TIERRA

October 20, 2023

OM Engineering Services, Inc.
621 E. Washington Street, Suite 8
Orlando, Florida 32801

Attn: Mr. Richard Bobletz, P.E.
Senior Roadway Engineer

RE: Geotechnical Engineering Services Report
CR 561 and Lakeshore Drive Roundabout
Lake County, Florida
Lake County RSQ No. 20-0918B
Tierra Project No.: 5511-23-050

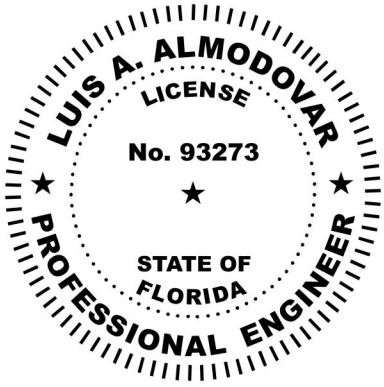
Mr. Bobletz:

Tierra, Inc. has completed a Geotechnical Engineering Services Report for the above referenced project. The results of our field exploration program, laboratory testing, and subsequent geotechnical recommendations are presented in this report.

Tierra, Inc. appreciates the opportunity to be of service to OM Engineering Services, Inc. (OME) on this project. If you have any questions or comments regarding this report, please contact our office at your earliest convenience.

Respectfully Submitted,

TIERRA, INC.



Luis A Almodovar
2023.10.20 09:00:02-04'00'

Luis A. Almodovar, P.E.
Geotechnical Engineer
Florida License No. 93273

Kenneth L. Symonds, Jr., P.E.
Senior Geotechnical Engineer
Florida License No. 59518

This item has been digitally signed and sealed by Luis A. Almodovar, P.E. on the date adjacent to the seal.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

591 Susan B. Britt Court • Winter Garden, Florida 34787
Phone (407) 877-1354 • Fax (407) 654-7347
Florida Certificate No. 6486

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1.0 PROJECT INFORMATION

1.1 Project Authorization

Authorization to proceed with this project was issued by OM Engineering Services, Inc. (OME) in accordance with a Subconsultant Agreement dated May 25, 2023.

1.2 Project Description

Based on information provided to us, the project consists of the design and construction of new single lane roundabout at the intersection of CR 561 and Lakeshore Drive in Lake County, Florida. The planned roundabout will be located approximately 300 feet north of the current intersection of CR 561 and Lakeshore Drive in order to avoid having to close the existing roads during construction and minimize the impacts to the existing traffic flow. The project limits will then extend approximately 900 feet north of the intersection along CR 561, and approximately 800 feet north of the intersection along Lakeshore Drive. Stormwater management for the project will include one new stormwater pond located north of the roundabout.

The purpose of this study is to provide geotechnical (i.e. soils and groundwater) input to the design team to assist in the design of the proposed roadway and drainage improvements.

2.0 PURPOSE AND SCOPE OF SERVICES

This study was performed to obtain information on the existing subsurface conditions at the project site to assist the design team in developing design and construction plans. The following services were provided:

1. Reviewed soil information from the Soil Survey of Lake County, Florida published by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). Reviewed topographic and potentiometric information obtained from the “Lake Nellie, Florida” Quadrangle Map and the “Potentiometric Surface of the Upper Floridan Aquifer in the St. Johns River Water Management District and Vicinity, Florida” maps published by the USGS, respectively.

2. Performed site reconnaissance and coordinated utility clearances via Sunshine State One Call.

3. Executed a program of subsurface exploration consisting of soil borings, subsurface sampling and field testing:

    - Performed nine (9) hand auger borings to a depth of approximately 5 feet below existing grades within the limits of the proposed roadway improvements.

    - Performed two (2) Standard Penetration Test (SPT) borings to a depth of 20 feet below existing grades within the footprint of the proposed stormwater pond.

    - Performed four (4) full depth pavement cores along CR 561 and Lakeshore Drive to identify the existing pavement type and thickness.

- Completed four (4) field permeability tests at depths of approximately 2 to 6 feet below existing site grades within the footprint of the proposed stormwater pond.

4. Visually classified and stratified the recovered soil samples in the laboratory. Performed laboratory tests on selected representative samples to develop the soil legend for the project in accordance with the American Association of State Highway and Transportation Officials (AASHTO) Soil Classification System.

5. Recorded groundwater levels (if encountered) and estimated the depth to the seasonal high groundwater level at the boring locations.

6. Prepared this formal engineering report, which summarizes the course of study pursued, the field and laboratory data generated, and the subsurface conditions encountered.

3.0 REVIEW OF PUBLISHED DATA

3.1 Review of USDA Soil Survey

The USDA Soil Survey map for the project vicinity was reviewed for information regarding near surface soil and groundwater information. A copy of the Lake County Soil Survey published by the USDA is illustrated on the **USDA Vicinity Map** in **Appendix A**. The Lake County Soil Survey identifies one (1) soil-mapping unit within the proposed improvement areas. The mapped soil unit depicted by the SCS is as follows.

