GEO-TECH, INC.

ENGINEERING CONSULTANTS IN GEOTECHNICAL • ENVIRONMENTAL • CONSTRUCTION MATERIALS TESTING

February 26, 2019
Project No. 18-3006.158.1

Mr. Oscar E. Tovar, P.E.
City of Ocala – Engineering Department
1805 NE 30th Avenue, Building 600
Ocala, Florida 34470

Project: Proposed Concorde Parking Site, NE 1st Avenue, Ocala, Florida
Geotechnical Site Exploration

Dear Mr. Tovar:

As requested, Geo-Technologies, Inc. (Geo-Tech) has performed a site exploration at the project site. Services were conducted in accordance with our Proposal No. 9320 dated December 5, 2018.

The following report summarizes our findings, evaluations and recommendations. Generally accepted soils and foundation engineering practices were employed in the preparation of this report.

Geo-Tech appreciates the opportunity to provide our services for this project. Should you have any questions regarding the contents of this report or if we may be of further assistance, please do not hesitate to contact the undersigned.

Sincerely,

Matthew W. Holland
Geotechnical Project Manager

MWH/CAH/jj

CRAIG AUSTIN HAMPY LICENSE No. 83240 STATE OF FLORIDA PROFESSIONAL ENGINEER

Craig A. Hampy, P.E.
Florida Registration No. 83240

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By

Purposes
Purpose of this study was to explore the subsurface conditions in the existing lot area.

Site Description
The project site is located at the northeast corner of the intersection of NE 1st Avenue and NE 1st Street in Ocala, Florida. At the time of our site exploration, the project site consisted of an existing asphalt parking lot.

Exploration Program
Field exploration services for the geotechnical exploration consisted of the following:

- Four (4) Standard Penetration Test (SPT) borings (B-1 thru B-4) to depths ranging from approximately forty (40) to seventy (70) feet below existing site grade in the anomalous area determined by the Ground Penetrating Radar (GPR) and throughout the remainder of the parking lot (ASTM D-1586). SPT borings were performed on February 15, 18 and 19, 2019.

- A Ground Penetrating Radar (GPR) survey throughout the existing parking lot. The GPR survey was performed on January 29, 2019.

Sampling & Testing Descriptions

Standard Penetration Testing
A Standard Penetration Test (SPT) boring (ASTM D-1586) is defined as a standard split-barrel sampler driven into the soil by a one hundred and forty (140) pound hammer falling thirty (30) inches. The number of blows required to drive the sampler one (1) foot, after seating six (6) inches, is designated resistance, or "N"-Value is an index to soil strength and consistency.

Samples recovered during performance of our SPT borings were visually classified in the field and representative portions of the samples were placed in containers and transported to our laboratory for further analysis.

GPR
GPR is an electromagnetic geophysical method that detects interfaces between subsurface materials with differing dielectric constants. The GPR system consists of an antenna which houses the transmitter and receiver; a profiling recorder which processes the received signal and produces a graphic display of the data; and a video display unit which processes and transmits the output signal to a color video display unit that records the data in a file base in a portable computer.

The transmitter radiates repetitive short-duration electromagnetic waves into the earth from an antenna moving across the ground surface. These radar waves are reflected back to the receiver by interfaces between materials with different dielectric constants. Travel times of the signal are used to estimate the depth of signal penetration. Intensity of the reflected signal is a function of the contrast in the dielectric constant between the materials, the conductivity of the material through which the wave is traveling, and the frequency of the signal. Subsurface features which commonly cause such reflections are: 1) natural geology such as changes in sediment

composition, bedding and cementation horizons, voids, and water content; or 2) unnatural changes to the subsurface such as disturbed soils, soil backfill, buried debris, tanks, pipelines and utilities. Moisture contents of underlying soils will limit the depth of the transmitted signal. The profiling recorder processes the signal from the receiver and produces a continuous cross-section of the subsurface interface reflections, referred to as reflectors.

GPR data output from the recorder is transferred color printed charts, which present the data as a continuous profile. A GPR survey is conducted along transects which are measured paths along which the GPR antenna is moved. Calibrated survey wheel measurements are used to determine the position of the antenna during the field survey.

