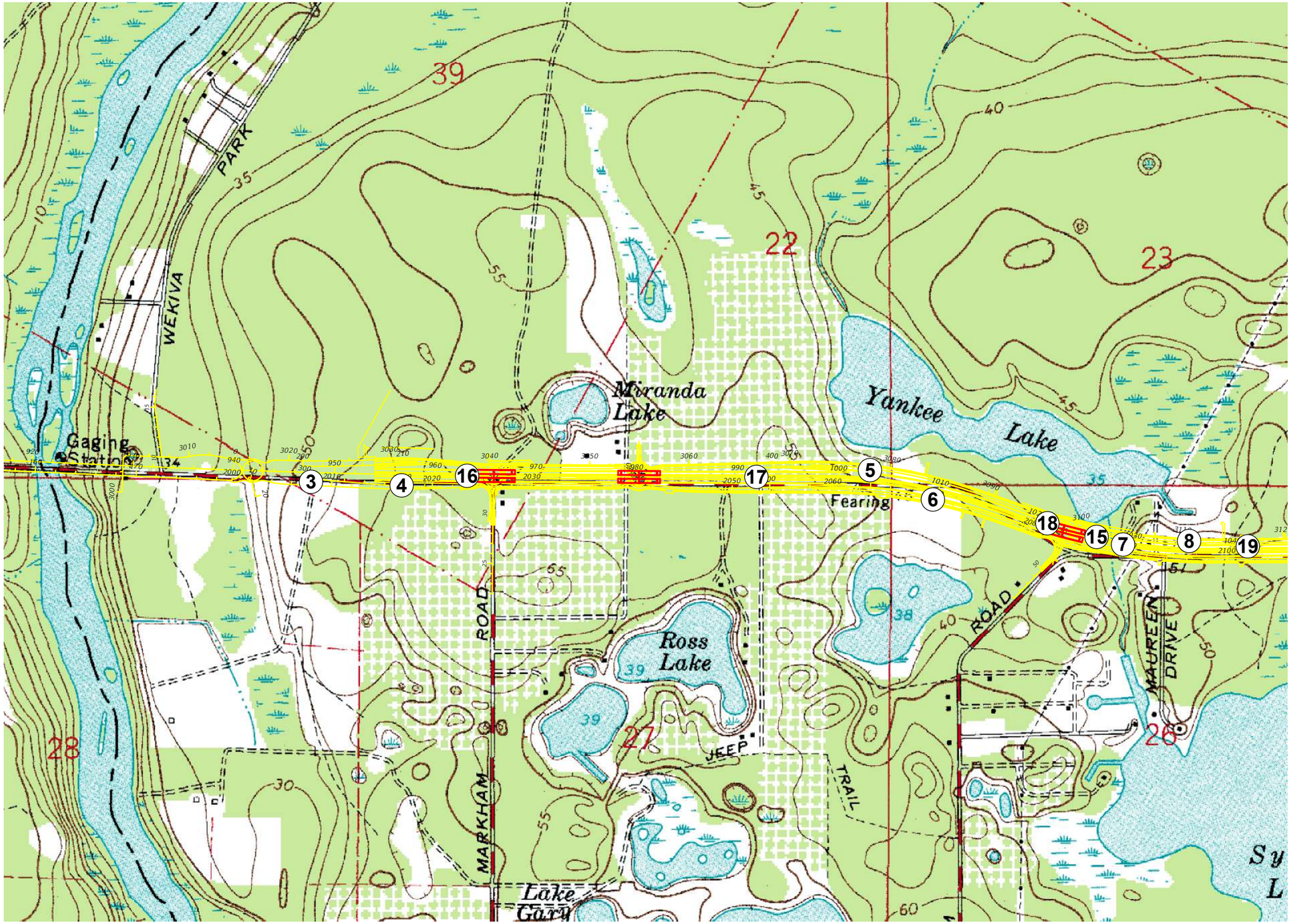
The sole purpose of the borings performed by GEC at this site was to obtain indications of subsurface conditions as part of a geotechnical exploration program. GEC has not evaluated the soil from the miscellaneous structure borings for the potential presence of contaminated soil or groundwater, nor have we subjected any soil samples to analysis for contaminants. Our Level 1 CIA Report is submitted under separate cover.

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.

APPENDIX

USGS QUADRANGLE AND NRCS SOIL SURVEY MAPS

1. RAMP F TOLL FACILITY (712+00, 30' LEFT)
2. RAMP E TOLL FACILITY (615+80, 30' RIGHT)
3. CANTILEVER SIGN 1 (947+57, 73' RIGHT)
4. CANTILEVER SIGN 2 (956+56, 60' RIGHT)
5. CANTILEVER SIGN 3 (1002+95, 78' LEFT)
6. CANTILEVER SIGN 4 (1009+36, 73' RIGHT)
7. CANTILEVER SIGN 5 (1029+35, 60' LEFT)
8. TRUSS SIGN 6 (1035+76, 60' LEFT, 60' RIGHT)
9. TRUSS SIGN 7 (1052+00, 60' LEFT, 60' RIGHT)
10. CANTILEVER SIGN 8 (1062+16, 73' RIGHT)
11. TRUSS SIGN 9 (1075+36, 60' LEFT, 60' RIGHT)
12. CANTILEVER SIGN 10 (3167+20, 20' LEFT)
13. TRUSS SIGN 11 (1101+76, 60' LEFT, 60' RIGHT)
14. MASP A (2164+04, 122' LEFT)
14. MASP B (191+27, 86' LEFT)
14. MASP C (191+53, 86' RIGHT)
14. MASP D (2164+29, 42' RIGHT)
15. BOX CULVERT (CD-2) (1027+14-1027+49)
16. ITS POLE 1 (964+26, 70' LEFT)
17. ITS POLE 2 (991+85, 73' LEFT)
18. ITS POLE 3 (1021+58, 71' LEFT)
19. ITS POLE 4 (1041+61, 71' LEFT)
20. ITS POLE 5 (1061+64, 71' LEFT)
21. ITS POLE 6 (1084+60, 71' LEFT)
22. ITS POLE 7 (1109+49, 71' LEFT)



USGS Sanford SW, FL Quadrangle Map
USGS Sanford, FL Quadrangle Map
Sections: 22, 23, 25, 26, 27, 28, 39
Township: 19 South
Range: 29 East

Section: 30
Townsip: 19 South
Range: 30 East

0 500 1,000
Feet

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DANIEL C. STANFILL P.E. NO. 42763

GEC

PROJECT NO.	3520G
DATE	6-22-17
DRAWN BY	SKR
CHECKED BY	CGB 71571
CHECKED BY	DCS 42763

USGS QUADRANGLE MAP

WEKIVA PARKWAY (SR 429) SECTION 7A

FIGURE NO. 1A

J:\D107\3520E Wekiva 7A\5-3-17\3520GquadA.mxd 7/13/2017

1. RAMP F TOLL FACILITY (712+00, 30' LEFT)
2. RAMP E TOLL FACILITY (615+80, 30' RIGHT)
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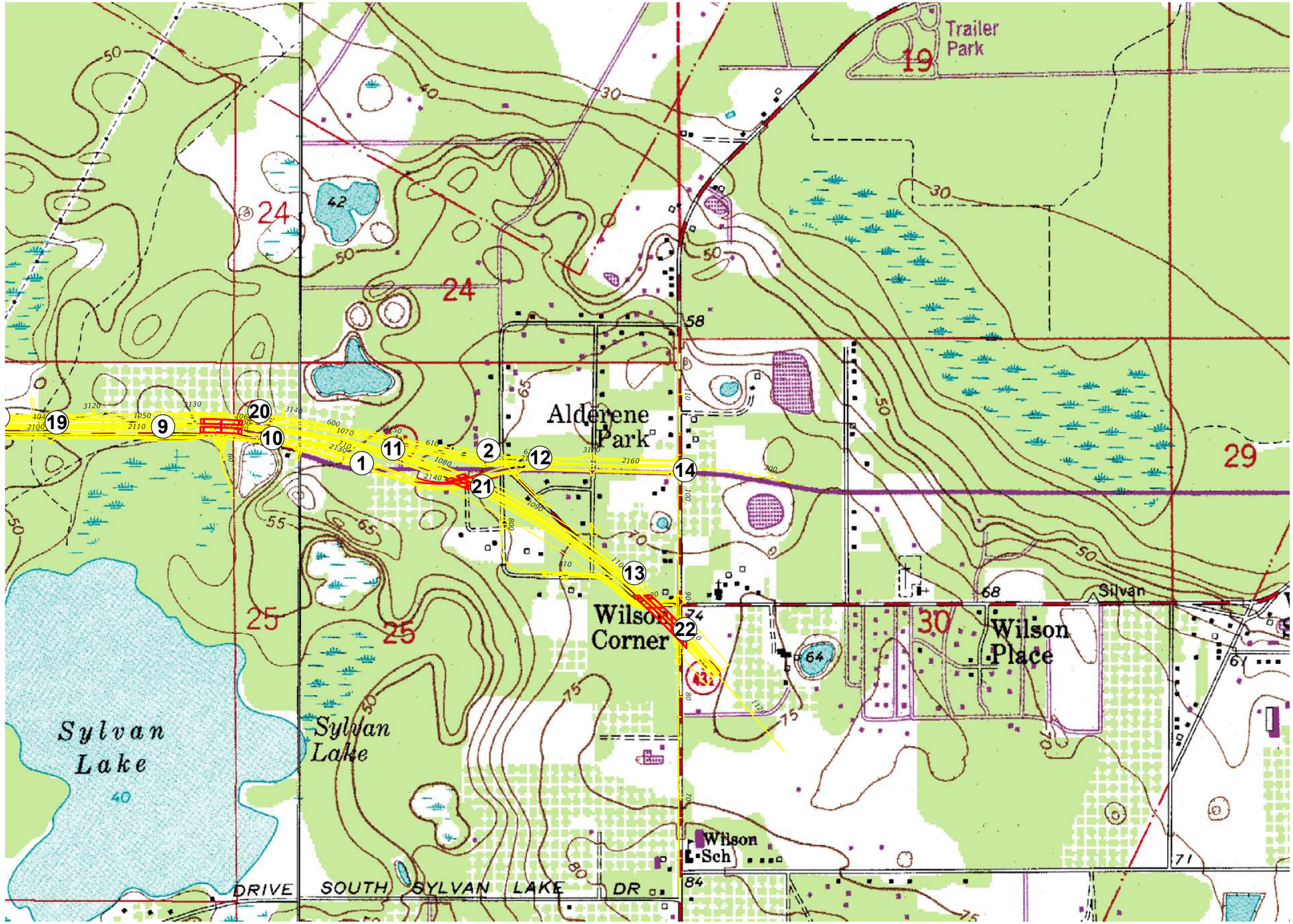

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USGS Sanford, FL Quadrangle Map
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Township: 19 South
Range: 29 East

Section: 30
Townsip: 19 South
Range: 30 East

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PROJECT NO.	DRAWN BY	CHECKED BY	CHECKED BY
3520G	SKR	CGB 71571	DCS 42763

DATE 6-22-17

USGS QUADRANGLE MAP

WEKIVA PARKWAY (SR 429) SECTION 7A

FIGURE NO. 1B

J:\D107\3520E Wekiva 7A\5-3-17\3520GquadB.mxd 7/13/2017

1. RAMP F TOLL FACILITY (712+00, 30' LEFT)
2. RAMP E TOLL FACILITY (615+80, 30' RIGHT)
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4. CANTILEVER SIGN 2 (956+56, 60' RIGHT)
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8. TRUSS SIGN 6 (1035+76, 60' LEFT, 60' RIGHT)
9. TRUSS SIGN 7 (1052+00, 60' LEFT, 60' RIGHT)
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22. ITS POLE 7 (1109+49, 71' LEFT)

NRCS Soil Survey of Seminole County, FL
Seminole County Map Unit Legend
2 - Adamsville-Sparr fine sands
6 - Astatula-Apopka fine sands, 0 to 5 percent slopes
10 - Basinger, Samsula, and Hontoon soils, depressional
13 - EauGallie and Immokalee fine sands
20 - Myakka and EauGallie fine sands
27 - Pomello fine sand, 0 to 5 percent slopes
31 - Tavares-Millhopper fine sands, 0 to 5 percent slopes

0 500 1,000
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CHECKED BY	CGB 71571
CHECKED BY	DCS 42763

NRCS SOIL SURVEY MAP

WEKIVA PARKWAY (SR 429) SECTION 7A

FIGURE NO. 2A

J:\D107\3520E Wekiva 7A\5-3-17\3520G soils.mxd 7/13/2017

1. RAMP F TOLL FACILITY (712+00, 30' LEFT)
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Seminole County Map Unit Legend
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27 - Pomello fine sand, 0 to 5 percent slopes
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GEC

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CHECKED BY	CGB 71571
CHECKED BY	DCS 42763

NRCS SOIL SURVEY MAP

WEKIVA PARKWAY (SR 429) SECTION 7A

FIGURE NO. 2B

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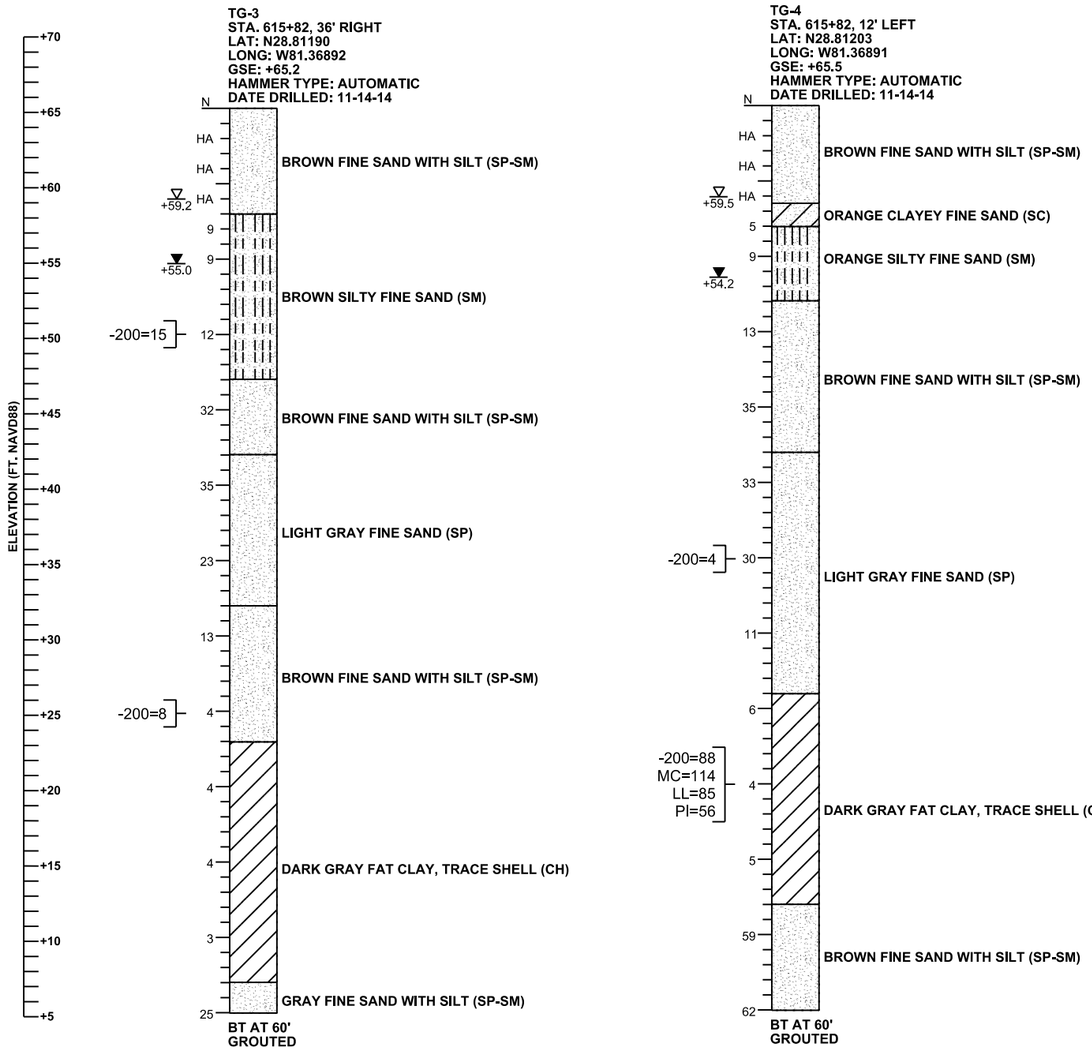
REPORT OF SPT BORINGS
RAMP F & E TOLL GANTRIES



LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
▽ +59.5	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
▼ +54.2	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) ON DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE
MC=	PERCENT NATURAL MOISTURE CONTENT
LL=	LIQUID LIMIT
PI=	PLASTICITY INDEX

SAND — SAND AND CLAY

SAND AND SILT — CLAY

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

STANDARD PENETRATION TEST BORINGS WERE PERFORMED IN ACCORDANCE WITH ASTM D-1586. STANDARD PENETRATION RESISTANCES ARE SHOWN ON THE BORINGS AT THE TEST DEPTHS IN IN BLOWS PER FOOT UNLESS OTHERWISE NOTED.

THE BORING LOCATIONS WERE ESTABLISHED IN THE FIELD USING SUB-METER ACCURACY GPS UNIT (TRIMBLE GEO 7X). GROUND SURFACE ELEVATIONS ESTIMATED FROM PROJECT CROSS SECTIONS. BORING LOCATIONS REFERENCE THE RAMP E BASELINE.

BASED ON REVIEW OF THE U.S. GEOLOGICAL SURVEY MAP ENTITLED "POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND VICINITY, FLORIDA, SEPTEMBER 2008" FOR THE PROJECT AREA, THE MAXIMUM ELEVATION OF THE ARTESIAN HEAD IS ESTIMATED TO BE +26 FT. NAVD88. THE CONTRACTOR SHALL BE PREPARED TO HANDLE ARTESIAN HEAD LEVELS UP TO +26 FT. NAVD88.

SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SECTION: 25
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

Tri-Chord Truss Ramp Gantry - Structure No. ######

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

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DANIEL C. STANFILL PE NO. 42763

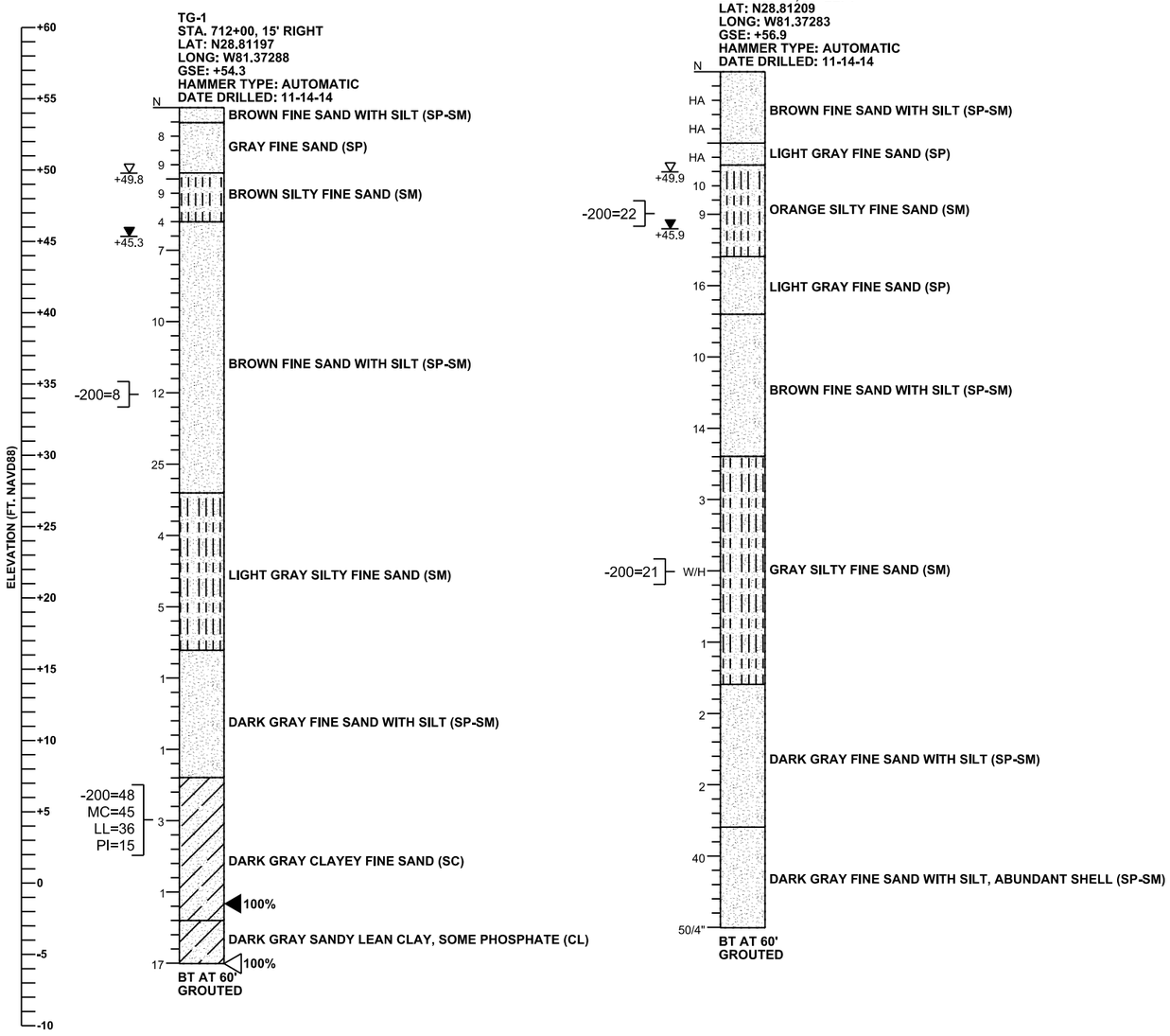
DRAWN BY: SKR
CHECKED BY: CGB 71571
DESIGNED BY: CGB 71571
CHECKED BY: DCS 42763

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 429	SEMINOLE	240200-2-52-01

SHEET TITLE: *REPORT OF SPT BORINGS RAMP E GANTRY*
REF. DWG. NO.:
PROJECT NAME: *WEKIVA PARKWAY SECTION 7A*
SHEET NO.: *GB-6*

Scott 5/3/2017 2:01:08 PM J:\D109\3520G Wekiva Parkway Section 7A\b1boring14.dgn



LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
50/4"	NUMBER OF BLOWS FOR 4 INCHES OF PENETRATION
W/H	WEIGHT OF HAMMER
▽ +49.9	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
▼ +45.9	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) ON DATE DRILLED
◀ 100%	PERCENT LOSS OF DRILLING FLUID
◁ 100%	PERCENT RETURN OF DRILLING FLUID
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE
MC=	PERCENT NATURAL MOISTURE CONTENT
LL=	LIQUID LIMIT
PI=	PLASTICITY INDEX

SAND

SAND AND CLAY

SAND AND SILT

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

STANDARD PENETRATION TEST BORINGS WERE PERFORMED IN ACCORDANCE WITH ASTM D-1586. STANDARD PENETRATION RESISTANCES ARE SHOWN ON THE BORINGS AT THE TEST DEPTHS IN IN BLOWS PER FOOT UNLESS OTHERWISE NOTED.