SUMMARY OF USDA SOIL SURVEY
LAKE COUNTY, FLORIDA

USDA Map Symbol and Soil Name	Soil Classification				pH	Seasonal High Water Table	
	Depth (in)	USCS	AASHTO	Permeability (in/hr)		Depth (feet)	Months
(6) Apopka sand, 5 to 12 percent slopes	0-55	SP, SP-SM	A-3, A-2-4	6.0 - 20.0	4.5-6.0	> 6.0	Jan-Dec
	55-80	SM-SC, SC	A-2-4, A-2-6, A-4	0.6 - 2.0	4.5-6.0		

3.2 Review of USGS Quadrangle Map

Based on a review of the United States Geological Survey (USGS) quadrangle map of “Lake Nellie, Florida”, it appears that the natural ground surface elevations along the project alignment generally range from approximately +110 feet to +150 feet National Geodetic Vertical Datum of 1929 (NGVD 29). The project limits generally sloe down from a high in the east to a low in the west and northwest. The water level in Lake Glona to the west is reported at an elevation of +102 ft. NGVD 29.

3.3 Potentiometric Surface Elevation

Based on a review of the "Potentiometric Surface of the Upper Floridan Aquifer in the St. Johns River Water Management District and Vicinity, Florida" maps, the potentiometric surface elevation of the Upper Floridan Aquifer in the project vicinity could potentially range from approximately +90 to +100 feet, NGVD 29. As indicated in Section 3.2, the natural ground surface elevation along the project alignment ranges from approximately +110 to +150 feet, NGVD 29. Artesian flow conditions were not encountered during the field exploration. Artesian conditions are not expected to impact the proposed construction.

4.0 SUBSURFACE EXPLORATION

4.1 Boring Location Plan and Utility Clearance

Prior to commencing our subsurface explorations, a boring location plan for the proposed improvements was generated based on project information provided by OME. Upon finalizing the boring location plan, Tierra personnel staked and performed the borings in the field. In general, the borings were performed at the proposed boring locations. When not possible, due to access or utility constraints, the boring locations were altered and the offsets were recorded on the field boring logs.

Utility clearances were coordinated by Tierra and updated as required prior to performing the soil borings in order to reduce the potential for damage to any underground utilities during the drilling process. Subsurface explorations and coring operations were completed in general compliance with the applicable FDOT Roadway and Traffic Design Standards when required.

4.2 Soil Borings

4.2.1 Roadway Borings

To evaluate the subsurface conditions and groundwater table levels along the roadway limits, nine (9) hand auger borings were advanced to depths approximately 5 feet below the existing ground surface.

The hand auger borings were performed by manually twisting and advancing a bucket auger into the ground, typically in 4 to 6 inch increments. As each soil type was revealed, representative samples were collected and returned to our office for confirmation of the field classification by a geotechnical engineer.

4.2.2 SPT Borings

To evaluate the subsurface conditions and groundwater table levels within proposed stormwater pond, two (2) Standard Penetration Test (SPT) borings were advanced to depths of 20 feet below the existing ground surface.

The SPT borings were performed with the use of a drill rig using Bentonite Mud drilling procedures. The soil sampling was performed in general accordance with ASTM D-1586 "Penetration Test and Split-Barrel Sampling of Soils". The initial 6 feet of the borings were performed using manual hand auger methods to verify utility clearance. SPT

resistance N values were then taken continuously to a depth of 10 feet and on intervals of 5 feet thereafter.

The boring locations were established in the field by a representative of Tierra using a handheld Garmin eTrex® Global Positioning System (GPS) device with a reported accuracy of +/- 10 feet. The approximate boring locations are presented on the **Boring Location Plan** in **Appendix A**. If a more accurate determination of the boring locations and elevations are required, then Tierra recommends the boring locations be survey located by the project surveyor.

Soil stratification was determined based on a review of recovered samples, laboratory test results, and interpretation of field boring logs. Stratification lines represent approximate boundaries between soil layers of different engineering properties; however actual transitions between layers may be gradual. In some cases, small variations in properties that were not considered pertinent to our engineering evaluation may have been abbreviated or omitted for clarity. The soil profiles represent the conditions at the particular boring location and variations do occur among the borings. Specific details about subsurface conditions and materials encountered at each test location can be obtained from the **Soil Profiles** sheet presented in **Appendix A**.

4.3 Asphalt Cores

Tierra performed a total of two (2) pavement cores along Lakeshore Drive and two (2) along CR 561. The purpose of the coring was to determine the existing pavement and base type/thickness at the core locations along these roadways. The results of our pavement cores are presented in **Table 3** in **Appendix C**.

The pavement cores were performed with the use of a 3.5 inch outside diameter core bit. The resulting core holes were then backfilled with asphalt patch to the existing pavement surface upon completion. The asphalt patch was placed in approximately 2-inch lifts which were compacted through the use of a 10-pound hand-held rammer. The hand-held rammer is the same device used by Tierra in the Modified Proctor Test (ASTM D-1557). The recovered pavement cores and base materials were then transported to our laboratory for visual classification. The pavement cores were visually classified using FDOT asphalt mixture nomenclature.

4.4 Permeability Testing

Tierra also performed four (4) field permeability tests at the approximate location of borings PB-1 and PB-2 performed within the limits of the proposed stormwater pond. The tests were performed at depths of approximately 2 and 6 feet below the existing ground surface within the Stratum 1 and 2 soils. The permeability tests were performed and the results evaluated in general accordance with the methodology presented in the booklet titled “Stormwater Retention Pond Infiltration Analyses in Unconfined Aquifers,” Jammal & Associates, Inc., prepared for the Southwest Florida Water Management District (SWFWMD). The test locations are presented on the **Boring Location Plan** sheet in **Appendix A**.