Normal geologic conditions in the subsurface, as viewed on a GPR profile, are frequently characterized by the occurrence of relatively continuous and horizontal GPR reflectors, representing soil horizons. Anomalous subsurface features, such as sinkholes, exhibit GPR reflectors, which, in the area of the sinkhole, dip down toward the center of the sinkhole. In the center of the sinkhole, the GPR reflectors associated with the suspected soil horizons either dip sharply downward or are discontinuous. Subsurface features such as water or air-filled voids are typically characterized by: 1) a relatively high-amplitude reflection of the GPR signals, and 2) a hyperbolic shape of the GPR signals. Fractures are typically characterized by an abrupt increase in the depth of penetration of the GPR signal and the occurrence of relatively high-angle reflectors near the boundaries of the suspected fracture.

Depth of investigation of the GPR signal is highly site-specific and is limited by signal attenuation (absorption) in the subsurface materials. Signal attenuation is dependent upon the electrical conductivity and moisture content of the subsurface materials. Signal attenuation is greatest in materials with relatively high electrical conductivities such as clays and brackish groundwater, and lowest in relatively low-conductivity materials such as dry sand or rock. Depth of investigation is also dependent on the antenna's transmitting frequency. Depth of investigation generally increases as transmitting frequency decreases; however, the ability to resolve smaller subsurface features is diminished as frequency is decreased.

GPR antennas used on the project are internally shielded from above ground interference sources. Accordingly, the GPR response is affected on minimally by overhead power lines, metallic buildings, or nearby objects.

Findings

Boring locations and general subsurface conditions found in our soil borings B-1 thru B-4 are graphically presented on the soil profiles in Appendix I. Horizontal lines designating the interface between differing materials found represent approximate boundaries. Transition between soil layers is typically gradual.

Soils found at our boring location B-1 below the pavement section generally consisted of a surficial layer of fine sand approximately two (2) feet thick underlain by medium dense clayey sand and medium stiff to very stiff slightly sandy clay to the depth drilled.

Soils found at our boring locations B-2, B-3 and B-4 below the pavement section generally consisted of a surficial layer of fine sand ranging from approximately two (2) to four (4) feet

thick underlain by loose to dense clayey sand, medium stiff to hard slightly sandy clay and limestone to the depths drilled.

Ground water table levels were not found at our boring locations at the time of drilling. In Geo-Tech's opinion, ground water levels are not expected to influence near surface construction. After periods of prolonged rainfall water may become perched above the clayey soils and deeper foundation systems may encounter a perched water condition.

GPR Survey Results

The GPR survey was performed utilizing a shielded two hundred fifty (250) MHz antenna, the Control Unit II, and the XV-11 monitor manufactured by Mala Geoscience of Mala, Hassleholm Municipality, Skane County, Sweden.

Data from the GPR survey was transferred from the XV-11 monitor to a desktop computer where processing was performed utilizing RAMAC Groundvision Version 1.4.5 software produced by Mala Geoscience of Mala, Hassleholm Municipality, Skane County, Sweden.

The GPR survey was performed on January 29, 2019. Preliminary GPR transects were performed on random areas of the project site to calibrate the GPR equipment and to characterize overall site conditions. Preliminary GPR survey data indicated that a shielded two hundred fifty (250) MHz antenna provided optimum penetration and resolution of the GPR data to identify potential subsurface karst features at the project site.

GPR transects were constructed by Geo-Tech on six (6) to eight (8) foot centers. The GPR survey was performed throughout the existing parking lot. We refer the reader to the GPR Transect Location Plan presented in Appendix I for GPR transect locations.

The GPR investigation was performed by towing the antenna along each transect line. The location of the antenna along a transect line is electronically marked on the GPR data to allow correlation of the data to actual ground locations.

Results from the GPR survey indicated a maximum penetration depth of approximately eight (8) feet below existing site grade. The depth of investigation was based upon two-way travel times of the GPR signal traveling through unsaturated and saturated soils underlying the site. The depth was limited by attenuation of the GPR signal due to existing soil conditions at the site. Subsurface features located below the maximum depth of penetration would not have been detected by the GPR.

