Geotechnical and Environmental Consultants, Inc.

Report of Preliminary Geotechnical Engineering Exploration

MALABAR ROAD PD&E STUDY

From St. Johns Heritage Parkway to Minton Road

Palm Bay, Brevard County, Florida

Kittelson & Associates, Inc. Project No 23773

FIN No. 437210-1-28-01

RFQ No. 230-2019/SB

GEC Project No. 4511G

Geotechnical and Environmental Consultants, Inc.

February 25, 2021
Revised June 14, 2023
Revised June 26, 2023
Revised December 11, 2023

Kittelson & Associates, Inc.
225 East Robinson Street, Suite 355
Orlando, Florida 32801

Attention: Mr. John R. Freeman, Jr., P.E., PTOE, RSP
Senior Principal

Subject: Report of Preliminary Geotechnical Engineering Exploration
MALABAR ROAD PD&E STUDY
From St. Johns Heritage Parkway to Minton Road
Palm Bay, Brevard County, Florida
Kittelson & Associates, Inc. Project No. 23773
FIN No. 437210-1-28-01
RFQ No. 23-0-2019/SB
GEC Project No. 4511G

Dear Mr. Freeman:

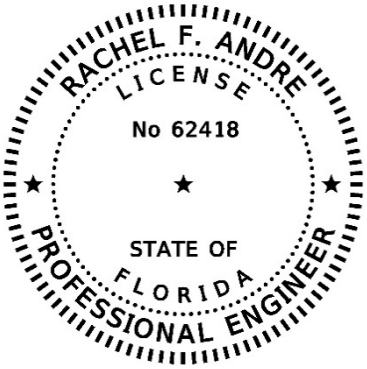
Geotechnical and Environmental Consultants, Inc. (GEC) is pleased to provide this Report of Preliminary Geotechnical Engineering Exploration for the above-referenced project. The purpose of this investigation was to evaluate soil and groundwater conditions at the potential stormwater management locations and to use the information obtained to guide planning and selection of stormwater facilities for the upcoming widening of this section of Malabar Road. This report describes our exploration procedures, exhibits the data obtained and presents our findings.

A full geotechnical exploration and evaluation will be necessary to support roadway and stormwater management design. In particular, auger borings will be required in the proposed roadway widening areas in addition to the selected stormwater pond locations for use in developing pavement and stormwater management design and construction.

GEC appreciates the opportunity to work with Kittelson & Associates, Inc. and the City of Palm Bay 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.

Sincerely,

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
919 Lake Baldwin Lane
Orlando, Florida 32814



Rachel F Andre
2023.12.11
13:21:07 -05'00'

Alexis E. Perry, E.I.
Engineer Intern

Rachel F. André, P.E.
President
Florida License No. 62418

This Report has been digitally signed and sealed by Rachel F. André, 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.

TABLE OF CONTENTS

1.0 SITE AND PROJECT DESCRIPTION

The proposed widening of Malabar Road extends from St. Johns Heritage Parkway to Minton Road, approximately 4 miles, in Palm Bay, Brevard County, Florida. The vicinity includes commercial businesses, residential properties, agricultural land and vacant land. The project corridor is shown on excerpts of the U.S. Geological Survey (USGS) Melbourne West and Fellsmere NW, Florida Quadrangle maps on **Figure 1**.

This report includes preliminary soil and groundwater data for the potential stormwater pond and swale locations. It also describes our exploration procedures, exhibits the data obtained and presents preliminary groundwater level information at these locations.

2.0 REVIEW OF AVAILABLE DATA

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

2.1 USGS Quadrangle Map

Based on our review of the USGS Melbourne West and Fellsmere NW, Florida Quadrangle map (dated 1988 and 1970, respectively), ground surface elevations at the potential pond locations range from +20 to +27 feet NGVD from east to west. Flowing wells are shown at the western terminus (St. Johns Heritage Parkway) of the roadway section.