The following table presents the results of the field testing and our interpretation of the results with respect to the hydraulic conductivity of the in-situ soils at each test location:

Test Location	Stratum Tested	Test Depth (feet)	In-situ Vertical Unsaturated Hydraulic Conductivity, (feet/day)
PB-1	1 (A-3)	2	42
PB-1	2 (A-2-4)	6	2.4
PB-2	1 (A-3)	2	19
PB-2	2 (A-2-4)	6	1.7

5.0 LABORATORY TESTING

5.1 General

Representative soil samples collected from the roadway borings and miscellaneous structures borings were classified and stratified in general accordance with the AASHTO Soil Classification Systems. Our classification was based on visual observations, using the results from the laboratory testing as confirmation.

5.2 Test Designation

The following list summarizes the laboratory tests performed and respective test methods.

- Grain-Size Analyses/Fines Content - The grain-size analyses and fines content tests were conducted in general accordance with the AASHTO test designation T-088 (ASTM test designation D-422).

- Atterberg Limits - The liquid limit and the plastic limit tests ("Atterberg Limits") were conducted in general accordance with the AASHTO test designations T-089 and T-090, respectively (ASTM test designation D-4318).

- Natural Moisture Content - The moisture content tests were conducted in general accordance with the AASHTO test designation T-265 (ASTM test designation D-2216).

- Environmental Corrosion - The environmental corrosion tests were conducted in general accordance with the FDOT test designations FM 5-550, FM 5-551, FM 5-552 and FM 5-553.

A summary of the laboratory test results for each soil stratum is presented on the **Roadway Soil Survey** sheet in **Appendix A**. The **Roadway Soil Survey** sheet includes ranges of laboratory test results for the soil samples collected from roadway and stormwater pond borings included in this report. A detailed summary of the laboratory tests with the corresponding results is also presented in **Appendix B**.

6.0 RESULTS OF SUBSURFACE EXPLORATION

6.1 General Soil Conditions

Specific information of each boring performed is provided on the **Soil Profiles** sheet in **Appendix A.**

The soil strata encountered in the borings performed at the project site are summarized in the following table:

Stratum Number	Typical Soil Description	AASHTO Classification
1	Brown to Light Brown SAND to SAND with Silt	A-3
2	Orange-Brown Silty to Slightly Clayey SAND	A-2-4
3	Orange-Brown Clayey SAND to Sandy CLAY	A-2-6/A-6

The subsurface soil stratification is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The soil profiles included in **Appendix A** should be reviewed for specific information at individual boring locations. These profiles include soil descriptions and stratifications. The SPT boring profiles also include penetration resistances (i.e. SPT N-Values). The stratifications shown on the boring profiles represent the conditions only at the actual boring location. Variations did occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual.

6.2 Groundwater

In general, the groundwater table was not encountered within the explored depths of the borings completed within the project limits (5 to 20 feet). As such, GNE (groundwater not encountered) is indicated on the soil profiles of these borings. Water levels in the adjacent lakes range from approximately +100 to +104 ft. NGVD.

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences (i.e. existing water management canals, swales, drainage ponds, underdrains and areas of covered soils, such as paved parking lots and sidewalks).

6.3 Seasonal High Groundwater Estimates

The seasonal high groundwater table (SHGWT) levels are estimated at depths greater than 6 feet below existing site grades, however, groundwater is expected to temporarily perch up to 1 foot above the silty and clayey sands (Strata 1 & 2 soils) following heavy rainfall events. The perched groundwater will be a transient condition, directly related to rainfall, irrigation and/or site grading and should be taken into consideration during design.

In general, the seasonal high groundwater table levels estimated along the project alignments were based on soil stratigraphy, the Lake County, Florida USDA Soil Survey information and past experience with similar soil conditions.

7.0 ENGINEERING EVALUATIONS AND RECOMMENDATIONS

7.1 General

In general, the existing shallow subsurface soils encountered in the borings performed are suitable for supporting the proposed roadway improvements after proper subgrade preparation.

The removal and utilization of plastic soils should be accomplished in accordance with the current FDOT Standard Plans. Site preparation should consist of normal clearing and grubbing followed by compaction of subgrade soils. Backfill should consist of materials conforming to the FDOT Standard Plans. Clearing and grubbing and compaction should be accomplished in accordance with Sections 110 and 120 of the FDOT Standard Specifications for Road and Bridge Construction (SSRBC), latest edition.

7.3 Cut and Fill Slopes

We anticipate that fill and/or cuts will be required for the proposed improvements. Assuming proper subgrade preparation and adequate fill materials are utilized, we recommend that all side slopes be constructed on 2 horizontal to 1 vertical (2H:1V) or flatter. Once cross sectional information becomes available then critical slopes can be analyzed as appropriate.

7.4 Excavations

Excavations and temporary side slopes should comply with the Occupational Safety and Health Administration's (OSHA) trench safety standards, 29 C.F.R., s. 1926.650, Subpart P, all subsequent revisions or updates of OSHA's referenced standard adopted by the Department of Labor and Employment Security and Florida's Trench Safety Act, Section 553.62, Florida Statutes. Excavated materials should not be stockpiled at the top of the slope within a horizontal distance equal to the excavation depth.

7.5 Groundwater Control

Depending upon groundwater levels and depths of excavations at the time of construction, some form of dewatering may be required for the anticipated construction activities. Tierra recommends that the Contractor determine the actual groundwater levels at the time of the construction to determine groundwater impacts on the planned construction procedure.

7.6 On-Site Soil Suitability

The general suitability of the soils encountered during our geotechnical exploration is presented on the **Roadway Soil Survey** sheet in **Appendix A**. The FDOT Standard Plans should be consulted to determine the specific use/suitability of the soil types present within the project limits.