Review of the GPR data presented indication of downwarping, discontinuous strata or localized areas of deeper GPR penetration in the radargrams. Based on the recorded GPR data, subsurface karst features do appear to exist at the project site. SPT soil boring B-1 was later performed in the anomalous area.

Evaluations

Based on the soil borings performed, the shallow clayey sand soils found at our boring locations appear to be moderately plastic and will typically exhibit moderate shrink/swell behavior with

moisture content changes. Generally, these clay soils will swell upon wetting and shrink upon drying thus causing movement of structures placed on them.

Closure/General Qualifications

This report has been prepared in order to aid evaluation of the project site. The scope is limited to the specific project and the location described herein, and our description of the project represents our understanding of the significant aspects relevant to soil and foundation characteristics. In the event that any changes in present project concepts as outlined in this report are planned, we should be informed so the changes can be reviewed and the conclusions of this report modified as necessary in writing by the soils and foundation engineer.

It is recommended that all construction operations dealing with earthwork and foundations be reviewed by our soil engineer to provide information on which to base a decision whether the design requirements are fulfilled in the actual construction. Evaluations and recommendations submitted in this report are based upon the data obtained from the soil borings performed at the locations indicated on the Boring Location Map, and from any other information discussed in this report. This report does not reflect any variations, which may occur between these borings. In the performance of subsurface investigations, specific information is obtained at specific locations at specific times. Variations in soil and rock conditions exist on most sites between boring locations. Groundwater levels may also vary from time to time. The nature and extent of variations may not become evident until the course of construction. If variations then appear evident, it will be necessary for a re-evaluation of the recommendations of this report after performing on-site observations during the construction period and noting the characteristics of any variations.

APPENDIX I

SOIL PROFILES

Log of Borehole: B-1

Project: PROP. CONCORDE PARKING SITE, NE 1ST AVE., OCALA, FL
Project No: 18-3006.158.1
Boring Location: (SEE SITE PLAN)
Engineer: NJH/DAC
Client: CITY OF OCALA ENGINEERING & WATER RESOURCES DEP.
Enclosure: SITE PLAN