THE BORING LOCATIONS WERE ESTABLISHED IN THE FIELD USING SUB-METER ACCURACY GPS UNIT (TRIMBLE GEO 7X). GROUND SURFACE ELEVATIONS ESTIMATED FROM PROJECT CROSS SECTIONS. BORING LOCATIONS REFERENCE THE RAMP F BASELINE.

BASED ON REVIEW OF THE U.S. GEOLOGICAL SURVEY MAP ENTITLED "POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND VICINITY, FLORIDA, SEPTEMBER 2008" FOR THE PROJECT AREA, THE MAXIMUM ELEVATION OF THE ARTESIAN HEAD IS ESTIMATED TO BE +26 FT. NAVD88. THE CONTRACTOR SHALL BE PREPARED TO HANDLE ARTESIAN HEAD LEVELS UP TO +26 FT. NAVD88.

SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SECTION: 25
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

Tri-Chord Truss Ramp Gantry - Structure No. ######

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
919 Lake Baldwin Lane
Orlando, FL 32814
T 407-898-1818 F 407-898-1837
Certificate of Authorization No. 5882
DANIEL C. STANFILL PE NO. 42763

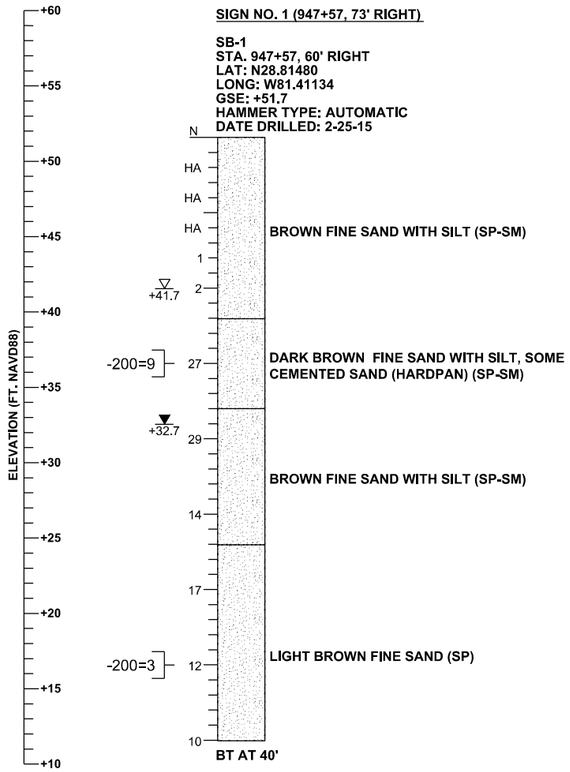
DRAWN BY: SKR
CHECKED BY: CGB 71571
DESIGNED BY: CGB 71571
CHECKED BY: DCS 42763

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
429	SEMINOLE	240200-2-52-01

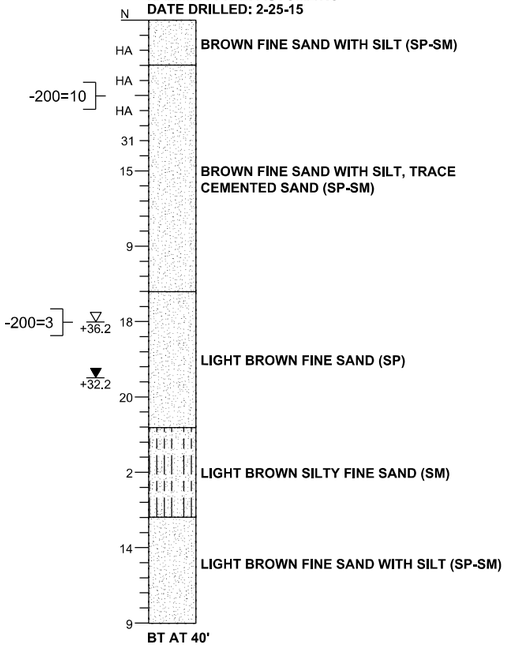
SHEET TITLE: REPORT OF SPT BORINGS RAMP F GANTRY
REF. DWG. NO.: GB-7
PROJECT NAME: WEKIVA PARKWAY SECTION 7A
SHEET NO.:

REPORT OF SPT BORINGS
CANTILEVER & TRUSS SIGNS



SIGN NO. 1 (947+57, 73' RIGHT)

SB-1
STA. 947+57, 60' RIGHT
LAT: N28.81480
LONG: W81.41134
GSE: +51.7
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 2-25-15



SIGN NO. 2 (956+56, 60' RIGHT)

SB-2
STA. 956+56, 60' RIGHT
LAT: N28.81475
LONG: W81.40853
GSE: +56.2
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 2-25-15

LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
▽ +36.2	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
▼ +32.2	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) ON DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE

SAND

SAND AND SILT

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

STANDARD PENETRATION TEST BORINGS WERE PERFORMED IN ACCORDANCE WITH ASTM D-1586. STANDARD PENETRATION RESISTANCES ARE SHOWN ON THE BORINGS AT THE TEST DEPTHS IN IN BLOWS PER FOOT UNLESS OTHERWISE NOTED.

THE BORING LOCATIONS WERE ESTABLISHED IN THE FIELD USING SUB-METER ACCURACY GPS UNIT (TRIMBLE GEO 7X). GROUND SURFACE ELEVATIONS ESTIMATED FROM PROJECT CROSS SECTIONS. BORING LOCATIONS REFERENCE THE SR 429 CENTERLINE.

BASED ON REVIEW OF THE U.S. GEOLOGICAL SURVEY MAP ENTITLED "POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND VICINITY, FLORIDA, SEPTEMBER 2008" FOR THE PROJECT AREA, THE MAXIMUM ELEVATION OF THE ARTESIAN HEAD IS ESTIMATED TO BE +20 FT. NAVD88. THE CONTRACTOR SHALL BE PREPARED TO HANDLE ARTESIAN HEAD LEVELS UP TO +20 FT. NAVD88.

SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SECTION: 39
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
919 Lake Baldwin Lane
Orlando, FL 32814
T 407-898-1818 F 407-898-1837
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DRAWN BY:	SKR
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DESIGNED BY:	CGB 71571
CHECKED BY:	CGB 71571

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 429	SEMINOLE	240200-2-52-01

SHEET TITLE: REPORT OF SPT BORINGS

REF. DWG. NO.:

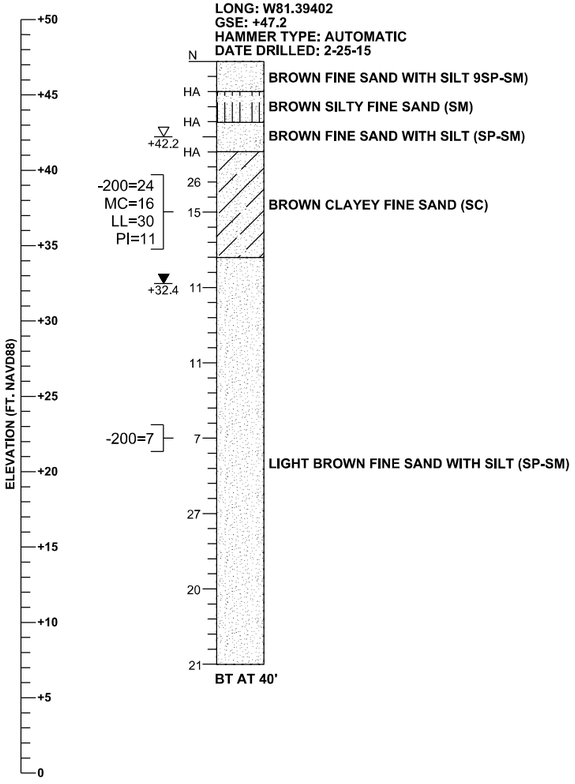
PROJECT NAME: WEKIVA PARKWAY SECTION 7A

SHEET NO.: S-90

scott 7/6/2017 10:38:11 AM J:\D109\3520G Wekiva Parkway Section 7A\b1boring18.dgn

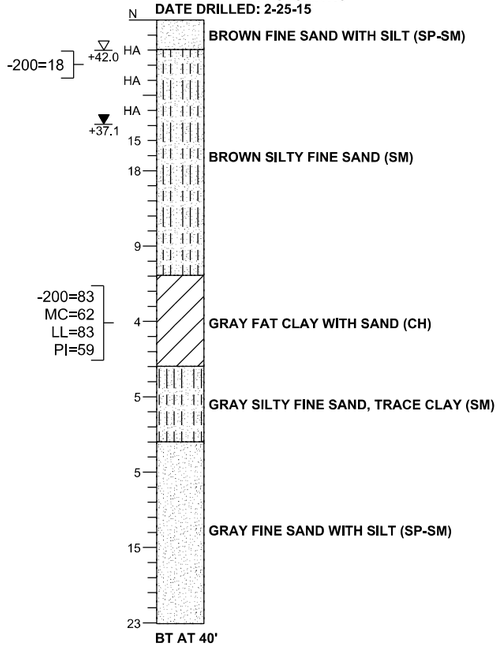
SIGN NO. 3 (1002+95, 78' LEFT)

SB-3
STA. 1002+95, 77' LEFT
LAT: N28.81502
LONG: W81.39402
GSE: +47.2
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 2-25-15



SIGN NO. 4 (1009+36, 73' RIGHT)

SB-4
STA. 1009+36, 73' RIGHT
LAT: N28.81434
LONG: W81.39212
GSE: +44.0
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 2-25-15



LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
▽ +42.4	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
▼ +32.4	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) ON DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE
MC=	PERCENT NATURAL MOISTURE CONTENT
LL=	LIQUID LIMIT
PI=	PLASTICITY INDEX

SAND — SAND AND CLAY
SAND AND SILT — CLAY

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

STANDARD PENETRATION TEST BORINGS WERE PERFORMED IN ACCORDANCE WITH ASTM D-1586. STANDARD PENETRATION RESISTANCES ARE SHOWN ON THE BORINGS AT THE TEST DEPTHS IN IN BLOWS PER FOOT UNLESS OTHERWISE NOTED.

THE BORING LOCATIONS WERE ESTABLISHED IN THE FIELD USING SUB-METER ACCURACY GPS UNIT (TRIMBLE GEO 7X). GROUND SURFACE ELEVATIONS ESTIMATED FROM PROJECT CROSS SECTIONS. BORING LOCATIONS REFERENCE THE SR 429 CENTERLINE.

BASED ON REVIEW OF THE U.S. GEOLOGICAL SURVEY MAP ENTITLED "POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND VICINITY, FLORIDA, SEPTEMBER 2008" FOR THE PROJECT AREA, THE MAXIMUM ELEVATION OF THE ARTESIAN HEAD IS ESTIMATED TO BE +22 FT. NAVD88. THE CONTRACTOR SHALL BE PREPARED TO HANDLE ARTESIAN HEAD LEVELS UP TO +22 FT. NAVD88.

SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

BORING SB-3:
SECTION: 22
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

BORING SB-4:
SECTION: 26
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
919 Lake Baldwin Lane
Orlando, FL 32814
T 407-898-1818 F 407-898-1837
Certificate of Authorization No. 5882
DANIEL C. STANFILL PE NO. 42763

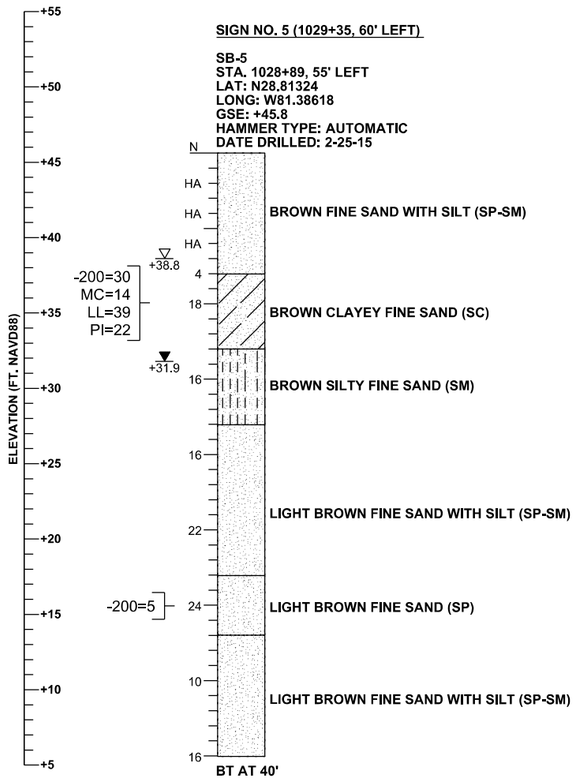
DRAWN BY: SKR
CHECKED BY: DCS 42763
DESIGNED BY: CGB 71571
CHECKED BY: CGB 71571

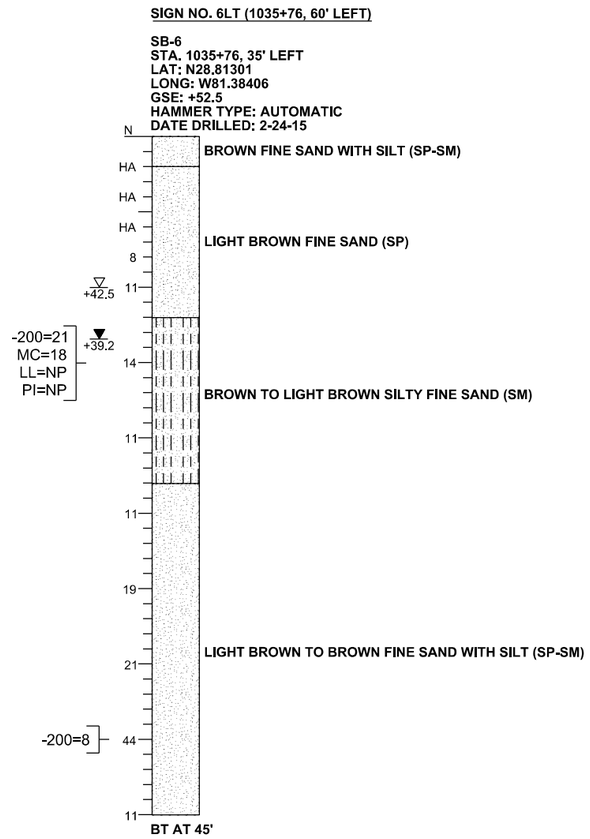
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

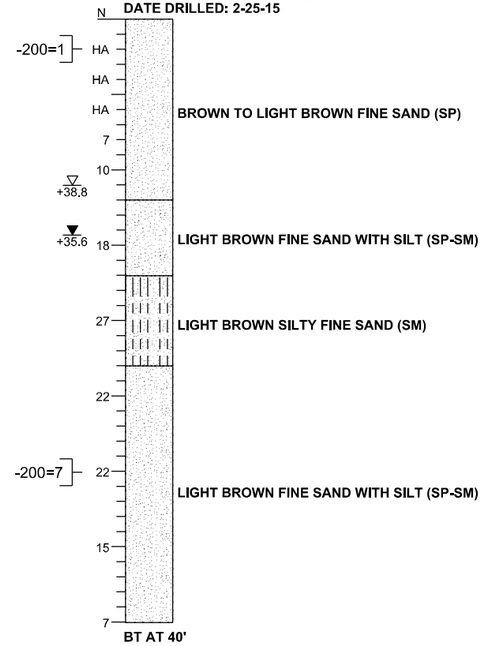
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 429	SEMINOLE	240200-2-52-01

SHEET TITLE: REPORT OF SPT BORINGS
REF. DWG. NO.
PROJECT NAME: WEKIVA PARKWAY SECTION 7A
SHEET NO. S-91

scott 7/6/2017 10:39:24 AM J:\D109\3520G Wekiva Parkway Section 7A\b1boring18.dgn







LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
+38.8 ▽	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
+31.9 ▼	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) ON DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE
MC=	PERCENT NATURAL MOISTURE CONTENT
LL=	LIQUID LIMIT
PI=	PLASTICITY INDEX
NP=	NON-PLASTIC

SAND

SAND AND CLAY

SAND AND SILT

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

STANDARD PENETRATION TEST BORINGS WERE PERFORMED IN ACCORDANCE WITH ASTM D-1586. STANDARD PENETRATION RESISTANCES ARE SHOWN ON THE BORINGS AT THE TEST DEPTHS IN IN BLOWS PER FOOT UNLESS OTHERWISE NOTED.

THE BORING LOCATIONS WERE ESTABLISHED IN THE FIELD USING SUB-METER ACCURACY GPS UNIT (TRIMBLE GEO 7X). GROUND SURFACE ELEVATIONS ESTIMATED FROM PROJECT CROSS SECTIONS. BORING LOCATIONS REFERENCE THE SR 429 CENTERLINE.

BASED ON REVIEW OF THE U.S. GEOLOGICAL SURVEY MAP ENTITLED "POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND VICINITY, FLORIDA, SEPTEMBER 2008" FOR THE PROJECT AREA, THE MAXIMUM ELEVATION OF THE ARTESIAN HEAD IS ESTIMATED TO BE +23 FT. NAVD88. THE CONTRACTOR SHALL BE PREPARED TO HANDLE ARTESIAN HEAD LEVELS UP TO +23 FT. NAVD88.

SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SECTION: 26
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
919 Lake Baldwin Lane
Orlando, FL 32814
T 407-898-1818 F 407-898-1837
Certificate of Authorization No. 5882
DANIEL C. STANFILL PE NO. 42763

DRAWN BY: SKR
CHECKED BY: DCS 42763
DESIGNED BY: CGB 71571
CHECKED BY: CGB 71571

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 429	SEMINOLE	240200-2-52-01

SHEET TITLE: REPORT OF SPT BORINGS

REF. DWG. NO.:

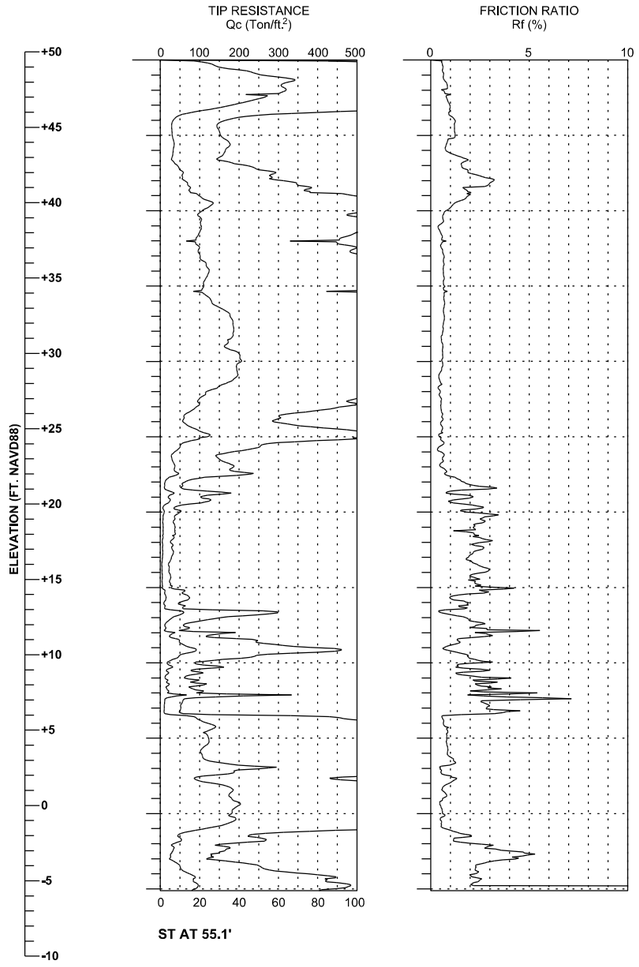
PROJECT NAME: WEKIVA PARKWAY SECTION 7A

SHEET NO.: S-92

scott 7/6/2017 10:39:53 AM J:\D109\3520G Wekiva Parkway Section 7A\b1boring18.dgn

SIGN NO. 7LT (1052+00, 60' LEFT)

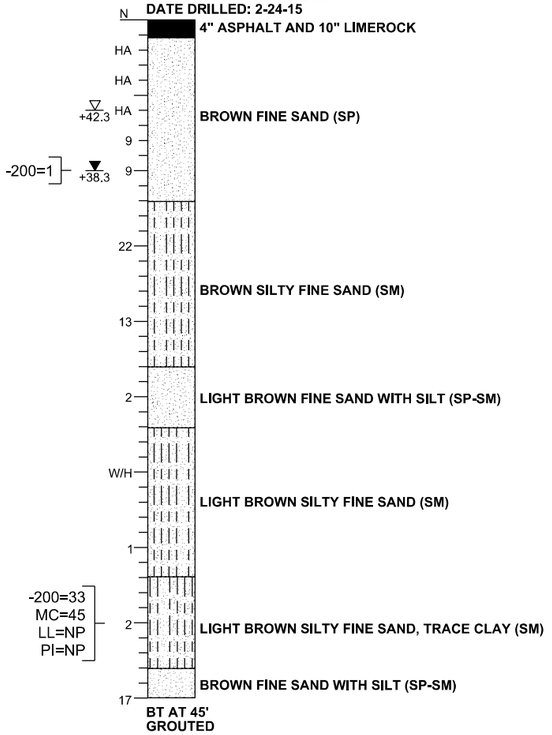
WB-74
STA. 1052+00, 60' LEFT
LAT: N28.81313
LONG: W81.37900
GSE: +49.4
DATE DRILLED: 7-14-14



ST AT 55.1'

SIGN NO. 7RT (1052+00, 60' RIGHT)

SB-8
STA. 1052+00, 60' RIGHT
LAT: N28.81280
LONG: W81.37899
GSE: +48.3
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 2-24-15



LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
W/H	WEIGHT OF HAMMER
▽ +42.3	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
▼ +38.3	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) ON DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE
MC=	PERCENT NATURAL MOISTURE CONTENT
LL=	LIQUID LIMIT
PI=	PLASTICITY INDEX
NP=	NON-PLASTIC

SAND

SAND AND SILT

GENERAL NOTES

STANDARD PENETRATION TEST BORINGS WERE PERFORMED IN ACCORDANCE WITH ASTM D-1586. STANDARD PENETRATION RESISTANCES ARE SHOWN ON THE BORINGS AT THE TEST DEPTHS IN IN BLOWS PER FOOT UNLESS OTHERWISE NOTED.