The potential pond locations are depicted on the U.S. Geological Survey (USGS) Melbourne West and Fellsmere NW Florida Quadrangle maps (**Figure 1**) in the **Appendix**.

2.2 NRCS Soil Survey

The Natural Resources Conservation Service (NRCS) Soil Survey of Brevard County was reviewed to obtain near-surface soils information in the vicinity of the locations of interest. According to the NRCS map, the soil types are summarized below. The NRCS Soil Survey map of the project area is shown on **Figure 1** in the **Appendix**.

Table 1
Brevard County NRCS Soil Survey Classifications

Soil Unit No.	Soil Name	Depth (inches)	Soil Description	AASHTO Classification Symbol	Depth to Seasonal High Groundwater (feet)	Hydrologic Group
17	EauGallie sand, 0 to 2 percent slopes	0 – 22 22 – 58 58 – 80	Sand Sand, fine sand Sandy loam, fine sandy loam	A-2-4, A-3 A-2-4, A-3 A-4, A-2-4	0.5 – 1.5	A/D
19	Riviera sand, 0 to 2 percent slopes	0 – 28 28 – 39 39 – 55 55 - 80	Sand Sandy loam, sandy clay loam Sandy loam, fine sandy loam, sandy clay loam Sandy loam, sandy clay loam	A-3, A-2-4 A-2-4, A-4, A-6 A-2-4, A-4, A-6 A-4, A-6	0.3 – 1.5	C/D
31	Malabar fine sand	0 – 45 45 – 54 54 – 61 61 – 65	Sand Sandy clay loam, fine sandy loam, clay loam Sandy loam, sandy clay loam Sand, fine sand, loamy fine sand	A-3 A-2, A-6 A-2, A-6 A-2, A-3	0.0 – 1.0	A/D
	Holopaw fine sand	0 – 7 7 – 45 45 – 62 62 – 71	Sand Fine sand, sand Sandy loam, sandy clay loam, fine sandy loam Loamy sand, loamy fine sand, fine sand	A-3 A-3 A-2 A-2, A-3		
	Pineda fine sand	0 – 5 5 – 35 35 – 38 38 – 60 60 – 65	Sand Sand, fine sand Loamy sand, sandy loam Sandy loam, sandy clay loam, fine sandy loam Loamy sand, sand, sandy loam	A-3 A-3 A-2 A-2 A-2, A-3		
47	Pineda sand, 0 to 2 percent slopes	0 – 35 35 – 60 60 – 80	Sand Sandy clay loam, sandy loam Sandy loam, sand, loamy sand	A-2-4, A-3 A-4, A-6, A-2-4 A-2-4	0.3 – 1.5	C/D
71	Wabasso sand, 0 to 2 percent slopes	0 – 6 6 – 25 25 – 30 30 – 58 58 – 80	Sand Sand Sand Sandy clay loam Loamy sand, sandy loam	A-2-4, A-3 A-3, A-2-4 A-2-4, A-3 A-7-6, A-6 A-2-4, A-2-6	0.5 – 1.5	C/D

*Information from Web Soil Survey in June 2023

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 NRCS seasonal high groundwater levels, summarized in **Table 1**, do not account for changes in groundwater due to development and are only relevant for the natural, undisturbed condition of the soils. The soils and groundwater data collected as part of this study should be considered a more accurate representation of soil conditions at the project site.

2.3 FDEP Potentiometric Map Data

According to the Florida Department of Environmental Protection (FDEP) September 2019 Upper Floridan Aquifer Potentiometric Surface map, the potentiometric surface of the Floridan Aquifer is approximately +38 feet NGVD at the project location. Since natural ground surface elevations in the study area are consistently below the potentiometric surface (see Section 2.1 which indicates a range between +20 and +27 ft NGVD), artesian flow conditions can be expected at locations where the confining layers are breached. This is evidenced by the presence of flowing wells shown near the intersection with St Johns Heritage Parkway on the USGS Quadrangle Map in Figure 1.