7.7 General Roadway Construction

The overall site preparation and mechanical densification work for the construction of the proposed roadway should be in accordance with the FDOT Specifications and Standard Index requirements.

7.8 Pavement Design Considerations

Grades for this type of roadway should be set to provide a minimum separation in accordance with the FDOT Plans and Preparation Manual (PPM) between the bottom of the base and the estimated seasonal high groundwater levels. Correspondingly, the base should remain at the minimum separation above sustained water levels in roadside ditches, making positive drainage of the ditches important.

The design of the pavement section should be in accordance with the FDOT flexible pavement manual and the FDOT PPM. The seasonal high groundwater table estimates provided in this report should be carefully reviewed and incorporated into the project pavement design. Tierra has also provided existing pavement section information in **Appendix C**.

7.9 Stormwater Pond

Based on the borings performed within the limits of these areas, the soils generally consist of relatively clean to slightly silty and silty fine sands to the boring termination depths. With the exception of topsoil, soils excavated from the pond site(s) should be suitable for use as fill for the project. However, design of the stormwater pond(s) should be cognizant of the Stata 2 and 3 soils encountered across the site. Seasonal high groundwater levels for pond design is estimated to consist of a temporary perched condition approximately 1 foot above the Strata 2 and 3 soils with the base of aquifer corresponding to the upper surface of the Strata 2 and 3 soils. Once pond geometry and design details are available, we can assist with evaluating parameters to model the shallow effective aquifer in the pond recovery analysis.

The performance of a given stormwater system is dependent on the soil permeability as well as the groundwater table, system bottom elevation, system geometry, confining layer and water level in the system. We recommend a commercially available computer program such as PONDS or MODRET be used by an engineer experienced in groundwater modeling to evaluate the proposed stormwater system. The system should be designed and constructed in accordance with St. Johns River Water Management District and local City/County requirements. The project drainage engineer should also apply a factor of safety that is appropriate for the project design.

8.0 REPORT LIMITATIONS

Our services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices at the time of this report. Our geotechnical engineering evaluation of the site and subsurface conditions with respect to the planned improvements are based upon the following: (1) site observations, (2) the field exploratory test data obtained during the geotechnical study, and (3) our understanding of the project information and anticipated grades as presented in this report. This company is not responsible for the conclusions, opinions or recommendations made by others based on these data.

The scope of the exploration was intended to evaluate soil conditions within the influence of the proposed roadway and drainage improvements. The analyses and recommendations submitted in this report are based upon the anticipated location and type of construction and data obtained from the soil borings performed at the locations indicated and does not reflect any variations which may occur among these borings. If any variations become evident during the course of construction, a re-evaluation of the recommendations contained in this report will be necessary after we have had an opportunity to observe the characteristics of the conditions encountered.

The scope of services, included herein, did not include any environmental assessment for the presence or absence of hazardous or toxic materials in the soil, surface water, groundwater, air, on the site, below and around the site. Any statements in this report or on the boring logs regarding odors, colors, unusual or suspicious items and conditions are strictly for the information of OM Engineering Services, Inc. and Lake County.

APPENDIX A

- USDA and USGS Vicinity Maps (**1 Sheet**)
- Roadway Soil Survey Sheet **(1 Sheet)**
- Boring Location Plan (**1 Sheet**)
- Soil Profiles (**1 Sheet**)

DATE OF SURVEY: SEPTEMBER 2023
SURVEY MADE BY: TIERRA, INC.
SUBMITTED BY: LUIS A. ALMODOVAR, P.E.

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

DISTRICT: 5
ROAD NO.: N/A
COUNTY: LAKE

LAKE COUNTY RSQ NO. 20-0918B
PROJECT NAME: CR 561 AND LAKESHORE DRIVE ROUNDABOUT

CROSS SECTION SOIL SURVEY FOR THE DESIGN OF ROADS AND PONDS

	ORGANIC CONTENT		MOISTURE CONTENT (%)		SIEVE ANALYSIS RESULTS PERCENT PASS						ATTERBERG LIMITS (%)					CORROSION TEST RESULTS				
STRATUM NO.	NO. OF TESTS	% ORGANIC	NO. OF TESTS	MOISTURE CONTENT	NO. OF TESTS	10 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTIC INDEX	AASHTO GROUP	DESCRIPTION	NO. OF TESTS	RESISTIVITY ohm-cm	CHLORIDE ppm	SULFATES ppm	pH
1	--	--	--	--	5	99-100	65-78	36-48	15-18	7-9	--	--	--	A-3	BROWN TO LIGHT BROWN SAND TO SAND WITH SILT	2	31,000-33,000	30	6-9	7.5-8.1
2	--	--	2	13-14	4	100	70-79	40-46	23-39	20-29	2	25-26	9-10	A-2-4	ORANGE-BROWN SILTY SAND TO SLIGHTLY CLAYEY SAND	--	--	--	--	--
3	--	--	2	14-23	4	99-100	67-85	48-72	35-60	35-40	2	32-55	16	A-2-6/A-6	ORANGE-BROWN CLAYEY SAND TO SANDY CLAY	--	--	--	--	--

NOTES:

1. SOIL ANALYSIS INCLUDES STRATA FORM ROADWAY AND POND AREAS. THE SYMBOL "-" REPRESENTS AN UNMEASURED PARAMETER.
2. STRATA 1 AND 2 SHALL BE TREATED AS SELECT (S) IN ACCORDANCE WITH FDOT STANDARD PLANS, INDEX 120-001.
3. STRATUM 3 SHALL BE TREATED AS PLASTIC (P) IN ACCORDANCE WITH FDOT STANDARD PLANS, INDEX 120-001.
4. STRATUM 2 MAY RETAIN EXCESS MOISTURE AND MAY BE DIFFICULT TO DRY AND COMPACT.