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

ELECTRONIC CONE PENETRATION TEST SOUNDINGS WERE PERFORMED IN ACCORDANCE WITH ASTM D-3441-79.

THE BORING AND SOUNDING LOCATIONS WERE ESTABLISHED IN THE FIELD USING SUB-METER ACCURACY GPS UNIT (TRIMBLE GEO 7X). GROUND SURFACE ELEVATIONS ESTIMATED FROM PROJECT CROSS SECTIONS. BORING AND SOUNDING LOCATIONS REFERENCE THE SR 429 CENTERLINE.

BASED ON REVIEW OF THE U.S. GEOLOGICAL SURVEY MAP ENTITLED "POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND VICINITY, FLORIDA, SEPTEMBER 2008" FOR THE PROJECT AREA, THE MAXIMUM ELEVATION OF THE ARTESIAN HEAD IS ESTIMATED TO BE +25 FT. NAVD88. THE CONTRACTOR SHALL BE PREPARED TO HANDLE ARTESIAN HEAD LEVELS UP TO +25 FT. NAVD88.

SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SECTION: 26
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS

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T 407-898-1818 F 407-898-1837
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DANIEL C. STANFILL PE NO. 42763

DRAWN BY:	SKR
CHECKED BY:	DCS 42763
DESIGNED BY:	CGB 71571
CHECKED BY:	CGB 71571

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 429	SEMINOLE	240200-2-52-01

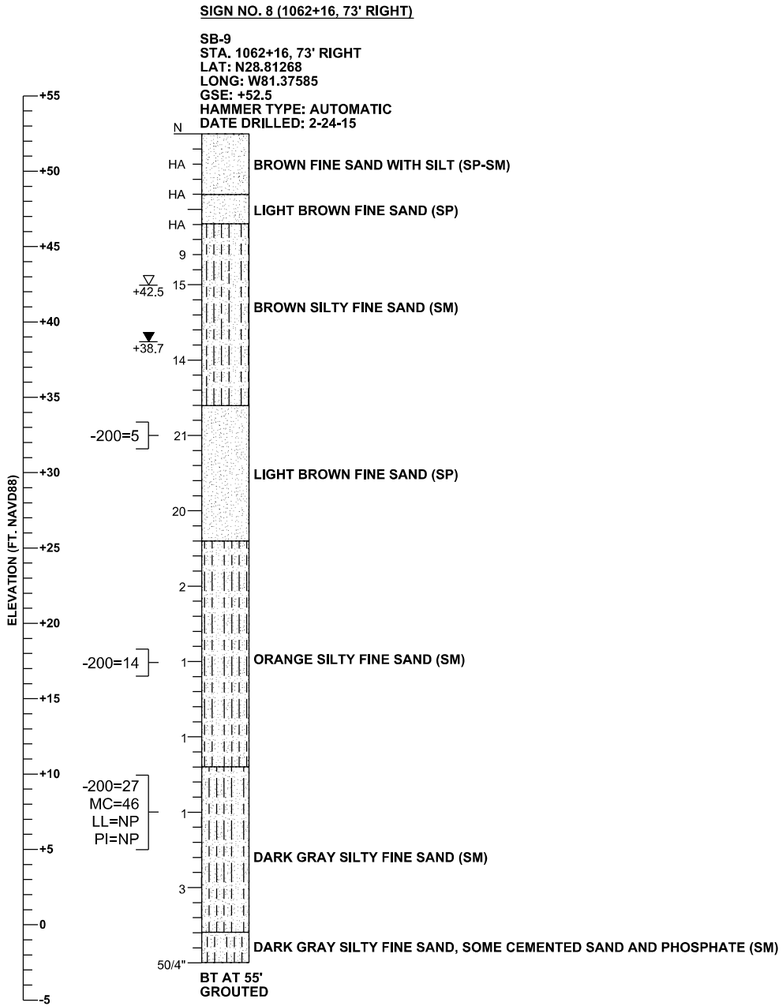
SHEET TITLE: REPORT OF SPT BORING AND CPT SOUNDING

REF. DWG. NO.:

PROJECT NAME: WEKIVA PARKWAY SECTION 7A

SHEET NO.: S-93

scott 7/6/2017 10:40:24 AM J:\D109\3520G Wekiva Parkway Section 7A\b1boring18.dgn



LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
50/4"	NUMBER OF BLOWS FOR 4 INCHES OF PENETRATION
▽ +42.5	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
▼ +38.7	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) ON DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE
MC=	PERCENT NATURAL MOISTURE CONTENT
LL=	LIQUID LIMIT
PI=	PLASTICITY INDEX
NP=	NON-PLASTIC

SAND

SAND AND SILT

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

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THE BORING LOCATIONS WERE ESTABLISHED IN THE FIELD USING SUB-METER ACCURACY GPS UNIT (TRIMBLE GEO 7X). GROUND SURFACE ELEVATIONS ESTIMATED FROM PROJECT CROSS SECTIONS. BORING LOCATIONS REFERENCE THE SR 429 CENTERLINE.

BASED ON REVIEW OF THE U.S. GEOLOGICAL SURVEY MAP ENTITLED "POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND VICINITY, FLORIDA, SEPTEMBER 2008" FOR THE PROJECT AREA, THE MAXIMUM ELEVATION OF THE ARTESIAN HEAD IS ESTIMATED TO BE +26 FT. NAVD88. THE CONTRACTOR SHALL BE PREPARED TO HANDLE ARTESIAN HEAD LEVELS UP TO +26 FT. NAVD88.

SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SECTION: 25
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
919 Lake Baldwin Lane
Orlando, FL 32814
T 407-898-1818 F 407-898-1837
Certificate of Authorization No. 5882
DANIEL C. STANFILL PE NO. 42763

DRAWN BY: SKR
CHECKED BY: DCS 42763
DESIGNED BY: CGB 71571
CHECKED BY: CGB 71571

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

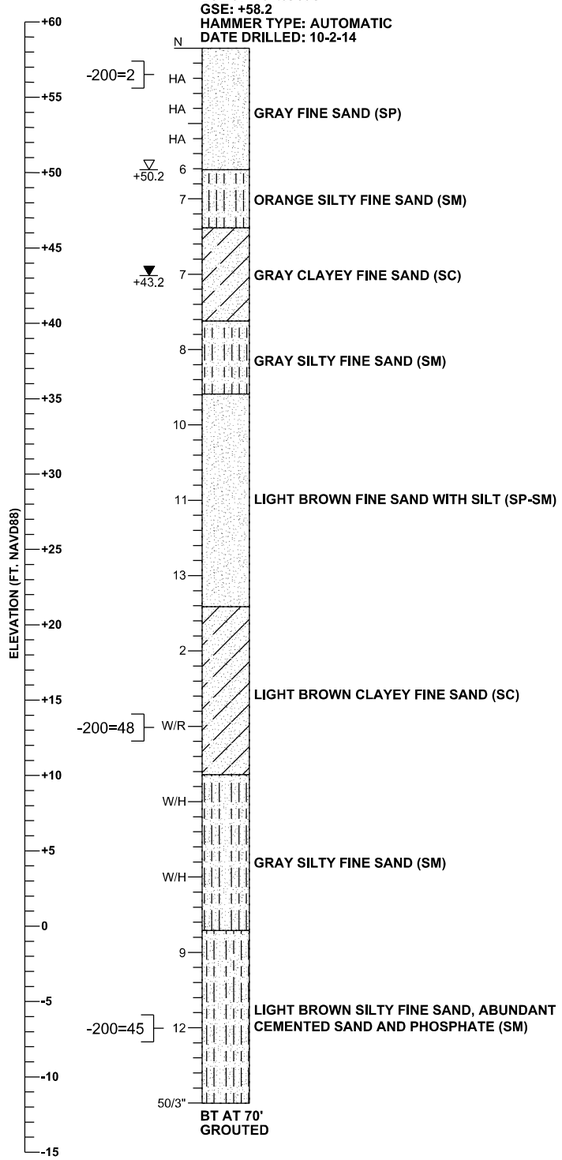
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 429	SEMINOLE	240200-2-52-01

SHEET TITLE: REPORT OF SPT BORINGS
REF. DWG. NO.
PROJECT NAME: WEKIVA PARKWAY SECTION 7A
SHEET NO. S-94

scott 7/6/2017 10:40:51 AM J:\D109\3520G Wekiva Parkway Section 7A\b1boring18.dgn

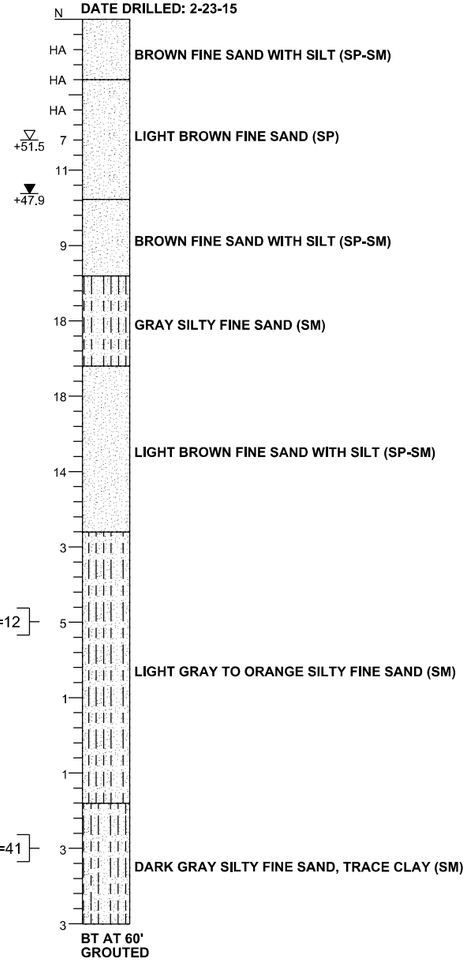
SIGN NO. 9LT (1075+36, 60' LEFT)

WB-93
STA. 3157+00, 45' RIGHT
LAT: 28.81242
LONG: W81.37164
GSE: +58.2
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 10-2-14



SIGN NO. 9RT (1075+36, 60' RIGHT)

SB-10
STA. 1075+36, 60' RIGHT
LAT: N28.81201
LONG: W81.37185
GSE: +59.5
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 2-23-15



LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
50/3"	NUMBER OF BLOWS FOR 3 INCHES OF PENETRATION
W/H	WEIGHT OF HAMMER
W/R	WEIGHT OF ROD
+50.2	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
+43.2	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) ON DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE

SAND — SAND AND CLAY — SAND AND SILT

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

STANDARD PENETRATION TEST BORINGS WERE PERFORMED IN ACCORDANCE WITH ASTM D-1586. STANDARD PENETRATION RESISTANCES ARE SHOWN ON THE BORINGS AT THE TEST DEPTHS IN IN BLOWS PER FOOT UNLESS OTHERWISE NOTED.

THE BORING LOCATIONS WERE ESTABLISHED IN THE FIELD USING SUB-METER ACCURACY GPS UNIT (TRIMBLE GEO 7X). GROUND SURFACE ELEVATIONS ESTIMATED FROM PROJECT CROSS SECTIONS. BORING LOCATIONS REFERENCE THE SR 429 CENTERLINE.

BASED ON REVIEW OF THE U.S. GEOLOGICAL SURVEY MAP ENTITLED "POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND VICINITY, FLORIDA, SEPTEMBER 2008" FOR THE PROJECT AREA, THE MAXIMUM ELEVATION OF THE ARTESIAN HEAD IS ESTIMATED TO BE +27 FT. NAVD88. THE CONTRACTOR SHALL BE PREPARED TO HANDLE ARTESIAN HEAD LEVELS UP TO +27 FT. NAVD88.

SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SECTION: 25
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

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REVISIONS

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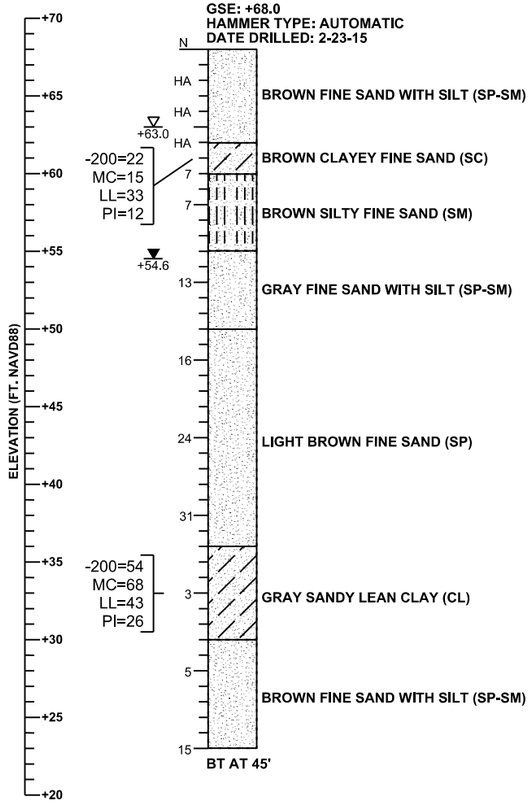
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 429	SEMINOLE	240200-2-52-01

SHEET TITLE: REPORT OF SPT BORINGS
REF. DWG. NO.
PROJECT NAME: WEKIVA PARKWAY SECTION 7A
SHEET NO. S-95

scott 7/6/2017 10:41:18 AM J:\D109\3520G Wekiva Parkway Section 7A\b1boring18.dgn



NO LONGER PROPOSED

SB-11
STA. 3164+90, 20' LEFT
LAT: N28.81214
LONG: W81.36731
GSE: +68.0
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 2-23-15

N
HA
HA
HA
+63.0
-200=22
MC=15
LL=33
PI=12
7
7
+54.6
13
16
24
31
3
5
15

BROWN FINE SAND WITH SILT (SP-SM)
BROWN CLAYEY FINE SAND (SC)
BROWN SILTY FINE SAND (SM)
GRAY FINE SAND WITH SILT (SP-SM)
LIGHT BROWN FINE SAND (SP)
-200=54
MC=68
LL=43
PI=26
GRAY SANDY LEAN CLAY (CL)
BROWN FINE SAND WITH SILT (SP-SM)
BT AT 45'

SIGN NO. 10 (3167+20, 20' LEFT)

SB-11A
STA. 3167+20, 20' LEFT
LAT: N28.81213
LONG: W81.36659
GSE: +68.0
HAMMER TYPE: N/A
DATE DRILLED: 7-6-17

GNE

LIGHT BROWN TO ORANGE FINE SAND WITH SILT (SP-SM)
BT AT 5'

SIGN NO. 10 (3167+20, 20' LEFT)

SB-11B
STA. 3167+20, C/L
LAT: N28.81207
LONG: W81.36659
GSE: +63.0
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 7-6-17

N
HA
HA
+59.0
HA
+55.0
18
11
50
7
43
23
4
19

LIGHT BROWN SILTY FINE SAND (SM)
LIGHT BROWN FINE SAND (SP)
LIGHT BROWN FINE SAND WITH SILT (SP-SM)
LIGHT GRAY FAT CLAY (CH)
LIGHT BROWN FINE SAND (SP)
LIGHT GRAY WEATHERED LIMESTONE
BT AT 40'
GROUTED

LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
▽ +63.0	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
▼ +54.6	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) ON DATE DRILLED
GNE	GROUNDWATER NOT ENCOUNTERED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE
MC=	PERCENT NATURAL MOISTURE CONTENT
LL=	LIQUID LIMIT
PI=	PLASTICITY INDEX

SAND | SAND AND CLAY | CLAY
SAND AND SILT | LIMESTONE

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

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SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SECTION: 25
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

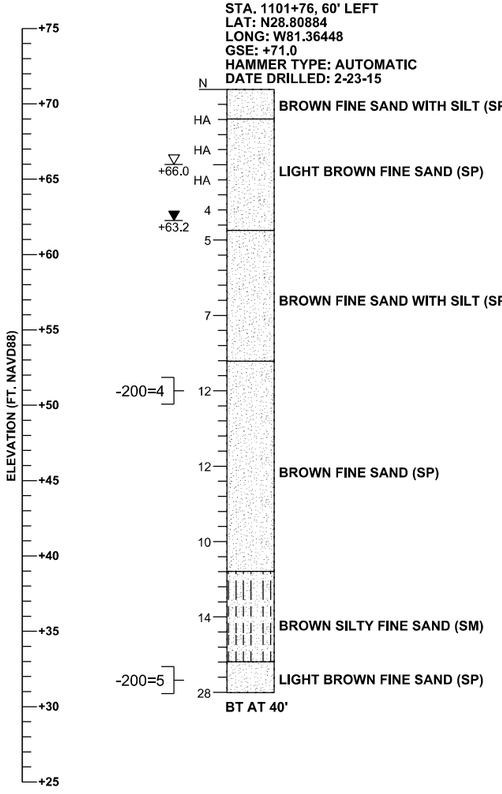
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 429	SEMINOLE	240200-2-52-01

SHEET TITLE: REPORT OF SPT BORINGS
REF. DWG. NO.:
PROJECT NAME: WEKIVA PARKWAY SECTION 7A
SHEET NO.: S-90

Scott 7/13/2017 1:22:23 PM J:\D109\3520G Wekiva Parkway Section 7A\b1boring18.dgn

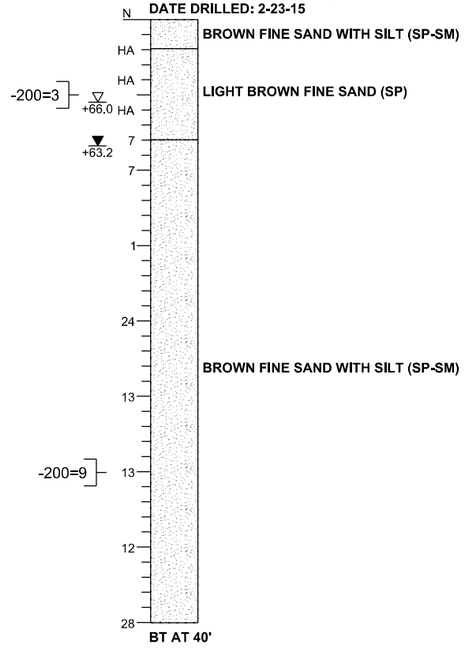
SIGN NO. 11LT (1101+76, 60' LEFT)

SB-12
STA. 1101+76, 60' LEFT
LAT: N28.80884
LONG: W81.36448
GSE: +71.0
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 2-23-15



SIGN NO. 11RT (1101+76, 60' RIGHT)

SB-13
STA. 1101+76, 70' RIGHT
LAT: N28.80859
LONG: W81.36472
GSE: +71.5
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 2-23-15



LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
+66.0 ▽	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
+63.2 ▼	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) ON DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE

SAND

SAND AND SILT

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

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SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SECTION: 25
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

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DANIEL C. STANFILL PE NO. 42763

DRAWN BY:	SKR
CHECKED BY:	DCS 42763
DESIGNED BY:	CGB 71571
CHECKED BY:	CGB 71571

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 429	SEMINOLE	240200-2-52-01

SHEET TITLE: REPORT OF SPT BORINGS

REF. DWG. NO.