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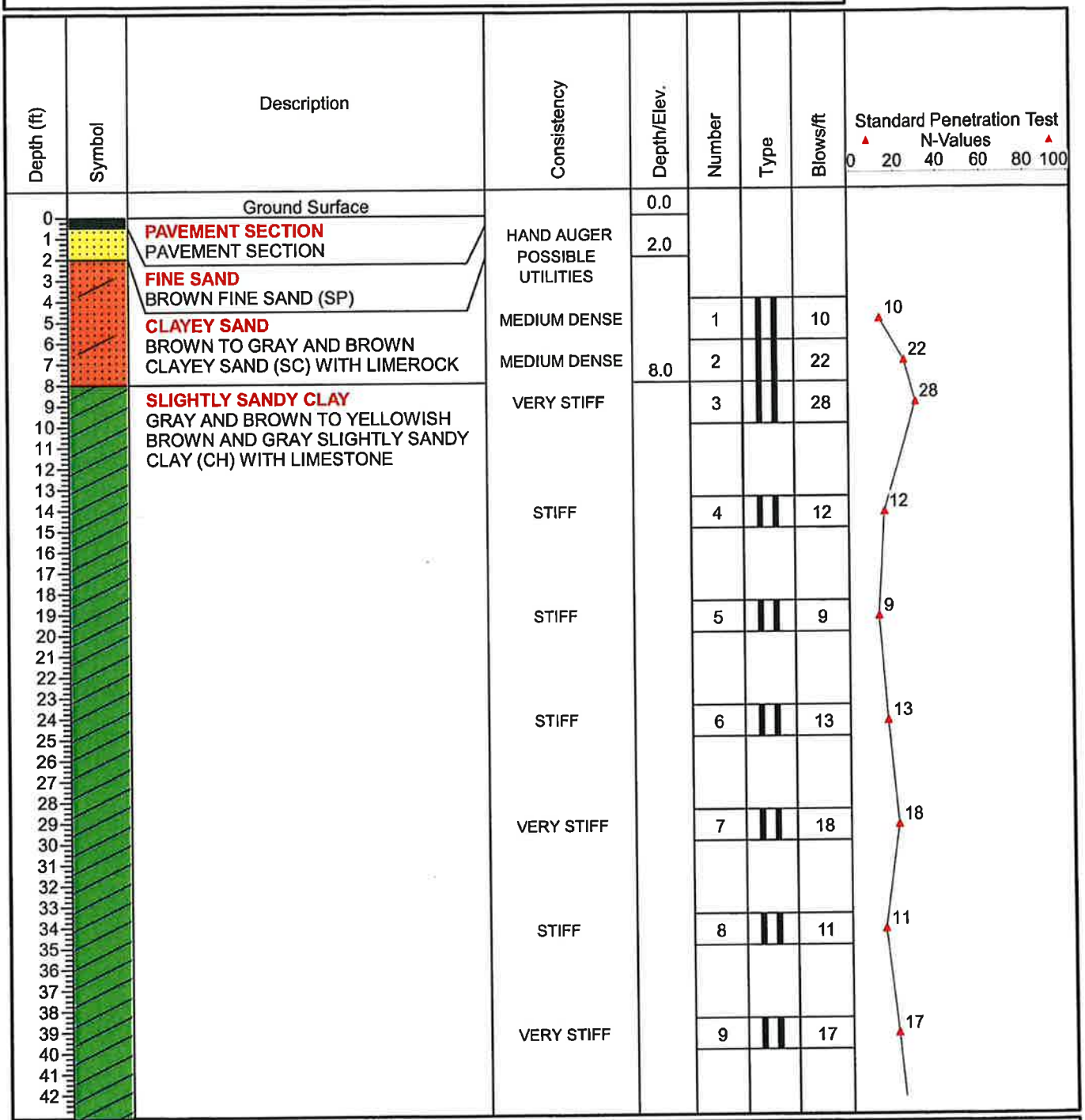

Ground Water Depth: GREATER THAN 10.0 FEET
Drill Date: FEBRUARY 15, 2019
Drilled By: BECHTOL
Drill Method: ASTM D-1586

Remarks: (SP) UNIFIED SOIL CLASSIFICATION SYMBOL AS DETERMINED BY VISUAL REVIEW

Log of Borehole: B-1

Project: PROP. CONCORDE PARKING SITE, NE 1ST AVE., OCALA, FL
Project No: 18-3006.158.1
Boring Location: (SEE SITE PLAN)
Engineer: NJH/DAC
Client: CITY OF OCALA ENGINEERING & WATER RESOURCES DEP.
Enclosure: SITE PLAN

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Depth (ft)	Symbol	Description	Consistency	Depth/Elev.	Number	Type	Blows/ft	Standard Penetration Test N-Values (0 20 40 60 80 100)
43–70			VERY STIFF		10		22	22
			MEDIUM STIFF		11		7	7
			STIFF		12		14	14
			MEDIUM STIFF		13		5	5
			STIFF		14		11	11
			VERY STIFF	70.0	15		21	21
71–84		End of Borehole						

Ground Water Depth: GREATER THAN 10.0 FEET
Drill Date: FEBRUARY 15, 2019
Drilled By: BECHTOL
Drill Method: ASTM D-1586

Remarks: (SP) UNIFIED SOIL CLASSIFICATION SYMBOL AS DETERMINED BY VISUAL REVIEW

Log of Borehole: B-2

Project: PROP. CONCORDE PARKING SITE, NE 1ST AVE., OCALA, FL
Project No: 18-3006.158.1
Boring Location: (SEE SITE PLAN)
Engineer: NJH/DAC
Client: CITY OF OCALA ENGINEERING & WATER RESOURCES DEP.
Enclosure: SITE PLAN