EMBANKMENT AND SUBGRADE MATERIAL

STRATA BOUNDARIES ARE APPROXIMATE. MAKE FINAL CHECK AFTER GRADING.

▼ - GROUNDWATER LEVEL ENCOUNTERED DURING INVESTIGATION

GNE - GROUNDWATER NOT ENCOUNTERED

REVISIONS	
DATE	DESCRIPTION

TIERRA INC.
591 SUSAN B. BRITT COURT
WINTER GARDEN, FL 34787

ENGINEER OF RECORD: LUIS A. ALMODOVAR, P.E.
P.E. LICENSE NUMBER 93273

CR 561 & LAKESHORE DRIVE ROUNDABOUT

ROADWAY SOIL SURVEY

SHEET NO. ----

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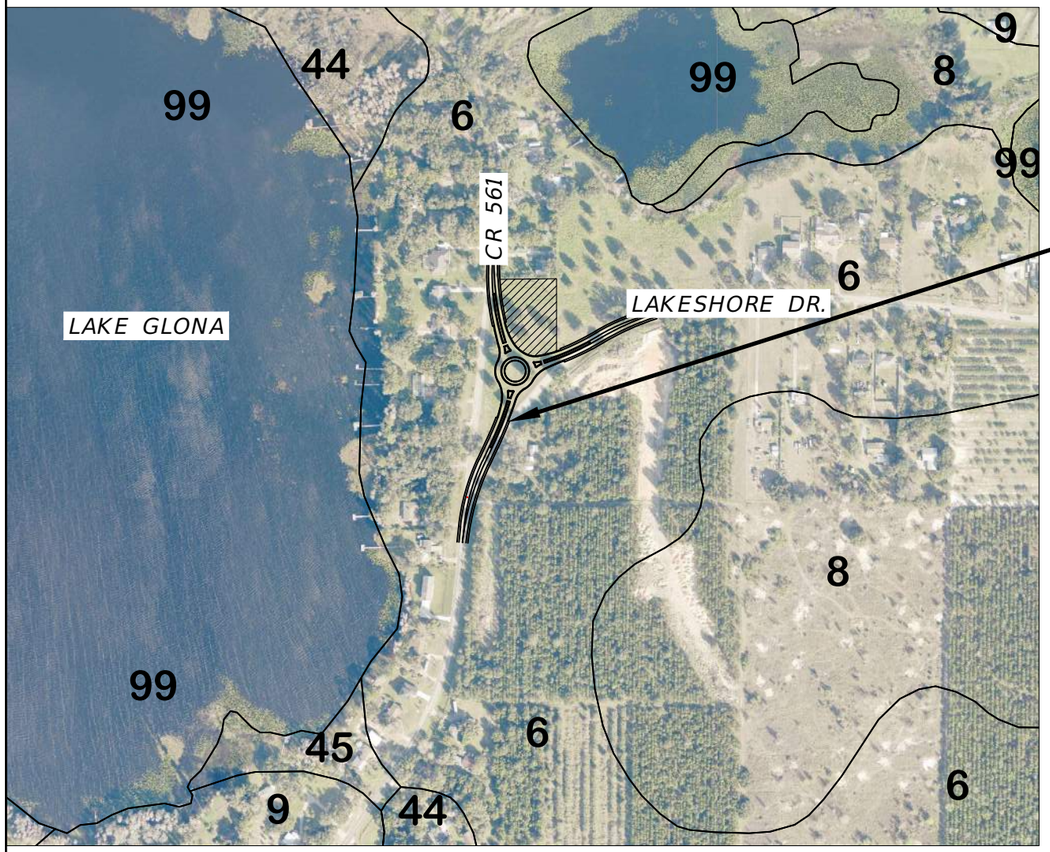
USDA SOIL SURVEY MAP