PROJECT NAME: WEKIVA PARKWAY SECTION 7A

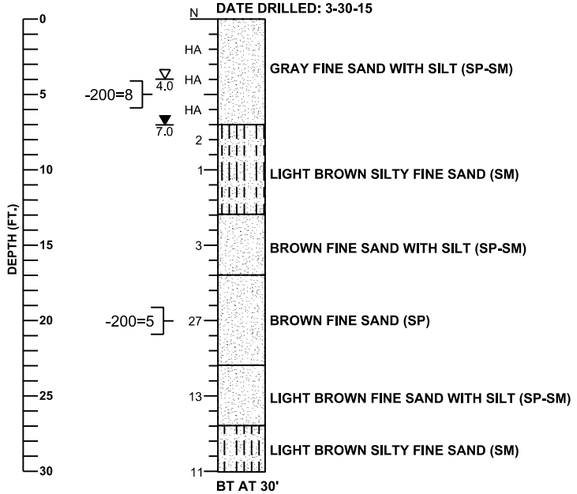
SHEET NO. S-97

scott 7/6/2017 10:42:15 AM J:\D109\3520G Wekiva Parkway Section 7A\b1boring18.dgn

REPORT OF SPT BORINGS
MAST ARM SIGNAL POLES

MASP A (2164+04, 122' LEFT)

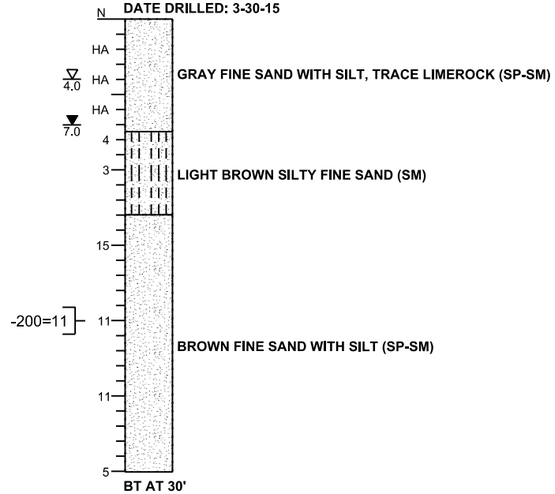
SB-14
STA. 103+52, 62' LEFT
LAT: N28.81207
LONG: W81.36324
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 3-30-15



BT AT 30'

MASP B (191+27, 86' LEFT)

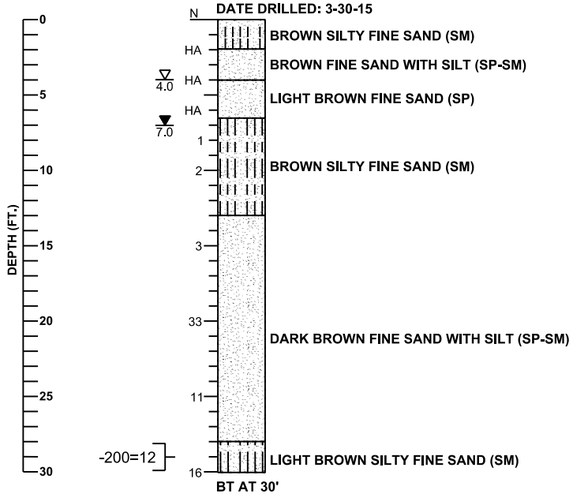
SB-15
STA. 103+57, 55' RIGHT
LAT: N28.81209
LONG: W81.36287
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 3-30-15



BT AT 30'

MASP C (191+53, 86' RIGHT)

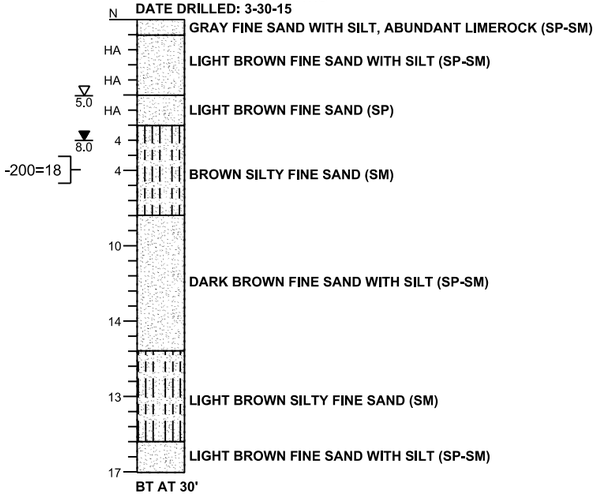
SB-16
STA. 101+93, 71' RIGHT
LAT: N28.81164
LONG: W81.36282
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 3-30-15



BT AT 30'

MASP D (2164+29, 42' RIGHT)

SB-17
STA. 101+76, 42' LEFT
LAT: N28.81159
LONG: W81.36317
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 3-30-15



BT AT 30'

LEGEND

N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
$\overline{4.0}$	ESTIMATED SEASONAL HIGH GROUNDWATER DEPTH (FT.)
$\overline{7.0}$	ENCOUNTERED GROUNDWATER DEPTH (FT.) ON DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE

SAND

SAND AND SILT

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

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INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SB-15 / SB-16
SECTION: 30
TOWNSHIP: 19 SOUTH
RANGE: 30 EAST

SB-14 / SB-17
SECTION: 25
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

REVISIONS

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
429	SEMINOLE	240200-2-52-01

SHEET TITLE: REPORT OF SPT BORINGS

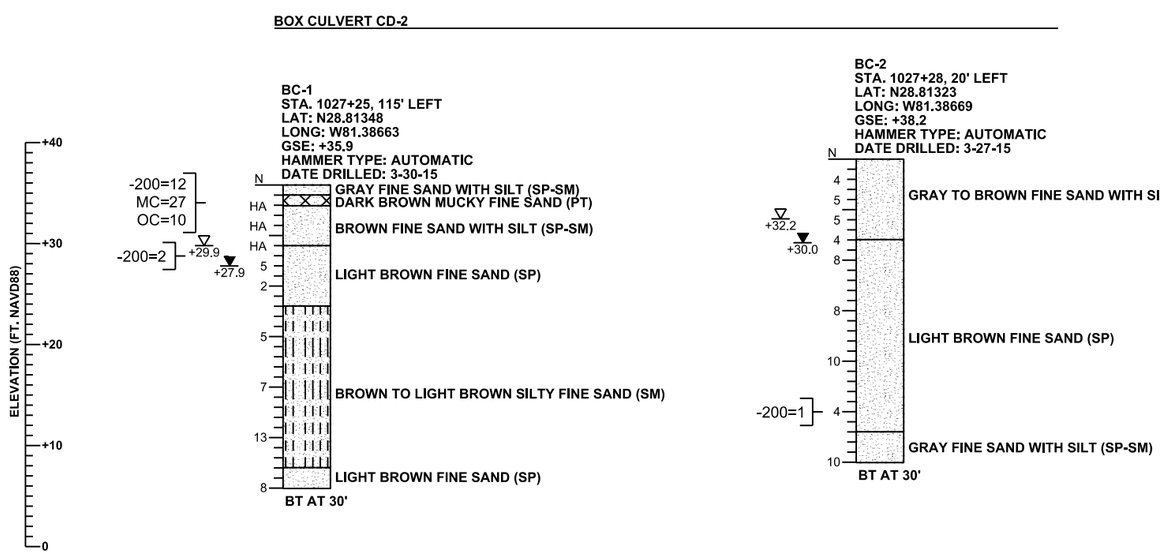
PROJECT NAME: WEKIVA PARKWAY SECTION 7A

REF. DWG. NO.

SHEET NO.

scott 5/12/2015 7:50:44 AM J:\D109\3520G Wekiva Parkway Section 7A\b1boring18.dgn

REPORT OF SPT BORINGS
BOX CULVERTS



LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
+29.9	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
+27.9	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) 24 HRS. AFTER DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE
MC=	PERCENT NATURAL MOISTURE CONTENT
OC=	PERCENT ORGANIC CONTENT

SAND

SAND AND MUCK

SAND AND SILT

GENERAL NOTES

STANDARD PENETRATION TEST BORINGS WERE PERFORMED IN ACCORDANCE WITH ASTM D-1586. STANDARD PENETRATION RESISTANCES ARE SHOWN ON THE BORINGS AT THE TEST DEPTHS IN IN BLOWS PER FOOT UNLESS OTHERWISE NOTED.

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

THE BORING LOCATIONS WERE NOT SURVEYED. BORING LOCATIONS WERE ESTABLISHED IN THE FIELD USING A SUB-METER ACCURACY GPS UNIT (TRIMBLE GEO XT AND XH) FOR HORIZONTAL CONTROL. GROUND SURFACE ELEVATIONS ESTIMATED FROM PROJECT CROSS SECTIONS. BORING LOCATIONS REFERENCE THE SR 429 CENTERLINE.

SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: SEE BORING

ENVIRONMENTAL CLASSIFICATION:
SUBSTRUCTURE:
STEEL: MODERATELY AGGRESSIVE
CONCRETE: SLIGHTLY AGGRESSIVE

SECTION: 26
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	MANUAL HAMMER N VALUE (blows per foot)	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-4	0-3	VERY LOOSE
	4-10	3-8	LOOSE
	10-30	8-24	MEDIUM DENSE
	30-50	24-40	DENSE
	OVER 50	OVER 40	VERY DENSE

NON-GRANULAR SOILS	MANUAL HAMMER N VALUE (blows per foot)	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-2	0-1	VERY SOFT
	2-4	1-3	SOFT
	4-8	3-6	FIRM
	8-15	6-12	STIFF
	15-30	12-24	VERY STIFF
	OVER 30	OVER 24	HARD

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
919 Lake Baldwin Lane
Orlando, FL 32814
T 407-898-1818 F 407-898-1837
Certificate of Authorization No. 5882
DANIEL C. STANFILL PE NO. 42763

DRAWN BY: SKR
CHECKED BY: CGB 71571
DESIGNED BY: CGB 71571
CHECKED BY: DCS 42763

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
429	SEMINOLE	240200-2-52-01

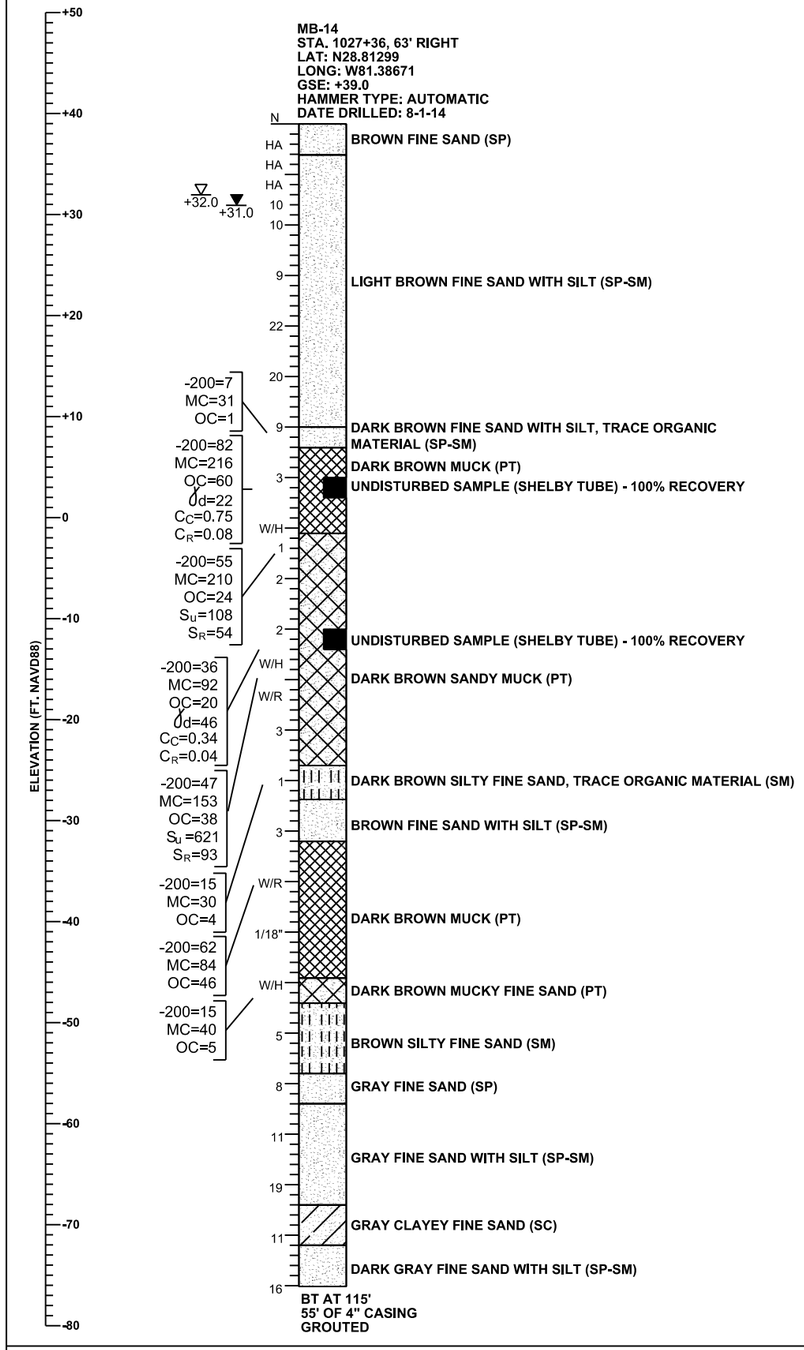
SHEET TITLE: REPORT OF SPT BORINGS FOR BOX CULVERTS

PROJECT NAME: WEKIVA PARKWAY (SR 429) SECTION 7A

REF. DWG. NO.

SHEET NO.

BOX CULVERT CD-2



MB-14
STA. 1027+36, 63' RIGHT
LAT: N28.81299
LONG: W81.38671
GSE: +39.0
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 8-1-14

N	HA	BROWN FINE SAND (SP)
	HA	
▽ +32.0 ▼ +31.0	HA	
	10	
	10	
	9	LIGHT BROWN FINE SAND WITH SILT (SP-SM)
	22	
-200=7, MC=31, OC=1	20	
	9	DARK BROWN FINE SAND WITH SILT, TRACE ORGANIC MATERIAL (SP-SM)
-200=82, MC=216, OC=60, γd=22, C_C=0.75, C_R=0.08	3	DARK BROWN MUCK (PT)
	W/H	UNDISTURBED SAMPLE (SHELBY TUBE) - 100% RECOVERY
-200=55, MC=210, OC=24, S_u=108, S_R=54	1	
	2	
	2	UNDISTURBED SAMPLE (SHELBY TUBE) - 100% RECOVERY
-200=36, MC=92, OC=20, γd=46, C_C=0.34, C_R=0.04	W/H	DARK BROWN SANDY MUCK (PT)
	W/R	
	3	
-200=47, MC=153, OC=38, S_u=621, S_R=93	1	DARK BROWN SILTY FINE SAND, TRACE ORGANIC MATERIAL (SM)
	3	BROWN FINE SAND WITH SILT (SP-SM)
-200=15, MC=30, OC=4	W/R	
	1/18"	DARK BROWN MUCK (PT)
-200=62, MC=84, OC=46	W/H	
-200=15, MC=40, OC=5	5	DARK BROWN MUCKY FINE SAND (PT)
	8	BROWN SILTY FINE SAND (SM)
	11	GRAY FINE SAND (SP)
	19	GRAY FINE SAND WITH SILT (SP-SM)
	11	GRAY CLAYEY FINE SAND (SC)
	16	DARK GRAY FINE SAND WITH SILT (SP-SM)

BT AT 115'
55' OF 4" CASING
GROUTED

BC-3
STA. 1027+43, 130' RIGHT
LAT: N28.81281
LONG: W81.38673
GSE: +43.0
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 3-27-15

N	5	
-200=6	6	
	10	
▽ +34.6	13	
▼ +32.6	11	BROWN FINE SAND WITH SILT (SP-SM)
	7	
	27	
	41	
-200=90, MC=254, OC=66	4	UNDISTURBED SAMPLE (SHELBY TUBE) - 90% RECOVERY
-200=66, MC=206, OC=57, γd=23	6	
	1	DARK BROWN MUCK (PT)
-200=83, MC=250, OC=57	3	
	7	
	14	GRAY FINE SAND WITH SILT (SP-SM)
	9	DARK BROWN MUCKY FINE SAND (PT)
-200=96, MC=325, OC=80	3	
	1	
	2	
	3	DARK BROWN MUCK (PT)
-200=58, MC=138, OC=29	1	
	4	
	4	DARK BROWN TO GRAY MUCKY FINE SAND (PT)
	28	GRAY FINE SAND WITH SILT (SP-SM)

BT AT 100'
GROUTED

LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
1/18"	NUMBER OF BLOWS FOR 18 INCHES OF PENETRATION
W/R	WEIGHT OF ROD
W/H	WEIGHT OF HAMMER
▽ +34.6	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
▼ +32.6	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) 24 HRS. AFTER DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE
MC=	PERCENT NATURAL MOISTURE CONTENT
OC=	PERCENT ORGANIC CONTENT
γd=	DRY UNIT WEIGHT (pcf)
C_C=	COMPRESSION INDEX
C_R=	RECOMPRESSION INDEX
S_u=	UNDRAINED SHEAR STRENGTH (psf)
S_R=	REMOLDED SHEAR STRENGTH (psf)

SAND — SAND AND CLAY — MUCK
SAND AND SILT — SAND AND MUCK

GENERAL NOTES

STANDARD PENETRATION TEST BORINGS WERE PERFORMED IN ACCORDANCE WITH ASTM D-1586. STANDARD PENETRATION RESISTANCES ARE SHOWN ON THE BORINGS AT THE TEST DEPTHS IN IN BLOWS PER FOOT UNLESS OTHERWISE NOTED.

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SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: SEE BORING

ENVIRONMENTAL CLASSIFICATION:
SUBSTRUCTURE:
STEEL: MODERATELY AGGRESSIVE
CONCRETE: SLIGHTLY AGGRESSIVE

SECTION: 26
TOWNSHIP: 19 SOUTH
RANGE: 29 EAST

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	MANUAL HAMMER N VALUE (blows per foot)	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-4	0-3	VERY LOOSE
	4-10	3-8	LOOSE
	10-30	8-24	MEDIUM DENSE
	30-50	24-40	DENSE
	OVER 50	OVER 40	VERY DENSE

NON-GRANULAR SOILS	MANUAL HAMMER N VALUE (blows per foot)	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-2	0-1	VERY SOFT
	2-4	1-3	SOFT
	4-8	3-6	FIRM
	8-15	6-12	STIFF
	15-30	12-24	VERY STIFF
	OVER 30	OVER 24	HARD

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
919 Lake Baldwin Lane
Orlando, FL 32814
T 407-898-1818 F 407-898-1837
Certificate of Authorization No. 5882
DANIEL C. STANFILL PE NO. 42763

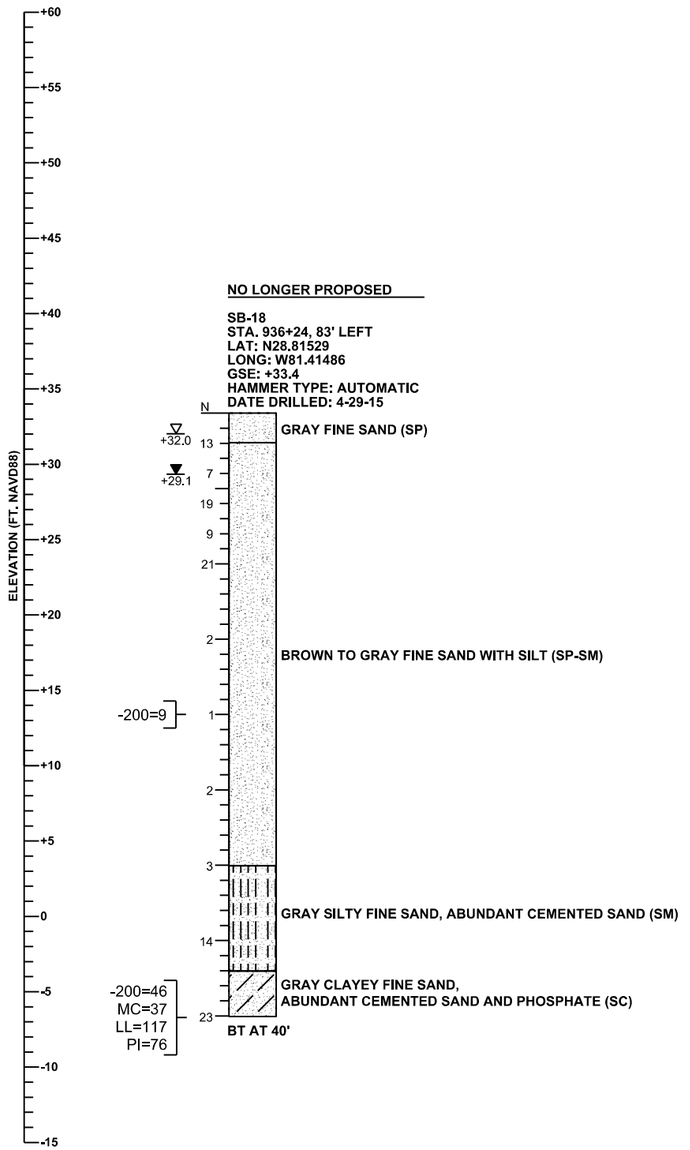
DRAWN BY: SKR
CHECKED BY: CGB 71571
DESIGNED BY: CGB 71571
CHECKED BY: DCS 42763

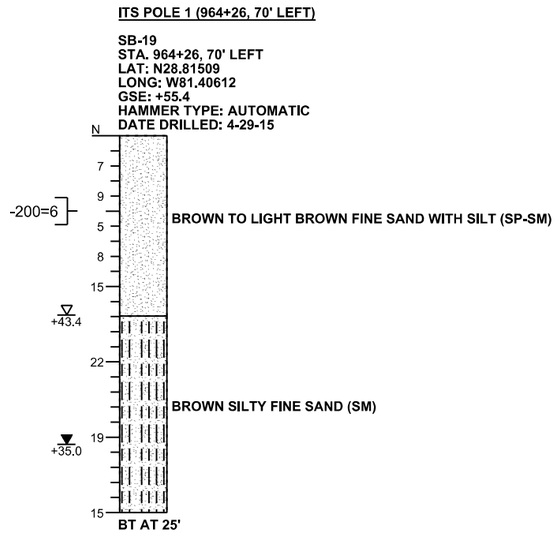
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
429	SEMINOLE	240200-2-52-01

SHEET TITLE: REPORT OF SPT BORINGS FOR BOX CULVERTS
REF. DWG. NO.
PROJECT NAME: WEKIVA PARKWAY (SR 429) SECTION 7A
SHEET NO.

REPORT OF SPT BORINGS
ITS CCTV POLES





LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
▽ +32.0	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
▼ +29.1	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) 24 HOURS AFTER DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE
MC=	PERCENT NATURAL MOISTURE CONTENT
LL=	LIQUID LIMIT
PI=	PLASTICITY INDEX

SAND

SAND AND CLAY

SAND AND SILT

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

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BASED ON REVIEW OF THE U.S. GEOLOGICAL SURVEY MAP ENTITLED "POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND VICINITY, FLORIDA, SEPTEMBER 2008" FOR THE PROJECT AREA, THE MAXIMUM ELEVATION OF THE ARTESIAN HEAD IS ESTIMATED TO BE +22 FT. NAVD88. THE CONTRACTOR SHALL BE PREPARED TO HANDLE ARTESIAN HEAD LEVELS UP TO +22 FT. NAVD88.

SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SB-18	SB-19
SECTION: 21	SECTION: 39
TOWNSHIP: 19 SOUTH	TOWNSHIP: 19 SOUTH
RANGE: 29 EAST	RANGE: 29 EAST

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

DANIEL C. STANFILL, P.E.
P.E. LICENSE NUMBER 42763
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
919 LAKE BALDWIN LANE
ORLANDO, FL 32814
CERTIFICATE OF AUTHORIZATION 00005882

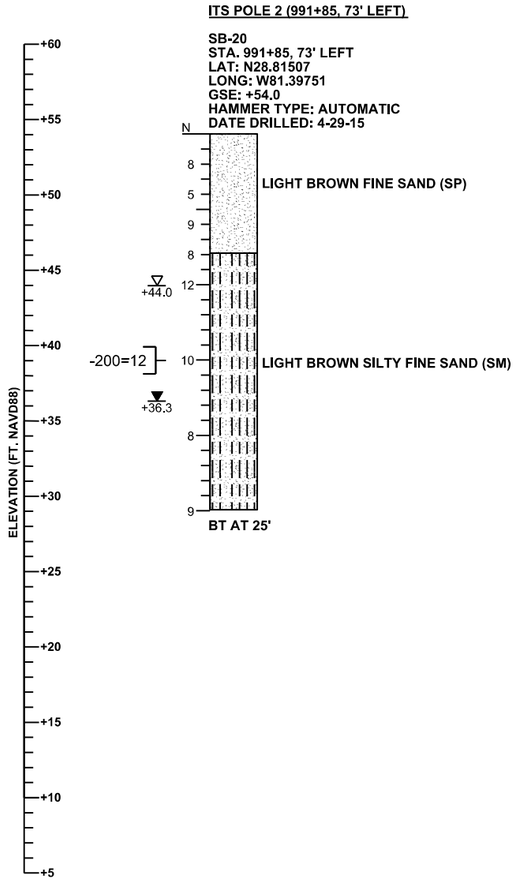
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 429	SEMINOLE	240200-2-52-01

REPORT OF SPT BORINGS

SHEET NO. GI-1

scott 6/21/2017 3:23:11 PM J:\D109\3520G Wekiva Parkway Section 7A\b1boring18.dgn



ITS POLE 2 (991+85, 73' LEFT)

SB-20
STA. 991+85, 73' LEFT
LAT: N28.81507
LONG: W81.39751
GSE: +54.0
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 4-29-15

N
8
5
9
8
12
10
8
9

+44.0
+36.3

-200=12

LIGHT BROWN FINE SAND (SP)

LIGHT BROWN SILTY FINE SAND (SM)

BT AT 25'

ITS POLE 3 (1021+58, 71' LEFT)

SB-21
STA. 1021+58, 71' LEFT
LAT: N28.81373
LONG: W81.38836
GSE: +36.6
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 4-29-15

N
12
12
13
9
6
16
16
11

+32.6
+29.9

-200=13
MC=24
OC=5

BROWN FINE SAND WITH SILT (SP-SM)

BROWN FINE SAND (SP)

BROWN SILTY FINE SAND, TRACE ORGANIC MATERIAL (SM)

BROWN FINE SAND WITH SILT (SP-SM)

BT AT 25'

LEGEND

N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
+44.0 ▽	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT.NAVD88)
+36.3 ▼	ENCOUNTERED GROUNDWATER ELEVATION (FT.NAVD88) 24 HOURS AFTER DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE
MC=	PERCENT NATURAL MOISTURE CONTENT
OC=	PERCENT ORGANIC CONTENT

SAND

SAND AND SILT

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

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THE BORING LOCATIONS WERE ESTABLISHED IN THE FIELD USING SUB-METER ACCURACY GPS UNIT (TRIMBLE GEO 7X). GROUND SURFACE ELEVATIONS ESTIMATED FROM PROJECT CROSS SECTIONS. BORING LOCATIONS REFERENCE THE SR 429 CENTERLINE.

BASED ON REVIEW OF THE U.S. GEOLOGICAL SURVEY MAP ENTITLED "POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND VICINITY, FLORIDA, SEPTEMBER 2008" FOR THE PROJECT AREA, THE MAXIMUM ELEVATION OF THE ARTESIAN HEAD IS ESTIMATED TO BE +25 FT. NAVD88. THE CONTRACTOR SHALL BE PREPARED TO HANDLE ARTESIAN HEAD LEVELS UP TO +25 FT. NAVD88.

SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SB-20	SB-21
SECTION: 22	SECTION: 26
TOWNSHIP: 19 SOUTH	TOWNSHIP: 19 SOUTH
RANGE: 29 EAST	RANGE: 29 EAST

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

DANIEL C. STANFILL, P.E.
P.E. LICENSE NUMBER 42763
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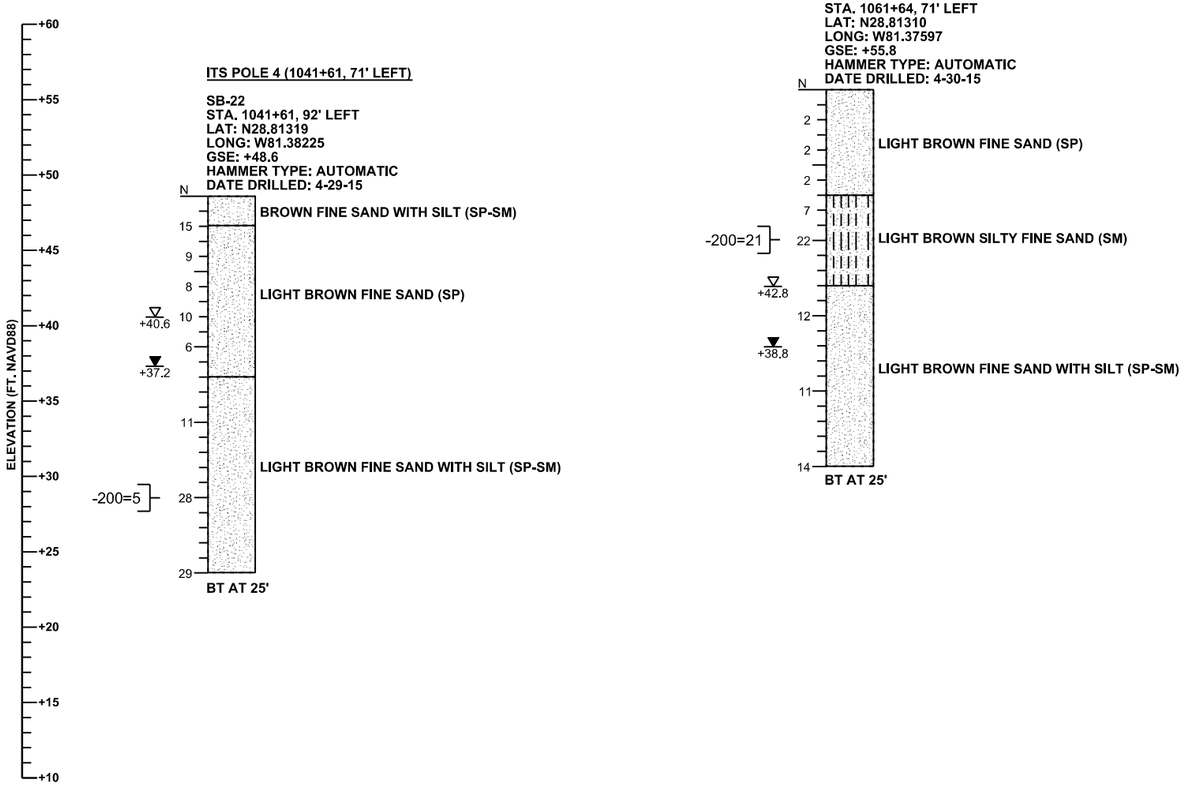
919 LAKE BALDWIN LANE
ORLANDO, FL 32814
CERTIFICATE OF AUTHORIZATION 00005882

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 429	SEMINOLE	240200-2-52-01

REPORT OF SPT BORINGS

SHEET NO.
GI-2



LEGEND

N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
▽ +40.6	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT.NAVD88)
▼ +37.2	ENCOUNTERED GROUNDWATER ELEVATION (FT.NAVD88) ON DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE

SAND

SAND AND SILT

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

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SPLIT SPOON SAMPLER:
- INSIDE DIAMETER: 1.375 IN.
- OUTSIDE DIAMETER: 2.0 IN.
- AVERAGE HAMMER DROP: 30 IN.
- HAMMER WEIGHT: 140 LBS.
- HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SB-22	SB-23
SECTION: 26	SECTION: 25
TOWNSHIP: 19 SOUTH	TOWNSHIP: 19 SOUTH
RANGE: 29 EAST	RANGE: 29 EAST

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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CONSULTANTS, INC.
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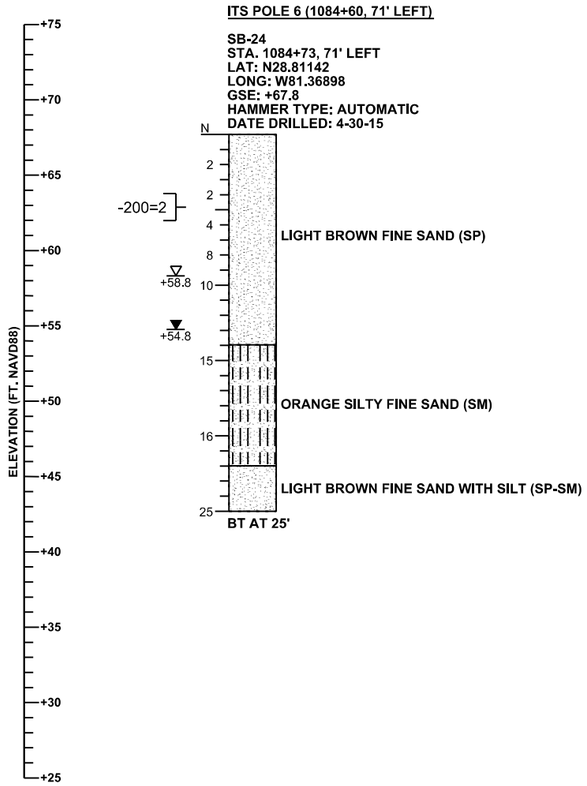
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 429	SEMINOLE	240200-2-52-01

REPORT OF SPT BORINGS

SHEET NO. GI-3

scott 6/21/2017 3:25:29 PM J:\D109\3520G Wekiva Parkway Section 7A\b1boring18.dgn

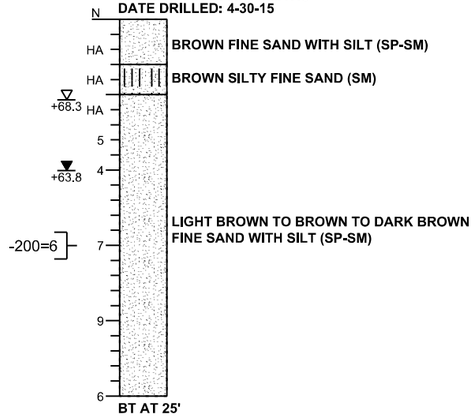


ITS POLE 6 (1084+60, 71' LEFT)

SB-24
STA. 1084+73, 71' LEFT
LAT: N28.81142
LONG: W81.36898
GSE: +67.8
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 4-30-15

ITS POLE 7 (1109+49, 71' LEFT)

SB-25
STA. 1109+49, 71' LEFT
LAT: N28.80739
LONG: W81.36269
GSE: +73.8
HAMMER TYPE: AUTOMATIC
DATE DRILLED: 4-30-15



LEGEND

GSE	GROUND SURFACE ELEVATION (FT. NAVD88)
N	STANDARD PENETRATION RESISTANCE, BLOWS PER FOOT
HA	HAND AUGERED FOR UTILITY CLEARANCE
▽ +58.8	ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION (FT. NAVD88)
▼ +54.8	ENCOUNTERED GROUNDWATER ELEVATION (FT. NAVD88) ON DATE DRILLED
BT	BORING TERMINATED AT DEPTH INDICATED
-200=	PERCENT PASSING NO. 200 U.S. STANDARD SIEVE

SAND

SAND AND SILT

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. UNIFIED SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

STANDARD PENETRATION TEST BORINGS WERE PERFORMED IN ACCORDANCE WITH ASTM D-1586. STANDARD PENETRATION RESISTANCES ARE SHOWN ON THE BORINGS AT THE TEST DEPTHS IN IN BLOWS PER FOOT UNLESS OTHERWISE NOTED.

THE BORING LOCATIONS WERE ESTABLISHED IN THE FIELD USING SUB-METER ACCURACY GPS UNIT (TRIMBLE GEO 7X). GROUND SURFACE ELEVATIONS ESTIMATED FROM PROJECT CROSS SECTIONS. BORING LOCATIONS REFERENCE THE SR 429 CENTERLINE.

BASED ON REVIEW OF THE U.S. GEOLOGICAL SURVEY MAP ENTITLED "POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND VICINITY, FLORIDA, SEPTEMBER 2008" FOR THE PROJECT AREA, THE MAXIMUM ELEVATION OF THE ARTESIAN HEAD IS ESTIMATED TO BE +30 FT. NAVD88. THE CONTRACTOR SHALL BE PREPARED TO HANDLE ARTESIAN HEAD LEVELS UP TO +30 FT. NAVD88.

SPLIT SPOON SAMPLER:
INSIDE DIAMETER: 1.375 IN.
OUTSIDE DIAMETER: 2.0 IN.
AVERAGE HAMMER DROP: 30 IN.
HAMMER WEIGHT: 140 LBS.
HAMMER TYPE: AUTOMATIC

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL

GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	RELATIVE DENSITY
SANDS	0-3	VERY LOOSE
	3-8	LOOSE
	8-24	MEDIUM DENSE
	24-40	DENSE
	OVER 40	VERY DENSE

NON-GRANULAR SOILS	AUTOMATIC HAMMER N VALUE (blows per foot)	CONSISTENCY
SILTS, CLAYS, MUCK, PEAT	0-1	VERY SOFT
	1-3	SOFT
	3-6	FIRM
	6-12	STIFF
	12-24	VERY STIFF
	OVER 24	HARD

SB-24	SB-25
SECTION: 25	SECTION: 30
TOWNSHIP: 19 SOUTH	TOWNSHIP: 19 SOUTH
RANGE: 29 EAST	RANGE: 30 EAST

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

DANIEL C. STANFILL, P.E.
P.E. LICENSE NUMBER 42763
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
919 LAKE BALDWIN LANE
ORLANDO, FL 32814
CERTIFICATE OF AUTHORIZATION 00005882

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 429	SEMINOLE	240200-2-52-01

REPORT OF SPT BORINGS

SHEET NO. GI-4

scott 6/21/2017 3:25:57 PM J:\D109\3520G Wekiva Parkway Section 7A\b1boring18.dgn

SUMMARY OF MISCELLANEOUS STRUCTURE LOCATIONS AND SUBSURFACE INVESTIGATION

Table 6

Summary of Miscellaneous Structure Locations and Subsurface Exploration

Wekiva Parkway (SR 429) - Section 7A

FPID No. 240200-2-52-01

GEC Project No. 3520G

Miscelaneous Structures		Approximate Structure Location		Boring Data				
		Station	Offset (feet)	No.	Station	Offset	Depth (ft)	Boring Type
Toll Facilities	Ramp F Toll Facility	712+00	30 LT	TG-1	712+00	15 RT	60	SPT
				TG-2	712+00	33 LT	60	SPT
	Ramp E Toll Facility	615+80	30 RT	TG-3	615+82	36 RT	60	SPT
				TG-4	615+82	12 LT	60	SPT
Sign Structures	Cantilever Sign 1	947+57	73 RT	SB-1	947+57	60 RT	40	SPT
	Cantilever Sign 2	956+56	60 RT	SB-2	956+56	60 RT	40	SPT
	Cantilever Sign 3	1002+95	78 LT	SB-3	1002+95	77 LT	40	SPT
	Cantilever Sign 4	1009+36	73 RT	SB-4	1009+36	73 RT	40	SPT
	Cantilever Sign 5	1029+35	60 LT	SB-5	1028+89	55 LT	40	SPT
	Truss Sign 6	1035+76	60 LT	SB-6	1035+76	35 LT	45	SPT
		1035+76	60 RT	SB-7	1035+76	60 RT	40	SPT
	Truss Sign 7	1052+00	60 LT	WB-74	1052+00	60 LT	55	CPT
		1052+00	60 RT	SB-8	1052+00	60 RT	45	SPT
	Cantilever Sign 8	1062+16	73 RT	SB-9	1062+16	73 RT	40	SPT
	Truss Sign 9	1075+36	60 LT	WB-93	3157+00	45 RT	70	SPT
		1075+36	60 RT	SB-10	1075+36	60 RT	60	SPT
	Cantilever Sign 10	3167+20	20 LT	SB-11B	3167+20	CL	40	SPT
	Truss Sign 11	1101+76	60 LT	SB-12	1101+76	60 LT	40	SPT
		1101+76	60 RT	SB-13	1101+76	70 RT	40	SPT
Mast Arm Signal Poles (SR 46 / Orange Blvd)	MASP A	2164+04	122 LT	SB-14	103+52	62 LT	30	SPT
	MASP B	191+27	86 LT	SB-15	103+57	55 RT	30	SPT
	MASP C	191+53	86 RT	SB-16	101+93	71 RT	30	SPT
	MASP D	2164+29	42 RT	SB-17	101+76	42 LT	30	SPT
Box Culvert	CD-2 (9'x2')	1027+14 to 1027+49	119 LT to 156 RT	BC-1	1027+25	115 LT	30	SPT
				BC-2	1027+28	20 LT	30	SPT
				MB-14	1027+36	63 RT	115	SPT
				BC-3	1027+43	130 RT	100	SPT
ITS CCTV Poles	ITS POLE 1	964+26	70 LT	SB-19	964+26	70 LT	25	SPT
	ITS POLE 2	991+85	73 LT	SB-20	991+85	73 LT	25	SPT
	ITS POLE 3	1021+58	71 LT	SB-21	1021+58	71 LT	25	SPT
	ITS POLE 4	1041+61	71 LT	SB-22	1041+61	92 LT	25	SPT
	ITS POLE 5	1061+64	71 LT	SB-23	1061+64	71 LT	25	SPT
	ITS POLE 6	1084+60	71 LT	SB-24	1084+73	71 LT	25	SPT
	ITS POLE 7	1109+49	71 LT	SB-25	1109+49	71 LT	25	SPT

SUMMARY OF GROUNDWATER TABLES AND PIEZOMETRIC SURFACE ELEVATIONS

Table 7
Summary of Groundwater Tables and Piezometric Surface Elevations
Wekiva Parkway (SR 429) - Section 7A
FPID No. 240200-2-52-01
GEC Project No. 3520G

Miscellaneous Structures		Boring No.	Station	Offset (feet)	Approximate Existing Ground Surface Elevation (ft NAVD88)	Encountered Groundwater Elevation (ft NAVD8)	Estimated Seasonal High Groundwater Elevation (ft NAVD8)	Approximate Potentiometric Surface Elelvation (ft NAVD88)	NRCS Soil Survey Soil Unit No.
Toll Facilities	Ramp F Toll Facility	TG-1	712+00	15 RT	+54.3	+45.3	+49.8	+26.0	31
		TG-2	712+00	33 LT	+56.9	+45.9	+49.9	+26.0	31
	Ramp E Toll Facility	TG-3	615+82	36 RT	+65.2	+55.0	+59.2	+26.0	31
		TG-4	615+82	12 LT	+65.5	+54.2	+59.5	+26.0	31
Sign Structures	Cantilever Sign 1	SB-1	947+57	60 RT	+51.7	+32.7	+41.7	+20.0	6
	Cantilever Sign 2	SB-2	956+56	60 RT	+56.2	+32.2	+36.2	+20.0	6
	Cantilever Sign 3	SB-3	1002+95	77 LT	+47.2	+32.4	+42.2	+22.0	31
	Cantilever Sign 4	SB-4	1009+36	73 RT	+44.0	+37.1	+42.0	+22.0	27
	Cantilever Sign 5	SB-5	1028+89	55 LT	+45.8	+31.9	+38.8	+23.0	20
	Truss Sign 6	SB-6	1035+76	35 LT	+52.5	+39.2	+42.5	+23.0	6
		SB-7	1035+76	60 RT	+49.8	+35.6	+38.8	+23.0	6
	Truss Sign 7	WB-74	1052+00	60 LT	+49.4	---	---	+25.0	2
		SB-8	1052+00	60 RT	+48.3	+38.3	+42.3	+25.0	27
	Cantilever Sign 8	SB-9	1062+16	73 RT	+52.5	+38.7	+42.5	+26.0	6
	Truss Sign 9	WB-93	3157+00	45 RT	+58.2	+43.2	+50.2	+27.0	31
		SB-10	1075+36	60 RT	+59.5	+47.9	+51.5	+27.0	31
	Cantilever Sign 10	SB-11B	3167+20	CL	+63.0	+55.0	+59.0	+28.0	31
	Truss Sign 11	SB-12	1101+76	60 LT	+71.0	+63.2	+66.0	+29.0	31
		SB-13	1101+76	70 RT	+71.5	+63.2	+66.0	+29.0	31
*Mast Arm Signal Poles (SR 46 / Orange Blvd)	MASP A	SB-14	103+52	62 LT	---	7.0	4.0	+29.0	2
	MASP B	SB-15	103+57	55 RT	---	7.0	4.0	+29.0	2
	MASP C	SB-16	101+93	71 RT	---	7.0	4.0	+29.0	31
	MASP D	SB-17	101+76	42 LT	---	8.0	5.0	+29.0	2

* GSE not available for Mast Arm Signal Pole borings, values listed are depths (feet).