3.0 SUBSURFACE EXPLORATION

In addition to consulting the sources of information previously discussed for regional and site-specific soils data, GEC conducted a subsurface exploration to evaluate soil and groundwater conditions at the locations of interest.

Subsurface conditions at each of the potential stormwater pond, floodplain compensation area and swale locations were evaluated by performing a manual auger boring at an approximate rate of one 5-foot auger boring for every acre, for a total of thirty-six borings (AB-1 through AB-36).

A subsequent subsurface investigation was conducted at pond C-7 Alternative 3 by performing three machine auger borings to depths of 40 feet and an additional manual auger boring to 5 feet in the adjacent floodplain compensation area.

3.1 Boring Locations

Boring and locations were established in the field using a sub-meter accuracy handheld Global Positioning Satellite (GPS) unit. The approximate method used to locate them is sufficient to meet the intent of this study. If greater accuracy is desired, a registered professional land surveyor should survey the locations. Boring locations are shown on **Figures 2A** through **2H** in the **Appendix.**

3.2 Machine Auger Borings

Machine auger borings were performed in general accordance with ASTM Standard D1452. Machine auger borings were performed by hydraulically turning a continuous flight, solid-stem, auger into the ground in 5-foot increments until the desired boring termination depth was achieved. The auger flights were retrieved in 5-foot increments, without further rotation of the auger, and the retrieved soil was examined by our technician prior to collection of representative samples. Representative samples were collected for further visual examination and classification in the GEC laboratory.

3.3 Manual Auger Borings

A GEC engineering technician performed standard barrel manual auger borings in general accordance with ASTM D-1452, by manually turning a 3-inch diameter, 6-inch long sampler into the soil until it was full. He then retrieved the sampler and visually examined and classified the soil. This procedure was repeated until the desired termination depth was achieved. Representative samples were collected for further visual examination and classification in the GEC laboratory.

3.4 Groundwater Measurement

A GEC engineering technician measured the depth to groundwater in the boreholes where groundwater was encountered at the time of drilling and again after approximately 24 hours. Once the 24-hour groundwater measurement was recorded, the boreholes were then backfilled with soil cuttings to prevailing ground surface. Boring locations where groundwater was not encountered to the termination depth were backfilled on the same day.

4.0 LABORATORY TESTING

Selected soil samples retrieved from the borings were tested in accordance with Florida Standard Testing Methods (FM), and American Association of the State Highway Transportation Officials (AASHTO) testing methods. Our laboratory testing program is summarized on the following table:

Table 2
Summary of Laboratory Testing Program

Type of Test	Test No.
Percent Fines	AASHTO - T88
Atterberg Limits	AASHTO - T89/90
Organic Content	FM 1 - T267
Natural Moisture Content	AASHTO - T265

The results of our laboratory testing are summarized on the Pond Soil Survey sheet (**Figure 3**) and Laboratory Test Results Table (**Table 5**) in the **Appendix**.

5.0 DESCRIPTION OF SUBSURFACE CONDITIONS

The results of our borings are presented on the Pond Soil Boring Results sheets (**Figures 4A** to **4B**) in the **Appendix**. The soils encountered at the auger boring locations were classified in accordance with the American Association of State Highway and Transportation Officials (AASHTO) Soil Classification System (A-3, A-2-4, etc.). Soils were described using the ASTM soil descriptions (e.g., sand with silt). We based our classifications on visual examination and the limited laboratory testing performed.

The boring logs indicate subsurface conditions only at the specific boring locations at the time of our field exploration. Subsurface conditions, including groundwater levels, at other locations of the project site may differ from conditions we encountered at the boring locations. Moreover, conditions at the boring locations can change over time. Groundwater levels fluctuate seasonally, and soil conditions can be altered by earthmoving operations.