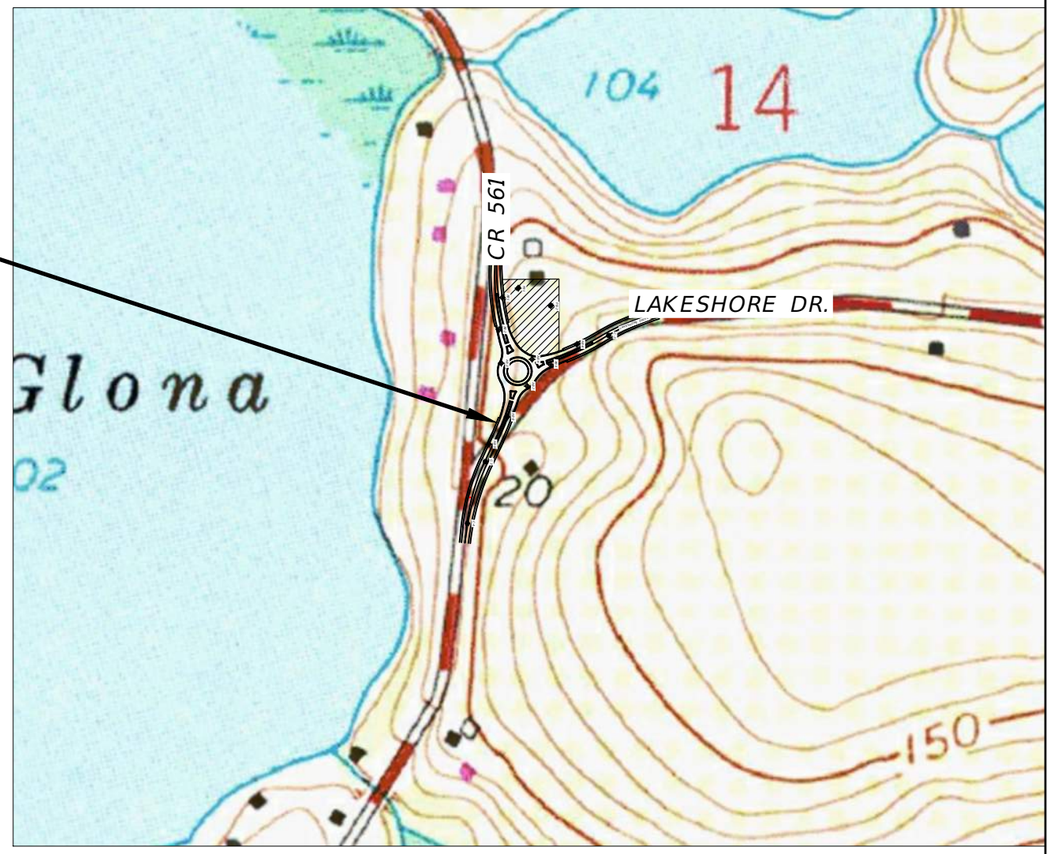
APPROXIMATE PROJECT LOCATION

N

0 100 500

Feet

USGS QUADRANGLE MAP



REFERENCE: USDA SOIL SURVEY OF LAKE COUNTY, FLORIDA

REFERENCE: "LAKE NELLIE, FLORIDA" USGS QUADRANGLE MAP

TOWNSHIP: 23 S
RANGE: 25 E
SECTION: 14

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

TIERRA INC.
591 SUSAN B. BRITT COURT
WINTER GARDEN, FL 34787

ENGINEER OF RECORD: LUIS A. ALMODOVAR, P.E.
P.E. LICENSE NUMBER 93273

CR 561 & LAKESHORE DRIVE ROUNDABOUT

USDA SOIL SURVEY & USGS VICINITY MAP

SHEET NO. ____

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LEGEND

- APPROXIMATE LOCATION OF AUGER BORING
- APPROXIMATE LOCATION OF SPT BORING
- APPROXIMATE LOCATION OF PAVEMENT CORE

REVISIONS	
DATE	DESCRIPTION

TIERRA INC.
591 SUSAN B. BRITT COURT
WINTER GARDEN, FL 34787

ENGINEER OF RECORD: LUIS A. ALMODOVAR, P.E.
P.E. LICENSE NUMBER 93273

CR 561 & LAKESHORE DRIVE ROUNDABOUT

BORING LOCATION PLAN

SHEET NO. ----

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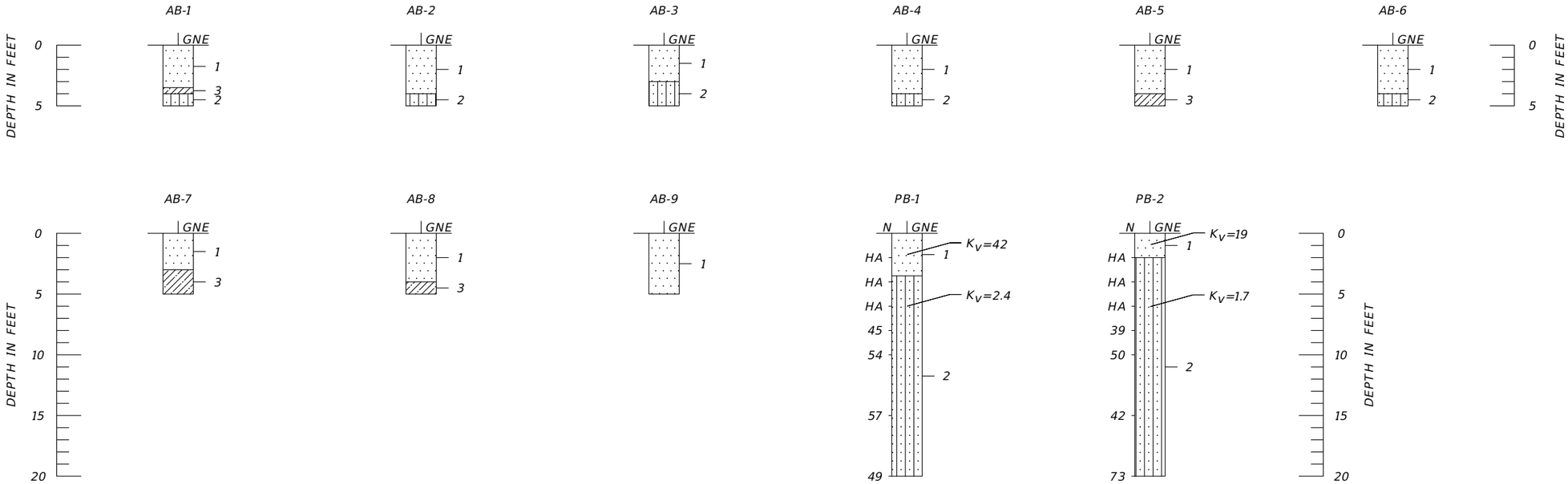
SOIL PROFILES