Table 7

Summary of Groundwater Tables and Piezometric Surface Elevations

Wekiva Parkway (SR 429) - Section 7A

FPID No. 240200-2-52-01

GEC Project No. 3520G

Miscellaneous Structures		Boring No.	Station	Offset (feet)	Approximate Existing Ground Surface Elevation (ft NAVD88)	Encountered Groundwater Elevation (ft NAVD8)	Estimated Seasonal High Groundwater Elevation (ft NAVD8)	Approximate Potentiometric Surface Elelvation (ft NAVD88)	NRCS Soil Survey Soil Unit No.
Box Culvert	CD-2 (9'x2')	BC-1	1027+25	115 LT	+35.9	+27.9	+29.9	+23.0	10
		BC-2	1027+28	20 LT	+38.2	+30.0	+32.2	+23.0	10
		MB-14	1027+36	63 RT	+39.0	+31.0	+32.0	+23.0	10
		BC-3	1027+43	130 RT	+43.0	+32.6	+34.6	+23.0	10
ITS CCTV Poles	ITS POLE 1	SB-19	964+26	70 LT	+55.4	+35.0	+43.4	+22.0	6
	ITS POLE 2	SB-20	991+85	73 LT	+54.0	+36.3	+44.0	+25.0	6
	ITS POLE 3	SB-21	1021+58	71 LT	+36.6	+29.9	+32.6	+25.0	10
	ITS POLE 4	SB-22	1041+61	92 LT	+48.6	+37.2	+40.6	+28.0	6
	ITS POLE 5	SB-23	1061+64	71 LT	+55.8	+38.8	+42.8	+28.0	6
	ITS POLE 6	SB-24	1084+73	71 LT	+67.8	+54.8	+58.8	+30.0	31
	ITS POLE 7	SB-25	1109+49	71 LT	+73.8	+63.8	+68.3	+30.0	2

* GSE not available for Mast Arm Signal Pole borings, values listed are depths (feet).

SUMMARY OF CORROSION SERIES
TEST RESULTS

Table 8

Summary of Corrosion Series Test Results

Wekiva Parkway (SR 429) - Section 7A

FPID No. 240200-2-52-01

GEC Project No. 3520G

Box Culvert	Boring No.	Soil Classification	Sample Depth (feet)	pH	Minimum Resistivity (ohm-cm)	Chlorides (ppm)	Sulfates (ppm)	Substructural Environmental Classification	
								Concrete	Steel
CD-2	BC-1	SP-SM	6 - 10	6.7	31,000	45	< 5	Slightly Aggressive	Moderately Aggressive
	BC-3	SP	0 - 6	7.9	21,000	45	< 5	Slightly Aggressive	Slightly Aggressive

RECOMMENDED SOIL PARAMETERS FOR SIGN FOUNDATION DESIGN

Table 9

Recommended Soil Parameters for Sign Foundation Design

Wekiva Parkway (SR 429) - Section 7A

FPID No. 240200-2-52-01

GEC Project No. 3520G

Sign No.	Sign Station	Sign Offset (feet)	Reference Boring No.	Approximate Ground Surface Elevation at Boring Location (ft NAVD88)	Recommended Design Groundwater Elevation (ft NAVD88)	Depth Below Existing Ground Surface (feet)	Soil Type	[1]General N-Value Range	[1]Average N-Value	Soil Moist Unit Weight (pcf)	Soil Saturated Unit Weight (pcf)	Soil Effective (Buoyant) Unit Weight (pcf)	Soil Angle of Internal Friction (Φ)	Soil Cohesion (psf)
1	947+57	73 RT	SB-1	+51.7	+41.7	0 - 12	Sand	1 - 2	2	95	100	40	26	---
						12 - 23	Sand	33 - 36	35	115	120	60	33	---
						23 - 40	Sand	17 - 21	16	105	110	50	30	---
2	956+56	60 RT	SB-2	+56.2	+36.2	0 - 27	Sand	11 - 38	19	105	110	50	30	---
						27 - 33	Sand	2	2	95	100	40	26	---
						33 - 40	Sand	11 - 17	14	105	110	50	30	---
3	1002+95	78 LT	SB-3	+47.2	+42.2	0 - 40	Sand	9 - 33	19	105	110	50	30	---
4	1009+36	73 RT	SB-4	+44.0	+42.0	0 - 17	Sand	11 - 22	17	105	110	50	30	---
						17 - 23	Clay	5	5	110	115	55	---	750
						23 - 33	Sand	6	6	100	105	45	28	---
						33 - 40	Sand	18 - 28	23	110	115	55	32	---
5	1029+35	60 LT	SB-5	+45.8	+38.8	0 - 40	Sand	5 - 29	19	105	110	50	30	---
6LT	1035+76	60 LT	SB-6	+52.5	+42.5	0 - 45	Sand	10 - 26	16	105	110	50	30	---
6RT	1035+76	60 RT	SB-7	+49.8		0 - 40	Sand	8 - 33	19	105	110	50	30	---
7LT	1052+00	60 LT	WB-74	+51.7	+42.3	0 - 25	Sand	6 - 34	19	105	110	50	30	---
						25 - 43	Sand	2 - 10	3	95	100	40	26	---
						43 - 55	Sand	9 - 34	24	110	115	55	32	---
7RT	1052+00	60 RT	SB-8	+48.3		0 - 23	Sand	11 - 27	16	105	110	50	30	---
						23 - 43	Sand	1 - 2	2	95	100	40	26	---
						43 - 45	Sand	21	21	110	115	55	32	---
8	1062+16	73 RT	SB-9	+52.5	+42.5	0 - 27	Sand	11 - 26	19	105	110	50	30	---
						27 - 53	Sand	1 - 3	2	95	100	40	26	---
						53 - 55	Sand	60	60	115	120	60	34	---

Table 9

Recommended Soil Parameters for Sign Foundation Design

Wekiva Parkway (SR 429) - Section 7A

FPID No. 240200-2-52-01

GEC Project No. 3520G

Sign No.	Sign Station	Sign Offset (feet)	Reference Boring No.	Approximate Ground Surface Elevation at Boring Location (ft NAVD88)	Recommended Design Groundwater Elevation (ft NAVD88)	Depth Below Existing Ground Surface (feet)	Soil Type	[1]General N-Value Range	[1]Average N-Value	Soil Moist Unit Weight (pcf)	Soil Saturated Unit Weight (pcf)	Soil Effective (Buoyant) Unit Weight (pcf)	Soil Angle of Internal Friction (Φ)	Soil Cohesion (psf)
9LT	1075+36	60 LT	WB-93	+58.2	+51.5	0 - 37	Sand	7 - 16	11	105	110	50	30	---
						37 - 58	Sand	1 - 2	2	95	100	40	26	---
						58 - 65	Sand	11 - 14	13	105	110	50	30	---
9RT	1075+36	60 RT	SB-10	+59.5		0 - 33	Sand	8 - 22	16	105	110	50	30	---
						33 - 60	Sand	1 - 6	3	95	100	40	26	---
10	3167+20	20 LT	SB-11A/B	+68.0	+63.0	0 - 23	Sand	13 - 62	32	110	115	55	32	---
						23 - 28	Clay	8	8	115	120	60	---	1500
						28 - 40	Sand	4 - 53	27	110	115	55	32	---
11LT	1101+76	60 LT	SB-12	+71.0	+66.0	0 - 18	Sand	4 - 9	6	100	105	45	28	---
						18 - 40	Sand	12 - 34	18	105	110	50	30	---
11RT	1101+76	60 RT	SB-13	+71.5		0 - 18	Sand	1 - 9	6	100	105	45	28	---
						18 - 40	Sand	14 - 34	22	110	115	55	32	---
[2]Sand Backfill			---	---	---	---	Sand	---	---	110	115	55	32	---

1. N-Value corrected using correction factor of 1.24 to reflect standard hammer.

2. Listed soil parameters are for use in areas of placed embankment sand backfill.

RECOMMENDED SOIL PARAMETERS FOR MAST ARM SIGNAL POLE FOUNDATION DESIGN

Table 10

Soil Parameters for Design of Mast Arm Signal Pole Foundations

Wekiva Parkway (SR 429) - Section 7A

FPID No. 240200-2-52-01

GEC Project No. 3520G

[2]Boring No. (Station, Offset)	Pole ID (Station, Offset)	Seasonal High Groundwater Depth (feet)	Depth Below Existing Ground Surface (feet)	Soil Type	[1]General N-Value Range	[1]Average N-Value	Soil Moist Unit Weight (pcf)	Soil Saturated Unit Weight (pcf)	Soil Effective (Buoyant) Unit Weight (pcf)	Soil Angle of Internal Friction (Φ)	Soil Cohesion (psf)
SB-14 (103+52, 62' LT)	A (2164+04, 122' LT)	4.0	0 - 17	Sand	1 - 3	2	95	100	40	26	---
			17 - 30	Sand	13 - 33	20	110	115	55	32	---
SB-15 (103+57, 55'RT)	B (191+27, 86' LT)	4.0	0 - 13	Sand	3 - 4	3	95	100	40	26	---
			13 - 30	Sand	6 - 18	12	105	110	50	30	---
SB-16 (101+93, 71' RT)	C (191+53, 86' RT)	4.0	0 - 17	Sand	1 - 3	2	95	100	40	26	---
			17 - 30	Sand	13 - 40	24	110	115	55	32	---
SB-17 (101+76, 42'LT)	D (2164+29, 42' RT)	5.0	0 - 13	Sand	4	4	100	105	45	28	---
			13 - 30	Sand	12 - 21	16	105	110	50	30	---

1. N-Value obtained with automatic hammer. N-Value corrected using correction factor of 1.24 to reflect standard hammer.

2. Boring locations reference the Orange Boulevard centerline of construction.

RECOMMENDED SOIL PARAMETERS FOR BOX CULVERT FOUNDATION DESIGN

Table 11
Recommended Soil Parameters for Box Culvert Design
Wekiva Parkway (SR 429) - Section 7A
FPID No. 240200-2-52-01
GEC Project No. 3520G

Structure Information	Soil (USCS Class.)	Soil Average N-Value	Nominal Bearing Resistance, q_{nom} (psf)	[1]Factored Bearing Resistance, q_{fac} (psf)	Angle of Internal Friction, ϕ (degrees)	Saturated Unit Weight, γ_{SAT} (pcf)	Soil Cohesion, C (psf)	Modulus of Subgrade Reaction, k (pci)	Maximum Total Settlement,Y (in)	Maximum Long Term Differential Settlement, ΔY (in)	Effective Length for Settlement, L (ft)	[2]Estimated Seasonal High Groundwater Elevation (ft NAVD88)	[3]Environmental Classification	
													Concrete	Steel
1, 9'X2' [4]CD-2	Sand Backfill (SP, SP-SM, SM)	---	---	---	32	115	0	---	---	---	---	---	---	---
1027+14, 119' LT to 1027+49, 156' RT	Foundation Soil (SP-SM, SM, SC)	10	10,000	5,500	30	110	0	40	2.0	1.0	282	+32.0	S.A.	M.A.

Notes

1. Bearing Capacity Resistance Factor of 0.55 applied to calculate factored bearing resistance, LRFD Table 10.5.5.2.2-1.
2. "AGS" indicates the estimated seasonal high groundwater elevation is above the existing ground surface. The height to which water may rise above the existing ground surface should be provided by the drainage engineer.
3. S.A. = Slightly Aggressive; M.A. = Moderately Aggressive; E.A. = Extremely Aggressive
4. Structure CD-2 is located within the surcharge area for the Lake Markham Road bridge site. Soil parameters listed in the table assume the culvert will be constructed after the release of the surcharge.

RECOMMENDED SOIL PARAMETERS FOR ITS POLE FOUNDATION DESIGN

Table 12

Recommended Soil Parameters for Sign Foundation Design

Wekiva Parkway (SR 429) - Section 7A

FPID No. 240200-2-52-01

GEC Project No. 3520G

[2]Boring No. (Station, Offset)	[2]ITS Pole ID (Station, Offset)	Seasonal High Groundwater Depth (feet)	Depth Below Existing Ground Surface (feet)	Soil Type	[1]General N-Value Range	[1]Average N-Value	Soil Moist Unit Weight (pcf)	Soil Saturated Unit Weight (pcf)	Soil Effective (Buoyant) Unit Weight (pcf)	Soil Angle of Internal Friction (Φ)	Soil Cohesion (psf)
SB-19 (964+26, 70'LT)	1 (964+26, 70'LT)	12.0	0 - 8	Sand	5 - 9	9	100	105	45	29	---
			8 - 21	Sand	15 - 22	25	110	115	55	32	---
			21 - 25	Sand	15	19	105	110	50	30	---
SB-20 (991+85, 73' LT)	2 (991+85, 73' LT)	10.0	0 - 18	Sand	4 - 12	10	100	105	45	29	---
			18 - 25	Sand	8 - 9	11	105	110	50	30	---
SB-21 (1021+58, 71'LT)	3 (1021+58, 71'LT)	4.0	0 - 7	Sand	9 - 13	14	105	110	50	30	---
			7 - 17	Sand	6 - 16	13	105	110	50	30	---
			17 - 23	Sand	16	20	105	110	50	30	---
			23 - 25	Sand	11	14	105	110	50	30	---
SB-22 (1041+61, 71'LT)	4 (1041+61, 92'LT)	8.0	0 - 11	Sand	6 - 15	12	105	110	50	30	---
			11 - 16	Sand	11	14	105	110	50	30	---
			16 - 25	Sand	28 - 29	35	115	120	60	33	---
SB-23 (1061+64, 71'LT)	5 (1061+64, 71'LT)	13.0	0 - 9	Sand	2 - 7	5	100	105	45	29	---
			9 - 17	Sand	12 - 22	21	110	115	55	32	---
			17 - 25	Sand	11 - 14	16	105	110	50	30	---
SB-24 (1084+73, 71'LT)	6 (1084+60, 71'LT)	9.0	0 - 13	Sand	2 - 10	6	100	105	45	29	---
			13 - 25	Sand	10 - 25	19	110	115	55	32	---
SB-25 (1109+49, 71'LT)	7 (1109+49, 71'LT)	10.0	0 - 10	Sand	4 - 5	6	100	105	45	29	---
			10 - 25	Sand	6 - 9	9	105	110	50	30	---
[3]Sand Backfill	---	---	---	Sand	---	---	110	115	55	32	---

1. N-Value obtained with automatic hammer. N-Value corrected using correction factor of 1.24 to reflect standard hammer.
2. Boring locations reference the SR 429 centerline of construction.
3. Listed soil parameters are for use in areas of placed embankment sand backfill.

TOLL GANTRY FB-MULTIPIER PARAMETERS

FB-MultiPier Soil Parameters

Project Name:	Wekiva Parkway Section 7A	GSE @ Boring Loc. (ft):	+54.3	Elevation Datum:	NAVD
GEC Project Number:	3520G	Water Table Elevation (ft):	+49.8	Foundation:	EB Frontage Rd Toll Gantry (RT)
FPID Number:	240200-2-52-01	Pile Tip Elevation (ft):	N/A	Reference Boring(s):	TG-1 (712+00, 15' RT)

Layer No.	**FILL**	**1**	**2**	**3**	**4**	**5**				
Soil Description ID*	SND	SND	SND	SND	SIL	CLY				
Soil Type	Cohesionless	Cohesionless	Cohesionless	Cohesionless	Cohesionless	Cohesive				
Layer Top Elevation (ft)	---	+54	+27	+16	+7	-3				
Layer Bottom Elevation (ft)	---	+27	+16	+7	-3	-6				
Layer Thickness (ft)	---	27	11	9	10	3				
Average N-Value, N_{avg} (bpf)[2]	20	10	5	1	2	21				
Corrected N-Value, N_{60} (bpf)	20	9	5	1	2	19				
Lateral Properties										
Recommended Lateral Soil Model	Sand (Reese)	Sand (Reese)	Sand (Reese)	Sand (Reese)	Sand (Reese)	Clay (Stiff < Water)				
Total Unit Weight, γ (pcf)	115	102	102	92	102	122				
Angle of Internal Friction, ϕ (degrees)	32	29	29	26	14	---				
Subgrade Modulus, K (pci)	80	30	30	15	50	1,000				
Undrained Shear Strength, c_u (psf)	---	---	---	---	---	2,533				
Major Principal Strain at 50%, ε_{50}	---	---	---	---	---	0.005				
Average Undrained Shear Strength, C_{avg} (psf)	---	---	---	---	---	2,533				
Unconfined Compressive Strength, q_u (psf)	---	---	---	---	---	---				
Axial/Torsional Properties										
Recommended Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Clay				
Recommended Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic				
Shear Modulus, G (ksi)	1.07	0.52	0.29	0.06	0.06	0.59				
Poisson's Ratio, ν	0.30	0.20	0.20	0.10	0.20	0.50				
Undrained Shear Strength, c_u (psf)	---	---	---	---	---	2,533				
Angle of Internal Friction, ϕ (degrees)	32	29	29	26	14	---				
Youngs Modulus, E (psf)	400,000	180,000	100,000	20,000	20,000	---				
Concrete [1]Ultimate Unit Skin Friction, T_f (psf)	760	342	190	38	189	1726				
Tip Model										
Recommended Tip Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Clay				
Shear Modulus, G (ksi)	1.07	0.52	0.29	0.06	0.06	0.59				
Poisson's Ratio, ν	0.30	0.20	0.20	0.10	0.20	0.50				
Uncorrected N-value (bpf)	20	10	5	1	2	---				
Undrained Shear Strength, c_u (psf)	---	---	---	---	---	2,533				

*ID	General Soil Description
SND	Fine Sand to Fine Sand with Silt to Silty Fine Sand (SP, SP-SM, SM)
CLY	Fat Clay (CH)
SIL	Clayey Fine Sand (SC) to Sandy Silt to Silt (ML)
SIH	Elastic Silt (MH)
WLS	Weathered Limestone
LST	Limestone
MCK	Muck (PT)
SMK	Sandy Muck (PT)

**Multiplied by end area of chosen pile type to obtain Ultimate End Bearing as a force.

Pile Type	End Area (in^2)
18" Square PPC Pile:	324.0
24" Square PPC Pile:	576.0
14x89 Steel H Pile:	26.1
20" Steel Pipe Pile (closed end):	314.2

Notes

1. For the input of **vertical failure shear stress** and **torsional shear stress** the ultimate unit skin friction for a pile can be used.
2. Average N-values greater than 60 truncated to a maximum N-value of 60 for calculations.

FB-MultiPier Soil Parameters

Project Name:	Wekiva Parkway Section 7A	GSE @ Boring Loc. (ft):	+56.9	Elevation Datum:	NAVD
GEC Project Number:	3520G	Water Table Elevation (ft):	+49.9	Foundation:	EB Frontage Rd Toll Gantry (LT)
FPID Number:	240200-2-52-01	Pile Tip Elevation (ft):	N/A	Reference Boring(s):	TG-2 (712+00, 33' LT)

Layer No.	**FILL**	**1**	**2**	**3**						
Soil Description ID*	SND	SND	SND	SND						
Soil Type	Cohesionless	Cohesionless	Cohesionless	Cohesionless						
Layer Top Elevation (ft)	---	+57	+30	+4						
Layer Bottom Elevation (ft)	---	+30	+4	-3						
Layer Thickness (ft)	---	27	26	7						
Average N-Value, N_{avg} (bpf)[2]	20	14	2	60						
Corrected N-Value, N_{60} (bpf)	20	12	2	54						
Lateral Properties										
Recommended Lateral Soil Model	Sand (Reese)	Sand (Reese)	Sand (Reese)	Sand (Reese)						
Total Unit Weight, γ (pcf)	115	107	92	132						
Angle of Internal Friction, ϕ (degrees)	32	30	26	36						
Subgrade Modulus, K (pci)	80	60	15	125						
Undrained Shear Strength, c_u (psf)	---	---	---	---						
Major Principal Strain at 50%, ε_{50}	---	---	---	---						
Average Undrained Shear Strength, C_{avg} (psf)	---	---	---	---						
Unconfined Compressive Strength, q_u (psf)	---	---	---	---						
Axial/Torsional Properties										
Recommended Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand						
Recommended Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic						
Shear Modulus, G (ksi)	1.07	0.67	0.13	2.59						
Poisson's Ratio, ν	0.30	0.25	0.10	0.45						
Undrained Shear Strength, c_u (psf)	---	---	---	---						
Angle of Internal Friction, ϕ (degrees)	32	30	26	36						
Youngs Modulus, E (psf)	400,000	240,000	40,000	1,080,000						
Concrete [1]Ultimate Unit Skin Friction, T_f (psf)	760	456	76	2052						
Tip Model										
Recommended Tip Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand						
Shear Modulus, G (ksi)	1.07	0.67	0.13	2.59						
Poisson's Ratio, ν	0.30	0.25	0.10	0.45						
Uncorrected N-value (bpf)	20	14	2	60						
Undrained Shear Strength, c_u (psf)	---	---	---	---						

*ID	General Soil Description
SND	Fine Sand to Fine Sand with Silt to Silty Fine Sand (SP, SP-SM, SM)
CLY	Fat Clay (CH)
SIL	Clayey Fine Sand (SC) to Sandy Silt to Silt (ML)
SIH	Elastic Silt (MH)
WLS	Weathered Limestone
LST	Limestone
MCK	Muck (PT)
SMK	Sandy Muck (PT)

**Multiplied by end area of chosen pile type to obtain Ultimate End Bearing as a force.

Pile Type	End Area (in^2)
18" Square PPC Pile:	324.0
24" Square PPC Pile:	576.0
14x89 Steel H Pile:	26.1
20" Steel Pipe Pile (closed end):	314.2

Notes

1. For the input of **vertical failure shear stress** and **torsional shear stress** the ultimate unit skin friction for a pile can be used.
2. Average N-values greater than 60 truncated to a maximum N-value of 60 for calculations.