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Depth (ft)	Description	Consistency	Depth/Elev.	Number	Type	Blows/ft	Standard Penetration Test N-Values (0 20 40 60 80 100)
0	Ground Surface		0.0				
0–4	**PAVEMENT SECTION** PAVEMENT SECTION **FINE SAND** BROWN FINE SAND (SP)	HAND AUGER POSSIBLE UTILITIES	4.0				
4–6	**CLAYEY SAND** GRAY AND BROWN CLAYEY SAND (SC)	LOOSE	6.0	1		7	7
6–8		STIFF	8.0	2		11	11
8–18	**SLIGHTLY SANDY CLAY** REDDISH BROWN AND GRAY SLIGHTLY SANDY CLAY (CH) **CLAYEY SAND** REDDISH BROWN AND GRAY CLAYEY SAND (SC)	MEDIUM DENSE		3		17	17
		MEDIUM DENSE		4		12	12
18–19			18.5				
19–24	**SLIGHTLY SANDY CLAY** GRAY AND BROWN TO BROWN SLIGHTLY SANDY CLAY (CH) WITH LIMESTONE	STIFF		5		11	11
		STIFF		6		12	12
29–34		STIFF		7		8	8
		MEDIUM STIFF		8		6	6
39–42		STIFF		9		8	8

Ground Water Depth: GREATER THAN 10.0 FEET
Drill Date: FEBRUARY 18, 2019
Drilled By: BECHTOL
Drill Method: ASTM D-1586

Remarks: (SP) UNIFIED SOIL CLASSIFICATION SYMBOL AS DETERMINED BY VISUAL REVIEW

Log of Borehole: B-2

Project: PROP. CONCORDE PARKING SITE, NE 1ST AVE., OCALA, FL
Project No: 18-3006.158.1
Boring Location: (SEE SITE PLAN)
Engineer: NJH/DAC
Client: CITY OF OCALA ENGINEERING & WATER RESOURCES DEP.
Enclosure: SITE PLAN

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Depth (ft)	Symbol	Description	Consistency	Depth/Elev.	Number	Type	Blows/ft	Standard Penetration Test N-Values (0 20 40 60 80 100)
43-59			MEDIUM STIFF		10		7	7
			STIFF		11		14	14
			STIFF		12		10	10
			STIFF	60.0	13		10	10
60-69		**LIMESTONE** LIGHT BROWN LIMESTONE	56 BLOWS - 12"		14		56	56
			50 BLOWS - 5"	70.0	15		50	50
70-84		End of Borehole						

Ground Water Depth: GREATER THAN 10.0 FEET
Drill Date: FEBRUARY 18, 2019
Drilled By: BECHTOL
Drill Method: ASTM D-1586

Remarks: (SP) UNIFIED SOIL CLASSIFICATION SYMBOL AS DETERMINED BY VISUAL REVIEW

Log of Borehole: B-3

Project: PROP. CONCORDE PARKING SITE, NE 1ST AVE., OCALA, FL
Project No: 18-3006.158.1
Boring Location: (SEE SITE PLAN)
Engineer: NJH/DAC
Client: CITY OF OCALA ENGINEERING & WATER RESOURCES DEP.
Enclosure: SITE PLAN

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Depth (ft)	Description	Consistency	Depth/Elev.	Number	Type	Blows/ft	Standard Penetration Test N-Values (0 20 40 60 80 100)
0	Ground Surface		0.0				
1-2	**PAVEMENT SECTION** PAVEMENT SECTION	HAND AUGER POSSIBLE UTILITIES	2.0				
3-5	**FINE SAND** DARK GRAY AND BROWN FINE SAND (SP)	MEDIUM DENSE		1		17	17
6-8	**CLAYEY SAND** REDDISH BROWN AND GRAY TO GRAY AND LIGHT BROWN CLAYEY SAND (SC)	DENSE		2		36	36
9-13		MEDIUM DENSE		3		11	11
14-18		MEDIUM DENSE	18.5	4		11	11
19-23	**SLIGHTLY SANDY CLAY** LIGHT BROWN AND GRAY TO GRAY SLIGHTLY SANDY CLAY (CH)	MEDIUM STIFF		5		7	7
24-28		STIFF		6		9	9
29-33		VERY STIFF		7		16	16
34-38		STIFF	38.5	8		14	14
39-42	**LIMESTONE** LIGHT BROWN LIMESTONE	16 BLOWS - 12"		9		16	16