LEGEND

1 — BROWN TO LIGHT BROWN SAND TO SAND WITH SILT (A-3)

2 — ORANGE-BROWN SILTY SAND TO SLIGHTLY CLAYEY SAND (A-2-4)

3 — ORANGE-BROWN CLAYEY SAND TO SANDY CLAY (A-2-6/A-6)

N	SPT N-VALUE IN BLOWS/FOOT FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED)
A-3	AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW AND LABORATORY TESTING ON SELECTED SAMPLES FOR CONFIRMATION OF VISUAL REVIEW
GNE	GROUNDWATER TABLE NOT ENCOUNTERED
HA	HAND AUGERED TO VERIFY UTILITY CLEARANCES
K_V	VERTICAL PERMEABILITY RATE (FT./DAY)

AUTOMATIC HAMMER	
GRANULAR MATERIALS-RELATIVE DENSITY	SPT N-VALUE (BLOWS/FT.)
VERY LOOSE	LESS THAN 3
LOOSE	3 TO 8
MEDIUM	8 TO 24
DENSE	24 TO 40
VERY DENSE	GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT N-VALUE (BLOWS/FT.)
VERY SOFT	LESS THAN 1
SOFT	1 TO 3
FIRM	3 TO 6
STIFF	6 TO 12
VERY STIFF	12 TO 24
HARD	GREATER THAN 24

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REVISIONS	
DATE	DESCRIPTION

TIERRA INC.
591 SUSAN B. BRITT COURT
WINTER GARDEN, FL 34787

ENGINEER OF RECORD: LUIS A. ALMODOVAR, P.E.
P.E. LICENSE NUMBER 93273

LAKE COUNTY, FL

CR 561 & LAKESHORE DRIVE ROUNDABOUT

SOIL PROFILES

SHEET NO. ----

APPENDIX B

- Summary of Laboratory Test Results for Soil Classification – Table 1
- Summary of Laboratory Test Results for Environmental Classification – Table 2

TABLE 1
Summary of Laboratory Test Results for Soil Classification
CR 561 and Lakeshore Drive Roundabout
Lake County, Florida
Lake County RSQ No. 20-0918B
Tierra Project No.: 5511-23-050

Boring Name	Depth (ft)	AASHTO Symbol	Stratum Number	Sieve Analysis					Atterberg Limits			Organic Content	Moisture Content
				#10	#40	#60	#100	#200	LL	PL	PI		
PB-1	0.0 - 3.5	A-3	1	100	65	36	15	8	-	-	-	-	-
AB-3	0.0 - 3.0	A-3	1	100	76	48	18	8	-	-	-	-	-
AB-4	0.0 - 4.0	A-3	1	100	78	48	17	7	-	-	-	-	-
AB-6	0 - 4	A-3	1	99	76	44	15	7	-	-	-	-	-
AB-9	0 - 5	A-3	1	100	71	41	16	9	-	-	-	-	-
PB-2	2.0 - 7.0	A-2-4	2	100	73	42	23	20	-	-	-	-	-
AB-2	4.0 - 5.0	A-2-4	2	100	79	59	37	29	25	16	9	-	14
PB-1	8 - 15	A-2-4	2	100	77	64	39	28	26	17	10	-	13
PB-2	8 - 10	A-2-4	2	100	70	40	26	24	-	-	-	-	-
AB-5	4.0 - 5.0	A-2-6	3	99	76	49	35	32	35	18	16	-	14
AB-7	3 - 5	A-2-6	3	99	67	48	36	33	-	-	-	-	-
AB-8	4 - 5	A-2-6	3	100	82	58	42	38	-	-	-	-	-
AB-1	3.5 - 4.0	A-6	3	100	85	72	60	55	40	23	16	-	23

TABLE 2
Summary of Laboratory Test Results for Environmental Classification
CR 561 and Lakeshore Drive Roundabout
Lake County, Florida
Lake County RSQ No. 20-0918B
Tierra Project No.: 5511-23-050

Boring Name	Depth (ft)	pH	Resistivity (ohm-cm)	Chlorides (ppm)	Sulfates (ppm)	Environmental Classification[1]	
						Steel Substructure	Concrete Substructure
PB-1	0.0 - 3.5	7.5	31,000	30	6	Slightly Aggressive	Slightly Aggressive
AB-9	0.0 - 5.0	8.1	33,000	30	9	Slightly Aggressive	Slightly Aggressive

APPENDIX C

- Pavement and Base Material Data Sheet – Table 3
- Photographs of Pavement Cores (**4 Sheets**)