FB-MultiPier Soil Parameters

Project Name:	Wekiva Parkway Section 7A	GSE @ Boring Loc. (ft):	+65.2	Elevation Datum:	NAVD
GEC Project Number:	3520G	Water Table Elevation (ft):	+59.2	Foundation:	WB Frontage Rd Toll Gantry (RT)
FPID Number:	240200-2-52-01	Pile Tip Elevation (ft):	N/A	Reference Boring(s):	TG-3 (615+82, 36' RT)

Layer No.	**FILL**	**1**	**[3]2**	**3**	**4**	**5**				
Soil Description ID*	SND	SND	SND	SND	CLY	SND				
Soil Type	Cohesionless	Cohesionless	Cohesionless	Cohesionless	Cohesive	Cohesionless				
Layer Top Elevation (ft)	---	+65	+47	+32	+23	+7				
Layer Bottom Elevation (ft)	---	+47	+32	+23	+7	+5				
Layer Thickness (ft)	---	18	15	9	16	2				
Average N-Value, N_{avg} (bpf)[2]	20	12	37	10	5	31				
Corrected N-Value, N_{60} (bpf)	20	9	33	9	5	28				
Lateral Properties										
Recommended Lateral Soil Model	Sand (Reese)	Sand (Reese)	Sand (Reese)	Sand (Reese)	Clay (Soft < Water)	Sand (Reese)				
Total Unit Weight, γ (pcf)	115	102	122	102	112	117				
Angle of Internal Friction, ϕ (degrees)	32	29	33	29	---	32				
Subgrade Modulus, K (pci)	80	30	90	30	100	80				
Undrained Shear Strength, c_u (psf)	---	---	---	---	667	---				
Major Principal Strain at 50%, ε_{50}	---	---	---	---	0.01	---				
Average Undrained Shear Strength, C_{avg} (psf)	---	---	---	---	667	---				
Unconfined Compressive Strength, q_u (psf)	---	---	---	---	---	---				
Axial/Torsional Properties										
Recommended Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Clay	Drilled Shaft Sand				
Recommended Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic				
Shear Modulus, G (ksi)	1.07	0.52	1.70	0.52	0.16	1.50				
Poisson's Ratio, ν	0.30	0.20	0.35	0.20	0.45	0.30				
Undrained Shear Strength, c_u (psf)	---	---	---	---	667	---				
Angle of Internal Friction, ϕ (degrees)	32	29	33	29	---	32				
Youngs Modulus, E (psf)	400,000	180,000	660,000	180,000	---	560,000				
Concrete [1]Ultimate Unit Skin Friction, T_f (psf)	760	342	1254	342	524	1064				
Tip Model										
Recommended Tip Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Clay	Drilled Shaft Sand				
Shear Modulus, G (ksi)	1.07	0.52	1.70	0.52	0.16	1.50				
Poisson's Ratio, ν	0.30	0.20	0.35	0.20	0.45	0.30				
Uncorrected N-value (bpf)	20	12	37	10	---	31				
Undrained Shear Strength, c_u (psf)	---	---	---	---	667	---				

*ID	General Soil Description
SND	Fine Sand to Fine Sand with Silt to Silty Fine Sand (SP, SP-SM, SM)
CLY	Fat Clay (CH)
SIL	Clayey Fine Sand (SC) to Sandy Silt to Silt (ML)
SIH	Elastic Silt (MH)
WLS	Weathered Limestone
LST	Limestone
MCK	Muck (PT)
SMK	Sandy Muck (PT)

**Multiplied by end area of chosen pile type to obtain Ultimate End Bearing as a force.

Pile Type	End Area (in^2)
18" Square PPC Pile:	324.0
24" Square PPC Pile:	576.0
14x89 Steel H Pile:	26.1
20" Steel Pipe Pile (closed end):	314.2

Notes

1. For the input of **vertical failure shear stress** and **torsional shear stress** the ultimate unit skin friction for a pile can be used.
2. Average N-values greater than 60 truncated to a maximum N-value of 60 for calculations.
3. Special equipment and/or procedures may be necessary to facilitate excavation of very dense/hard material during shaft construction at these depths.

FB-MultiPier Soil Parameters

Project Name:	Wekiva Parkway Section 7A	GSE @ Boring Loc. (ft):	+65.5	Elevation Datum:	NAVD
GEC Project Number:	3520G	Water Table Elevation (ft):	+59.5	Foundation:	WB Frontage Rd Toll Gantry (LT)
FPID Number:	240200-2-52-01	Pile Tip Elevation (ft):	N/A	Reference Boring(s):	TG-4 (615+82, 12' LT)

Layer No.	**FILL**	**1**	**[3]2**	**3**	**4**	**5**				
Soil Description ID*	SND	SND	SND	SND	CLY	SND				
Soil Type	Cohesionless	Cohesionless	Cohesionless	Cohesionless	Cohesive	Cohesionless				
Layer Top Elevation (ft)	---	+65	+47	+32	+26	+12				
Layer Bottom Elevation (ft)	---	+47	+32	+26	+12	+5				
Layer Thickness (ft)	---	18	15	6	14	7				
Average N-Value, N_{avg} (bpf)[2]	20	11	40	13	6	60				
Corrected N-Value, N_{60} (bpf)	20	8	36	12	5	54				
Lateral Properties										
Recommended Lateral Soil Model	Sand (Reese)	Sand (Reese)	Sand (Reese)	Sand (Reese)	Clay (Soft < Water)	Sand (Reese)				
Total Unit Weight, γ (pcf)	115	102	122	107	112	132				
Angle of Internal Friction, ϕ (degrees)	32	29	33	30	---	36				
Subgrade Modulus, K (pci)	80	30	90	60	100	125				
Undrained Shear Strength, c_u (psf)	---	---	---	---	667	---				
Major Principal Strain at 50%, ε_{50}	---	---	---	---	0.01	---				
Average Undrained Shear Strength, C_{avg} (psf)	---	---	---	---	667	---				
Unconfined Compressive Strength, q_u (psf)	---	---	---	---	---	---				
Axial/Torsional Properties										
Recommended Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Clay	Drilled Shaft Sand				
Recommended Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic				
Shear Modulus, G (ksi)	1.07	0.46	1.85	0.67	0.16	2.59				
Poisson's Ratio, ν	0.30	0.20	0.35	0.25	0.45	0.45				
Undrained Shear Strength, c_u (psf)	---	---	---	---	667	---				
Angle of Internal Friction, ϕ (degrees)	32	29	33	30	---	36				
Youngs Modulus, E (psf)	400,000	160,000	720,000	240,000	---	1,080,000				
Concrete [1]Ultimate Unit Skin Friction, T_f (psf)	760	304	1368	456	524	2052				
Tip Model										
Recommended Tip Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Clay	Drilled Shaft Sand				
Shear Modulus, G (ksi)	1.07	0.46	1.85	0.67	0.16	2.59				
Poisson's Ratio, ν	0.30	0.20	0.35	0.25	0.45	0.45				
Uncorrected N-value (bpf)	20	11	40	13	---	60				
Undrained Shear Strength, c_u (psf)	---	---	---	---	667	---				

*ID	General Soil Description
SND	Fine Sand to Fine Sand with Silt to Silty Fine Sand (SP, SP-SM, SM)
CLY	Fat Clay (CH)
SIL	Clayey Fine Sand (SC) to Sandy Silt to Silt (ML)
SIH	Elastic Silt (MH)
WLS	Weathered Limestone
LST	Limestone
MCK	Muck (PT)
SMK	Sandy Muck (PT)

**Multiplied by end area of chosen pile type to obtain Ultimate End Bearing as a force.

Pile Type	End Area (in^2)
18" Square PPC Pile:	324.0
24" Square PPC Pile:	576.0
14x89 Steel H Pile:	26.1
20" Steel Pipe Pile (closed end):	314.2

Notes

1. For the input of **vertical failure shear stress** and **torsional shear stress** the ultimate unit skin friction for a pile can be used.
2. Average N-values greater than 60 truncated to a maximum N-value of 60 for calculations.
3. Special equipment and/or procedures may be necessary to facilitate excavation of very dense/hard material during shaft construction at these depths.

TOLL GANTRY FB-DEEP AXIAL CAPACITY ANALYSES

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.2.04)

Date: May 13, 2015
Time: 16:21:15

General Information:
==========
Input file: .....Reports\90% Misc Structures Report\Toll Gantry FBDEEP\TG-1.spc
Project number: 3520G
Job name: Wekiva 7A
Engineer: CGB
Units: English

Analysis Information:
==========
Analysis Type: Drilled Shaft Analysis

Soil Information:
==========
Boring date: 11-14-14
Boring number: TG-1
Station number: 712+00 Offset: 15' RT

Ground Elevation: 62.50(ft)
Water table Elevation = 50.00(ft)

Hammer type: Safety Hammer

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	62.50	20.00	115.00	3- Clean sand
2	8.50	54.00	9.00	102.00	3- Clean sand
3	35.50	27.00	5.00	102.00	3- Clean sand
4	46.50	16.00	5.00	102.00	3- Clean sand
5	46.60	15.90	N/A	0.00	5- Cavity layer

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A

ID	RQD	F.M.	S.R.I.	Rock Recovery
1	N/A		N/A	N/A
2	N/A		N/A	N/A
3	N/A		N/A	N/A
4	N/A		N/A	N/A
5	N/A		N/A	N/A

SHAFT INFORMATION (Shaft ID = 1)
==========
Diameter = 54.00(in)
Base Diameter = 54.00(in)
Length = 30.00(ft)

Tip elevation = 32.50(ft)
Case length = 0.00(ft)
Bell length = 0.00(ft)

Skin friction capacity

Strength reduction factor for skin-friction = 1.00

Layer ID	Top Elev. (ft)	Thick. (ft)	Ult Skin Friction (Tons)	Soil Type	
1	62.50	46.60		3- Clean sand	<--- Bearing layer

(* IN LAYERS ABOVE BEARING LAYER)

Ultimate skin friction in layers above bearing layer = 0.00(tons)
Ultimate skin friction in bearing layer = 167.69(tons)
Total Skin Friction = 167.69(tons)

End bearing capacity

Soil type of end bearing layer: 3- Clean sand
Strength reduction factor for End-bearing = 1.00

ELEVATION (ft)	UNIT E. B. (tsf)	
39.25	4.09	<-- 1.5B above shaft tip
32.50	3.49	<-- Shaft tip elevation
27.00	3.00	
23.50	3.00	<-- 2.0B below shaft tip

Average unit end bearing above Shaft tip = 3.79(tsf)
Average unit end bearing below Shaft tip = 3.15(tsf)
Average unit end bearing in vicinity of Shaft tip = 3.47(tsf)

Uncorrected mobilized end bearing capacity = 55.17(tons)
Corrected mobilized end bearing capacity for wide shaft = 51.09(tons)

Shaft Capacity

For Probability of Failure, Pf = 0.1%, factor of safety equals 2.4
Ultimate Shaft capacity = 218.77(tons)
Allowable Shaft Capacity (Factor of Safety = 2.4) = 91.16(tons)

Settlement curve:

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.00%
Shaft capacity at user-defined settlement = 0.00(tons)

R(%)	Settl.(in)	Qs(tons)	Qb(tons)	Qt(tons)
0.1	0.054	58.27	1.76	60.03
0.2	0.108	97.74	3.47	101.21
0.4	0.216	139.66	6.77	146.43
0.6	0.324	155.93	9.89	165.83
0.8	0.432	162.81	12.86	175.68
1.0	0.540	164.02	15.68	179.70

1.5	0.810	164.02	22.11	186.13
2.0	1.080	164.02	27.77	191.78
2.5	1.350	164.02	32.74	196.76
3.0	1.620	164.02	37.15	201.16
4.0	2.160	164.02	44.58	208.60
5.0	2.700	164.02	50.71	214.72
6.0	3.240	164.02	56.01	220.02
7.0	3.780	164.02	60.85	224.87
8.0	4.320	164.02	65.47	229.48

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.2.04)

Date: May 13, 2015
Time: 16:24:44

General Information:
==========
Input file: .....Reports\90% Misc Structures Report\Toll Gantry FBDEEP\TG-2.spc
Project number: 3520G
Job name: Wekiva 7A
Engineer: CGB
Units: English

Analysis Information:
==========
Analysis Type: Drilled Shaft Analysis

Soil Information:
==========
Boring date: 11-14-14
Boring number: TG-2
Station number: 712+00 Offset: 33' LT

Ground Elevation: 62.50(ft)
Water table Elevation = 50.00(ft)

Hammer type: Safety Hammer

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	62.50	20.00	115.00	3- Clean sand
2	5.50	57.00	12.00	107.00	3- Clean sand
3	32.50	30.00	2.00	92.00	3- Clean sand
4	58.50	4.00	2.00	92.00	3- Clean sand
5	58.60	3.90	N/A	0.00	5- Cavity layer

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A

ID	RQD	F.M.	S.R.I.	Rock Recovery
1	N/A		N/A	N/A
2	N/A		N/A	N/A
3	N/A		N/A	N/A
4	N/A		N/A	N/A
5	N/A		N/A	N/A

SHAFT INFORMATION (Shaft ID = 1)
==========
Diameter = 54.00(in)
Base Diameter = 54.00(in)
Length = 30.00(ft)

Tip elevation = 32.50(ft)
Case length = 0.00(ft)
Bell length = 0.00(ft)

Skin friction capacity

Strength reduction factor for skin-friction = 1.00

Layer ID	Top Elev. (ft)	Thick. (ft)	Ult Skin Friction (Tons)	Soil Type	
1	62.50	58.60		3- Clean sand	<--- Bearing layer

(* IN LAYERS ABOVE BEARING LAYER)

Ultimate skin friction in layers above bearing layer = 0.00(tons)
Ultimate skin friction in bearing layer = 210.28(tons)
Total Skin Friction = 210.28(tons)

End bearing capacity

Soil type of end bearing layer: 3- Clean sand
Strength reduction factor for End-bearing = 1.00

ELEVATION (ft)	UNIT E. B. (tsf)	
39.25	3.26	<-- 1.5B above shaft tip
32.50	1.76	<-- Shaft tip elevation
30.00	1.20	
23.50	1.20	<-- 2.0B below shaft tip

Average unit end bearing above Shaft tip = 2.51(tsf)
Average unit end bearing below Shaft tip = 1.28(tsf)
Average unit end bearing in vicinity of Shaft tip = 1.89(tsf)

Uncorrected mobilized end bearing capacity = 30.08(tons)
Corrected mobilized end bearing capacity for wide shaft = 27.85(tons)

Shaft Capacity

For Probability of Failure, Pf = 0.1%, factor of safety equals 2.4
Ultimate Shaft capacity = 238.13(tons)
Allowable Shaft Capacity (Factor of Safety = 2.4) = 99.22(tons)

Settlement curve:

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.00%
Shaft capacity at user-defined settlement = 0.00(tons)

R(%)	Settl.(in)	Qs(tons)	Qb(tons)	Qt(tons)
0.1	0.054	73.08	0.96	74.03
0.2	0.108	122.56	1.89	124.45
0.4	0.216	175.13	3.69	178.82
0.6	0.324	195.54	5.39	200.93
0.8	0.432	204.17	7.01	211.18
1.0	0.540	205.67	8.55	214.22

1.5	0.810	205.67	12.06	217.73
2.0	1.080	205.67	15.14	220.81
2.5	1.350	205.67	17.85	223.53
3.0	1.620	205.67	20.25	225.93
4.0	2.160	205.67	24.31	229.98
5.0	2.700	205.67	27.64	233.32
6.0	3.240	205.67	30.53	236.21
7.0	3.780	205.67	33.18	238.85
8.0	4.320	205.67	35.69	241.37

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.2.04)

Date: May 13, 2015
Time: 16:28:46

General Information:
==========
Input file: .....Reports\90% Misc Structures Report\Toll Gantry FBDEEP\TG-3.spc
Project number: 3520G
Job name: Wekiva 7A
Engineer: CGB
Units: English

Analysis Information:
==========
Analysis Type: Drilled Shaft Analysis

Soil Information:
==========
Boring date: 11-14-14
Boring number: TG-3
Station number: 615+82 Offset: 30' RT

Ground Elevation: 69.50(ft)
Water table Elevation = 60.00(ft)

Hammer type: Safety Hammer

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	69.50	20.00	115.00	3- Clean sand
2	4.50	65.00	9.00	102.00	3- Clean sand
3	22.50	47.00	33.00	122.00	3- Clean sand
4	37.50	32.00	9.00	102.00	3- Clean sand
5	46.50	23.00	9.00	102.00	3- Clean sand
6	46.60	22.90	N/A	0.00	5- Cavity layer

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A

SHAFT INFORMATION (Shaft ID = 1)
==========

Diameter = 54.00(in)
Base Diameter = 54.00(in)
Length = 30.00(ft)
Tip elevation = 39.50(ft)
Case length = 0.00(ft)
Bell length = 0.00(ft)

Skin friction capacity

Strength reduction factor for skin-friction = 1.00

Layer ID	Top Elev. (ft)	Thick. (ft)	Ult Skin Friction (Tons)	Soil Type	
1	69.50	46.60		3- Clean sand	<--- Bearing layer

(* IN LAYERS ABOVE BEARING LAYER)

Ultimate skin friction in layers above bearing layer = 0.00(tons)
Ultimate skin friction in bearing layer = 171.43(tons)
Total Skin Friction = 171.43(tons)

End bearing capacity

Soil type of end bearing layer: 3- Clean sand
Strength reduction factor for End-bearing = 1.00

ELEVATION (ft)	UNIT E. B. (tsf)	
46.25	19.08	<-- 1.5B above shaft tip
39.50	12.60	<-- Shaft tip elevation
32.00	5.40	
30.50	5.40	<-- 2.0B below shaft tip

Average unit end bearing above Shaft tip = 15.84(tsf)
Average unit end bearing below Shaft tip = 8.40(tsf)
Average unit end bearing in vicinity of Shaft tip = 12.12(tsf)

Uncorrected mobilized end bearing capacity = 192.76(tons)
Corrected mobilized end bearing capacity for wide shaft = 178.48(tons)

Shaft Capacity

For Probability of Failure, Pf = 0.1%, factor of safety equals 2.4
Ultimate Shaft capacity = 349.91(tons)
Allowable Shaft Capacity (Factor of Safety = 2.4) = 145.80(tons)

Settlement curve:

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.00%
Shaft capacity at user-defined settlement = 0.00(tons)

R(%)	Settl.(in)	Qs(tons)	Qb(tons)	Qt(tons)
0.1	0.054	59.58	6.14	65.72
0.2	0.108	99.92	12.13	112.05
0.4	0.216	142.78	23.64	166.42

0.6	0.324	159.41	34.57	193.98
0.8	0.432	166.45	44.94	211.39
1.0	0.540	167.68	54.78	222.46
1.5	0.810	167.68	77.26	244.93
2.0	1.080	167.68	97.00	264.68
2.5	1.350	167.68	114.40	282.07
3.0	1.620	167.68	129.78	297.46
4.0	2.160	167.68	155.76	323.44
5.0	2.700	167.68	177.15	344.83
6.0	3.240	167.68	195.67	363.34
7.0	3.780	167.68	212.59	380.26
8.0	4.320	167.68	228.72	396.39

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.2.04)

Date: May 13, 2015
Time: 16:30:42

General Information:
==========
Input file: .....Reports\90% Misc Structures Report\Toll Gantry FBDEEP\TG-4.spc
Project number: 3520G
Job name: Wekiva 7A
Engineer: CGB
Units: English

Analysis Information:
==========
Analysis Type: Drilled Shaft Analysis

Soil Information:
==========
Boring date: 11-14-14
Boring number: TG-4
Station number: 615+82 Offset: 18' LT

Ground Elevation: 72.50(ft)
Water table Elevation = 60.00(ft)

Hammer type: Safety Hammer

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	72.50	20.00	115.00	3- Clean sand
2	7.00	65.50	8.00	102.00	3- Clean sand
3	25.50	47.00	36.00	122.00	3- Clean sand
4	40.50	32.00	12.00	107.00	3- Clean sand
5	46.50	26.00	12.00	107.00	3- Clean sand
6	46.60	25.90	N/A	0.00	5- Cavity layer

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A

ID	RQD	F.M.	S.R.I.	Rock Recovery
1	N/A		N/A	N/A
2	N/A		N/A	N/A
3	N/A		N/A	N/A
4	N/A		N/A	N/A
5	N/A		N/A	N/A
6	N/A		N/A	N/A