Ground Water Depth: GREATER THAN 10.0 FEET
Drill Date: FEBRUARY 18, 2019
Drilled By: BECHTOL
Drill Method: ASTM D-1586

Remarks: (SP) UNIFIED SOIL CLASSIFICATION SYMBOL AS DETERMINED BY VISUAL REVIEW

Soil Profile : 3 OF 4

Log of Borehole: B-3

Project: PROP. CONCORDE PARKING SITE, NE 1ST AVE., OCALA, FL
Project No: 18-3006.158.1
Boring Location: (SEE SITE PLAN)
Engineer: NJH/DAC
Client: CITY OF OCALA ENGINEERING & WATER RESOURCES DEP.
Enclosure: SITE PLAN

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Depth (ft)	Symbol	Description	Consistency	Depth/Elev.	Number	Type	Blows/ft	Standard Penetration Test N-Values 0 20 40 60 80 100
43-54			32 BLOWS - 12"		10		32	32
			7 BLOWS - 12"		11		7	7
			50 BLOWS - 3"	55.0	12		50	50
55		End of Borehole						

Ground Water Depth: GREATER THAN 10.0 FEET
Drill Date: FEBRUARY 18, 2019
Drilled By: BECHTOL
Drill Method: ASTM D-1586
Remarks: (SP) UNIFIED SOIL CLASSIFICATION SYMBOL AS DETERMINED BY VISUAL REVIEW
Soil Profile : 3 OF 4

Log of Borehole: B-4

Project: PROP. CONCORDE PARKING SITE, NE 1ST AVE., OCALA, FL
Project No: 18-3006.158.1
Boring Location: (SEE SITE PLAN)
Engineer: NJH/DAC
Client: CITY OF OCALA ENGINEERING & WATER RESOURCES DEP.
Enclosure: SITE PLAN

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Depth (ft)	Description	Consistency	Depth/Elev.	Number	Type	Blows/ft	Standard Penetration Test N-Values (0 20 40 60 80 100)
0	Ground Surface		0.0				
1-2	**PAVEMENT SECTION** PAVEMENT SECTION	HAND AUGER POSSIBLE UTILITIES	2.0				
3-4	**FINE SAND** DARK BROWN FINE SAND (SP)						
5-8	**CLAYEY SAND** LIGHT BROWN TO GRAY CLAYEY SAND (SC)	MEDIUM DENSE		1		11	11
7-8		MEDIUM DENSE		2		15	15
9-10		MEDIUM DENSE		3		19	19
13-14		MEDIUM DENSE		4		15	15
18			18.5				
19-23	**SLIGHTLY SANDY CLAY** GREEN AND BROWN SLIGHTLY SANDY CLAY (CH)	STIFF		5		9	9
24-25		VERY STIFF		6		18	18
28-29		HARD		7		62	62
33			33.5				
34-38	**LIMESTONE** LIGHT BROWN LIMESTONE	42 BLOWS - 12"		8		42	42
39		50 BLOWS - 3"	40.0	9		50	50
40-42	End of Borehole						

Ground Water Depth: GREATER THAN 10.0 FEET
Drill Date: FEBRUARY 19, 2019
Drilled By: BECHTOL
Drill Method: ASTM D-1586

Remarks: (SP) UNIFIED SOIL CLASSIFICATION SYMBOL AS DETERMINED BY VISUAL REVIEW

Soil Profile : 4 OF 4

APPENDIX II

BORING LOCATION MAP

● = APPROXIMATE STANDARD PENETRATION TEST (SPT) BORING LOCATION

—— = APPROXIMATE GROUND PENETRATING RADAR (GPR) TRANSECT LOCATION

CITY OF OCALA - ENGINEERING DEPARTMENT

PROPOSED CONCORDE PARKING SITE
NE 1ST AVENUE
OCALA, FLORIDA

FIELD EXPLORATION MAP

PROJECT NO. 18-3006.158.1

SCALE: NTS

DATE: 2-22-19

FIGURE: 1

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■CONSTRUCTION MATERIALS TESTING ■GEOPHYSICAL EXPLORATION
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