The depths and thicknesses of the subsurface strata indicated on the boring logs were interpolated between samples obtained at different depths in the borings. The actual transition between soil layers may be different than indicated. *These stratification lines were used for our analytical purposes and actual earthwork quantities measured during construction should be expected to vary from quantities calculated based on the information in this report.*

5.1 Soil Stratigraphy

The descriptions and stratum numbers used for the encountered soils are summarized as follows:

Table 3
Soil Stratigraphy

Stratum No.	Soil Description	AASHTO Classification
1	Light gray to brown to light brown to gray fine sand to fine sand with silt, occasional trace organic material and trace to some roots	A-3
2	Gray to light gray silty fine sand, some cemented sand	A-2-4
3	Light brown to brown to light gray to gray clayey fine sand to sandy clay, trace shell	A-2-6, A-6
4	Light gray to gray to brown silty fine sand, trace to some shell	A-2-4

For detailed results of the auger borings, please refer to **Figures 4A** to **4B** in the **Appendix**.

5.2 Boring Results

The borings (AB-1 to AB-36, PB-4) typically encountered fine sand to fine sand with silt (A-3) (Stratum 1) to depths typically ranging from 3 to 4 feet, underlain by silty fine sand to clayey fine sand (A-2-4, A-2-6) (Strata 2, 3 and 4) to depths ranging from 5 to 6 feet below the existing ground surface.

The deeper borings performed in pond C-7 Alternative 3 (PB-1 to PB-3) encountered fine sand to fine sand with silt (A-3) (Stratum 1) to 2 to 3 feet, underlain by silty fine sand to clayey fine sand to sandy clay (A-2-4, A-2-6, A-6) to a maximum depth of 40 feet below the ground surface.

The boring results are presented on **Figures 4A** to **4B** in the **Appendix**.

5.3 Groundwater Levels

The groundwater levels at the boring locations were measured approximately 24 hours after the borings were performed. 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 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.

Measured groundwater depths and estimated seasonal high groundwater depths at the boring locations are summarized in the table below:

Table 4
Summary of Groundwater Levels

Location	Encountered Groundwater Depth Range in the Borings (feet)	Estimated Seasonal High Groundwater Depth Range in the Borings (feet)
C-7 Alternative 3	4.6 – 6.1	1.6 – 2.6
FPCA	3.5 – 3.8	1.5 – 1.8

Location	Encountered Groundwater Depth Range in the Borings (feet)	Estimated Seasonal High Groundwater Depth Range in the Borings (feet)
C-7 Alternative 2	4.1 – 4.7	2.1 – 2.7
C-8 and C-9 Alternative 2	4.4 - GNE to 5	2.0 – 2.9
C-8 and C-9 Alternative 1	GNE to 6	1.5 to 2.5
C-10 West Alternative 1	GNE to 6	1.5
C-10 East Alternative 1 and C-10 West Alternative 2	4.0 – GNE to 6	2.0 – 3.2
C-10 East Alternative 2	3.4 – GNE to 6	1.4 – 2.5
C-20 Supplemental Swale	4.8 – GNE to 5	2.5 - 2.8
C-20 Alternative 1	2.5 – 3.0	0.5 – 1.0
C-20 Alternative 2	3.1 – 4.2	1.1 – 2.2

*GNE – Groundwater not encountered

The encountered and estimated seasonal high groundwater depths at the boring locations are presented adjacent to the boring logs on the Pond Soil Boring Results sheets (**Figures 4A** to **4B**) in the **Appendix**. If soil borings can be surveyed, updates to estimated seasonal high groundwater tables can be provided.

5.4 Potential Perched Groundwater Conditions

As mentioned above, the borings typically encountered fine sands (A-3) to approximately three to four feet of depth, underlain by silty/clayey sand to termination. These silty/clayey sand layers can cause perching of groundwater for extended periods over these low-permeability soils (Strata 3 and 4). This will need to be further explored during the design phase, especially along the roadway, where shallow groundwater can lead to premature pavement deterioration.