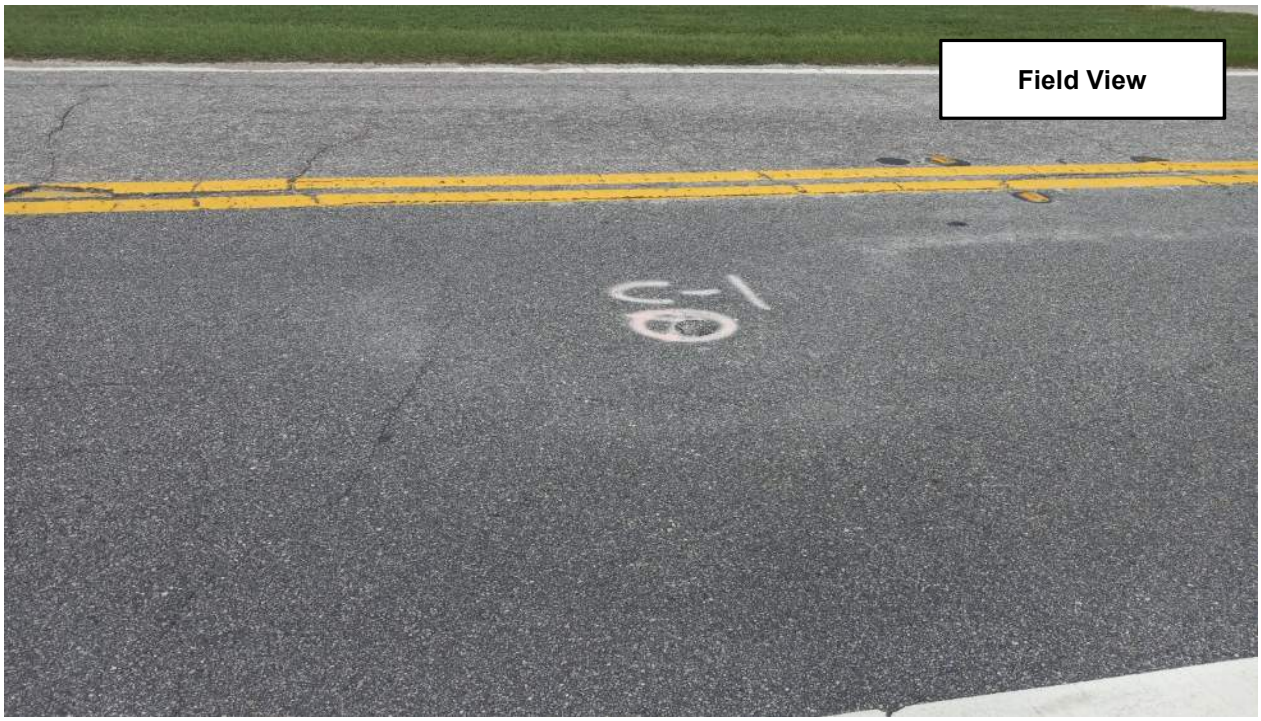
Table 3
CR 561 and Lakeshore Drive Roundabout
Lake County, Florida
Pavement and Base Material Data Sheet
Lake County RSQ No. 20-0918B
Tierra Project No. 5511-23-050

Core ID	Easting[1]	Northing[1]	Number of Layers Estimated	Pavement Layers[2]			Total Core Length (in.)	Base Material		Pavement Condition[3]
				Layer 1	Layer 2	Layer 3		Type	Thickness (in.)	
C-1	404257	1509315	3	S TYPE	S TYPE	S TYPE	3	Limerock	7	Fair
				1 1/8	1 1/8	3/4				
C-2	404631	1509062	3	S TYPE	S TYPE	S TYPE	3 1/2	Soil Cement	6 1/4	Fair
				1/2	1 1/2	1 1/2				
C-3	404224	1508645	2	S TYPE	S TYPE	-	3	Soil Cement	11	Fair
				3/4	2 1/4	-				
C-4	404165	1508442	3	S TYPE	S TYPE	S TYPE	3 1/2	Limerock	5 1/2	Fair
				1 1/4	1 1/2	3/4				

[1] Pavement core locations were estimated in the field by a representative of Tierra using a non-survey grade GPS unit with a reported accuracy of 10 feet and should therefore be considered approximate. The GPS coordinates provided are referenced to the Florida State Plane East coordinate system.

[2] Pavement layer identification based on visual review using FDOT Mixture nomenclature. Actual pavement may be a local mix. Pavement layers are classified in descending order from the top of the core sample to the bottom.

[3] Pavement condition based on visual observation only.



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Pavement Core Data

CR 561 and Lakeshore Drive Roundabout
Lake County, FL
Tierra Project No.: 5511-23-050

Core No. 1		Pavement Layer Data		
		Layer No.	Type	Thickness (in.)
Easting	404257	1	S	1 1/8
Northing	1509315	2	S	1 1/8
Base Type	Limerock	3	S	3/4
Base Thickness (in.)	7	4	-	-
Total Core Length (in.)	3	5	-	-

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Pavement Core Data

CR 561 and Lakeshore Drive Roundabout
Lake County, FL
Tierra Project No.: 5511-23-050

Core No. 2		Pavement Layer Data		
		Layer No.	Type	Thickness (in.)
Easting	404631	1	S	1/2
Northing	1509062	2	S	1 1/2
Base Type	Soil Cement	3	S	1 1/2
Base Thickness (in.)	6 1/4	4	-	-
Total Core Length (in.)	3 1/2	5	-	-

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Pavement Core Data

CR 561 and Lakeshore Drive Roundabout
Lake County, FL
Tierra Project No.: 5511-23-050

Core No. 2		Pavement Layer Data		
		Layer No.	Type	Thickness (in.)
Easting	404224	1	S	3/4
Northing	1508645	2	S	2 1/4
Base Type	Soil Cement	3	-	-
Base Thickness (in.)	11	4	-	-
Total Core Length (in.)	3	5	-	-

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Pavement Core Data

CR 561 and Lakeshore Drive Roundabout
Lake County, FL
Tierra Project No.: 5511-23-050

Core No. 2		Pavement Layer Data		
		Layer No.	Type	Thickness (in.)
Easting	404165	1	S	1 1/4
Northing	1508442	2	S	1 1/2
Base Type	Limerock	3	S	3/4
Base Thickness (in.)	5 1/2	4	-	-
Total Core Length (in.)	3 1/2	5	-	-