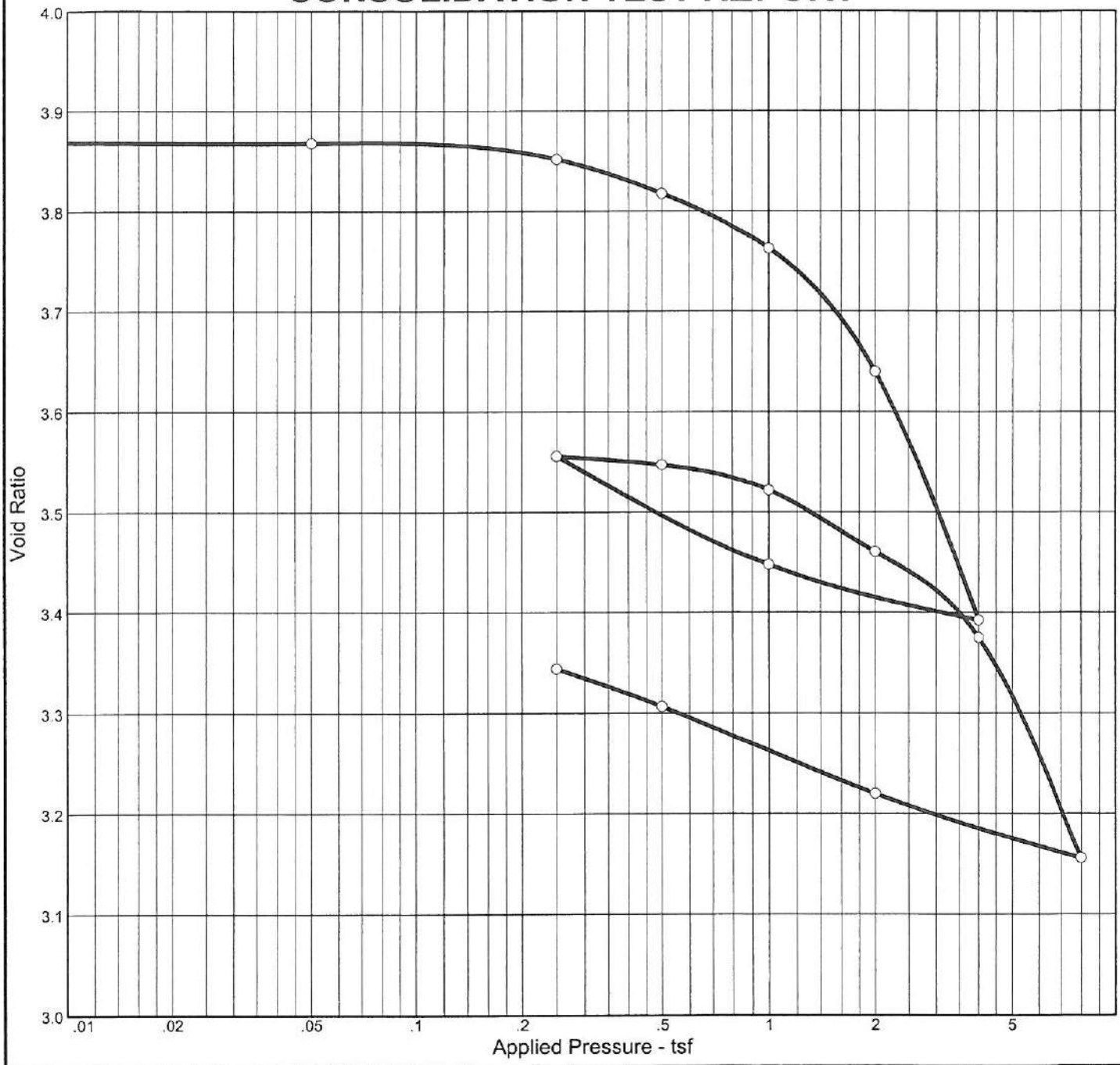
SHAFT INFORMATION (Shaft ID = 1)
==========

```
Diameter      =   54.00(in)
Base Diameter =   54.00(in)
Length        =   30.00(ft)
Tip elevation =   42.50(ft)
Case length   =    0.00(ft)
Bell length   =    0.00(ft)

Skin friction capacity
----------------------
  Strength reduction factor for skin-friction = 1.00

  Layer  Top            Ult Skin
   ID    Elev.   Thick. Friction          Soil Type
         (ft)    (ft)    (Tons)
  ----- -------- ------ -------- ------------------------------
     1    72.50  46.60          3- Clean sand                    <--- Bearing layer
  (* IN LAYERS ABOVE BEARING LAYER)

  Ultimate skin friction in layers above bearing layer =    0.00(tons)
  Ultimate skin friction in bearing layer              =  170.34(tons)
  Total Skin Friction                                  =  170.34(tons)

End bearing capacity
--------------------
  Soil type of end bearing layer:  3- Clean sand
  Strength reduction factor for End-bearing =  1.00

  ELEVATION  UNIT E. B.
    (ft)       (tsf)
  ---------- ----------
       49.25      19.56  <-- 1.5B above shaft tip
       47.00      21.60
       42.50      17.28  <-- Shaft tip elevation
       33.50       8.64  <-- 2.0B below shaft tip

  Average unit end bearing above Shaft tip          =   19.82(tsf)
  Average unit end bearing below Shaft tip          =   12.96(tsf)
  Average unit end bearing in vicinity of Shaft tip =   16.39(tsf)

  Uncorrected mobilized end bearing capacity               =  260.67(tons)
  Corrected mobilized end bearing capacity for wide shaft  =  241.36(tons)

Shaft Capacity
--------------
  For Probability of Failure, Pf = 0.1%, factor of safety equals 2.4
  Ultimate Shaft capacity =  411.70(tons)
  Allowable Shaft Capacity (Factor of Safety = 2.4) =  171.54(tons)


Settlement curve:
-----------------
***** Capacity is NOT modified by the strength reduction factors *****
                ---

User-Defined Settlement = 0.00%
Shaft capacity at user-defined settlement =    0.00(tons)

       R(%)     Settl.(in)    Qs(tons)     Qb(tons)     Qt(tons)
  ----------- ------------ ----------- ----------- -----------
         0.1        0.054       59.20        8.31       67.50
         0.2        0.108       99.28       16.40      115.68
         0.4        0.216      141.87       31.97      173.84
```

0.6	0.324	158.40	46.75	205.15
0.8	0.432	165.39	60.77	226.16
1.0	0.540	166.61	74.08	240.70
1.5	0.810	166.61	104.48	271.09
2.0	1.080	166.61	131.18	297.79
2.5	1.350	166.61	154.70	321.31
3.0	1.620	166.61	175.50	342.11
4.0	2.160	166.61	210.64	377.25
5.0	2.700	166.61	239.56	406.17
6.0	3.240	166.61	264.60	431.21
7.0	3.780	166.61	287.48	454.09
8.0	4.320	166.61	309.29	475.90

CONSOLIDATION TEST RESULTS

CONSOLIDATION TEST REPORT



Natural Sat.	Natural Moist.	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Swell Press. (tsf)	Heave %	e_o
95.1 %	205.6 %	23.0			1.79	0.95	1.79	0.80	0.20			3.869

MATERIAL DESCRIPTION	USCS	AASHTO
Dark Brown Sandy Muck	(PT)	

Project No. 3520G **Client:**

Project: Wekiva Parkway 7A

Location: BC-3 30'-32'

Remarks:

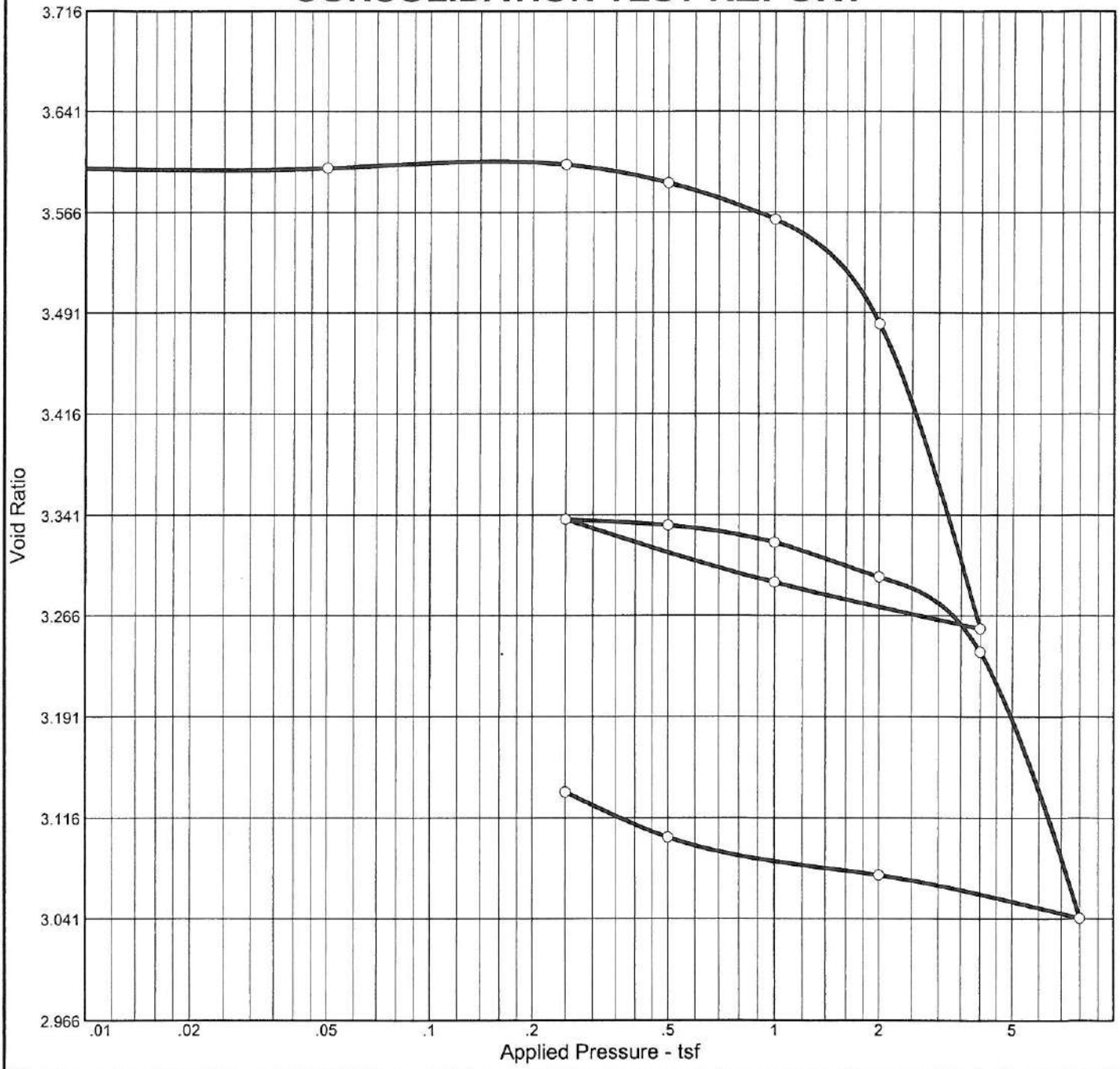
Percent Fines= 66.4%
Organic Content= 56.5%

CONSOLIDATION TEST REPORT

Geotechnical and Environmental Consultants, Inc.

Plate

CONSOLIDATION TEST REPORT



Natural Sat.	Natural Moist.	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Swell Press. (tsf)	Heave %	e_o
98.2 %	215.6 %	22.3			1.64	0.95	1.86	0.75	0.08			3.599

MATERIAL DESCRIPTION	USCS	AASHTO
Dark Brown Muck	(PT)	

Project No. 3520G **Client:**

Project: Wekiva Parkway 7A

Location: MB-14 35'-37'

Remarks:

Fines Content= 82.2%
Organic Content= 60.1%

CONSOLIDATION TEST REPORT

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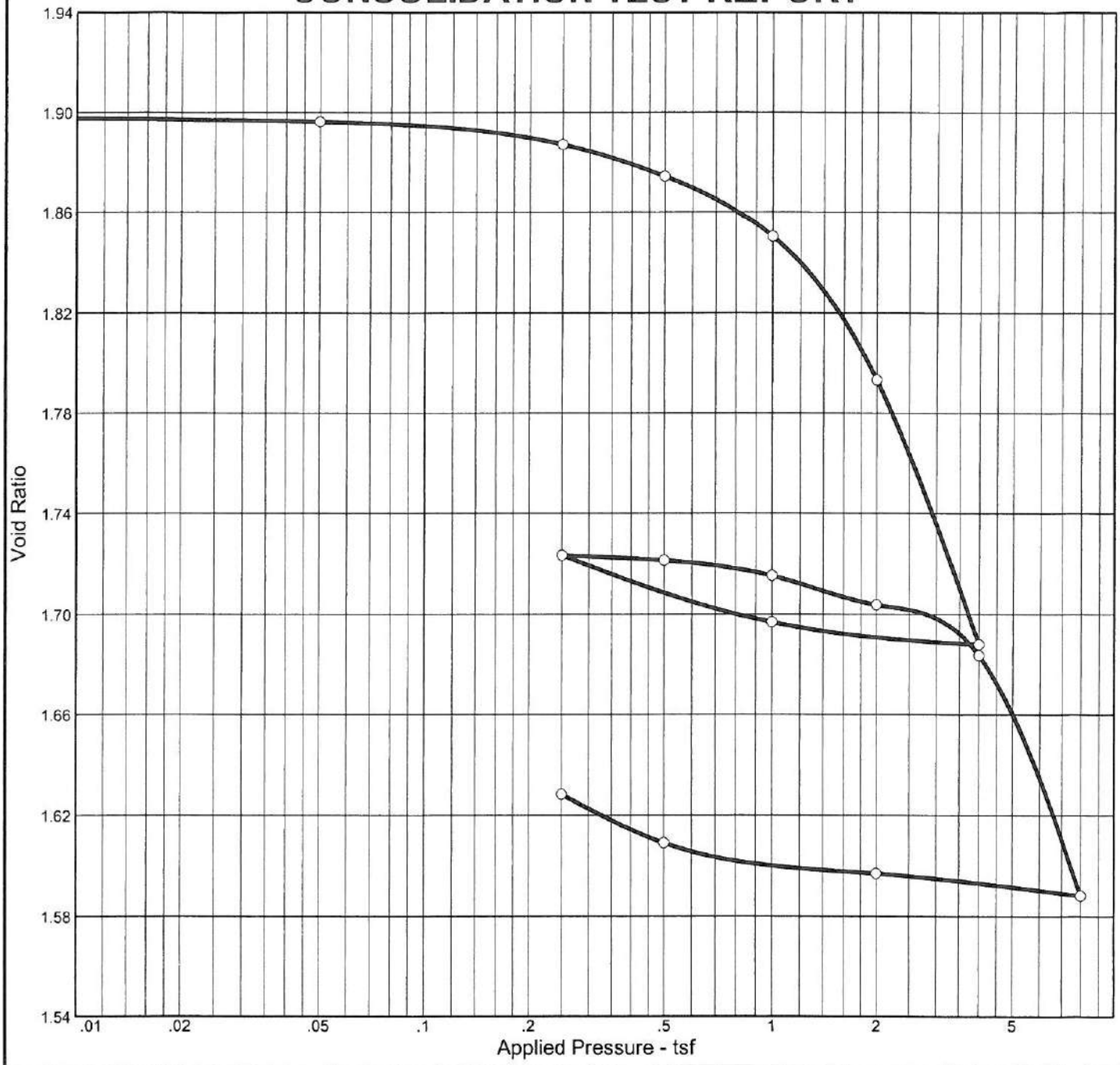
CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Swell Press. (tsf)	Heave %	e_o
Sat.	Moist.											
102.7 %	91.9 %	45.7			2.12	1.20	1.35	0.34	0.04			1.898

MATERIAL DESCRIPTION	USCS	AASHTO
Dark Brown Mucky Fine Sand	(PT)	

Project No. 3520G **Client:**

Project: Wekiva Parkway 7A

Location: MB-14 50'-52'

Remarks:

Fines Content= 35.9%
Organic Content=20.4%

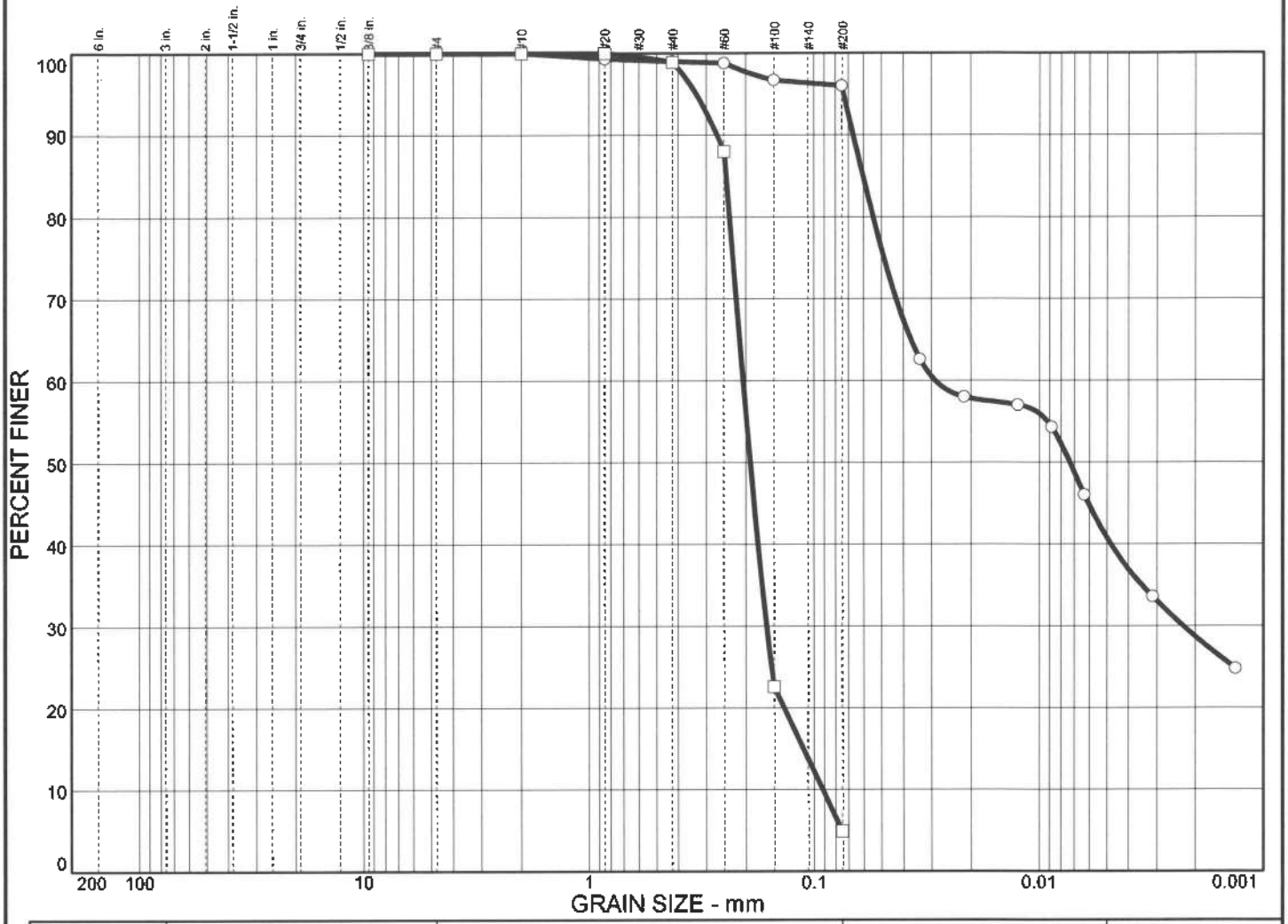
CONSOLIDATION TEST REPORT

Geotechnical and Environmental Consultants, Inc.

Plate

PARTICLE SIZE DISTRIBUTION CURVES
CULVERT OUTFALLS

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	4.0	55.3	40.7
□	0.0	0.0	95.1	4.9	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.0604	0.0289	0.0073	0.0023				
□			0.245	0.206	0.191	0.162	0.111	0.0916	1.39	2.25

MATERIAL DESCRIPTION	USCS	AASHTO
○ Dark Brown Muck	PT	
□ Gray Fine Sand	SP	

Project No. 3520G **Client:**

Project: Wekiva 7A

Wekiva 7A

○ **Location:** MB-1 0'-2' (1020+12, 162'LT, GSE: +32.6)

□ **Location:** MB-1 2'-4' (1020+12, 162'LT, GSE: +32.6)

Remarks:

○

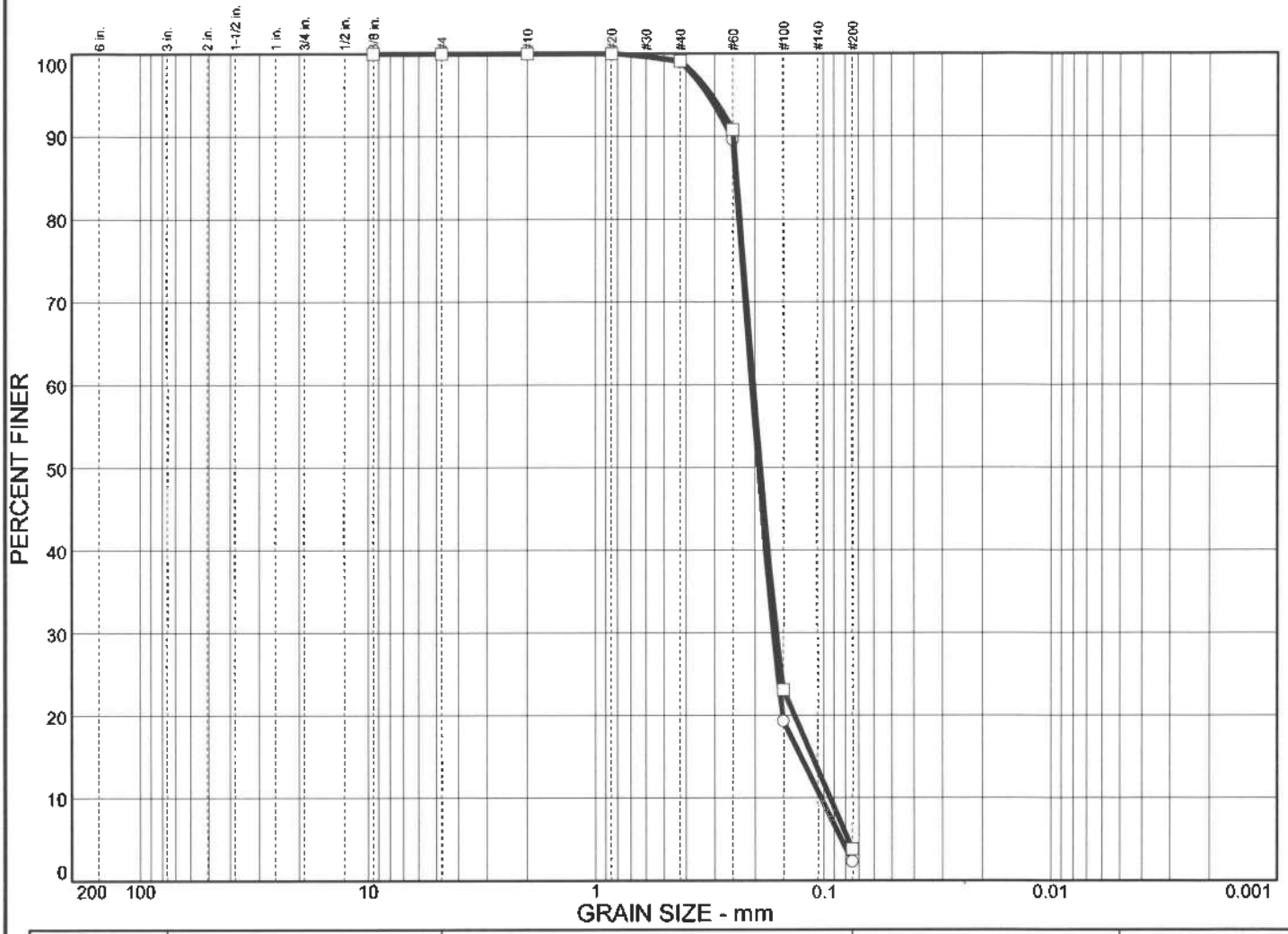
□

Particle Size Distribution Report

Geotechnical and Environmental Consultants, Inc.

Plate

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	97.7	2.3	
□	0.0	0.0	96.2	3.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.243	0.207	0.193	0.166	0.126	0.103	1.30	2.02
□			0.241	0.203	0.189	0.161	0.112	0.0937	1.36	2.17

MATERIAL DESCRIPTION	USCS	AASHTO
○ Light Brown Fine Sand	SP	
□ Light Brown Fine Sand	SP	

Project No. 3520G **Client:**

Project: Wekiva 7A

Wekiva 7A

○ **Location:** BC-1 4'-6' (1027+25, 115'LT, GSE: +35.9)

□ **Location:** PC-1 0'-2' (1055+30, 208'RT, GSE: +41.0)

Remarks:

○

□

Particle Size Distribution Report

Geotechnical and Environmental Consultants, Inc.

Plate