5.5 Preliminary Considerations

As described in the report, clayey sands and sandy clays (A-2-6, A-6) were encountered at several boring locations. These soils should help with pond sides slope and pipe trench stability. However, some concerns to be taken into consideration during design include:

- The clay soils have limitations for fill usage and pipe bedding; the clay soils will likely need to be over-excavated two feet below the pipe bottoms and replaced with “Select” sand soils.
- Penetrating clay layers during construction should be avoided, as the Floridan Aquifer Potentiometric Level is around + 38 ft NGVD, and the ground surface elevations along the project range between approximately +20 and +27. During construction, excavations

should not fully penetrate the Stratum 3 (clay soils) that extended to 40 feet in the Pond C-7 Alternate 3 borings, or artesian conditions could occur.

- The clay soils may also be encountered at other locations during the geotechnical investigation for final design, and these considerations will also apply.

During final design, we anticipate that additional borings and further testing will be conducted in order to verify these findings and finalize design and construction recommendations.

6.0 USE OF THIS REPORT

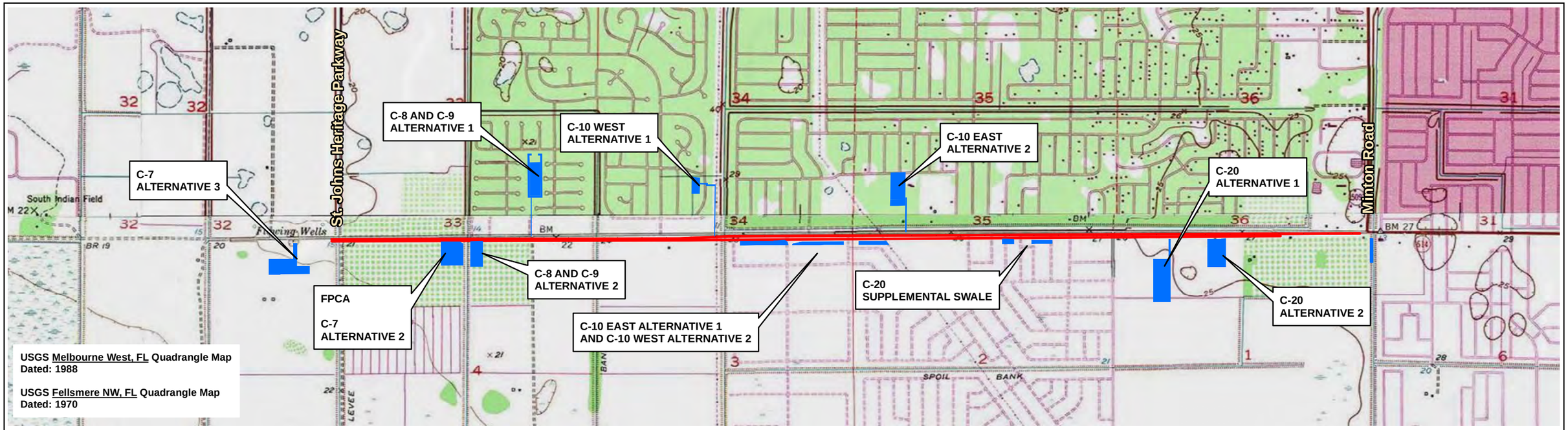
GEC has prepared this report for the exclusive use of our client Kittelson & Associates, Inc. and the City of Palm Bay, and for specific application to this project. GEC will not be held responsible for any other party's interpretation or use of this report's subsurface data or engineering analysis without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

The sole purpose of the borings performed was to obtain preliminary indications of subsurface conditions at potential stormwater management sites as part of a preliminary geotechnical exploration program in support of a PD&E study. The preliminary conclusions of this report should be disregarded if the nature, design or location of the facilities is changed. GEC has evaluated the site for the potential presence of contaminated soil or groundwater and submitted the report under a 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



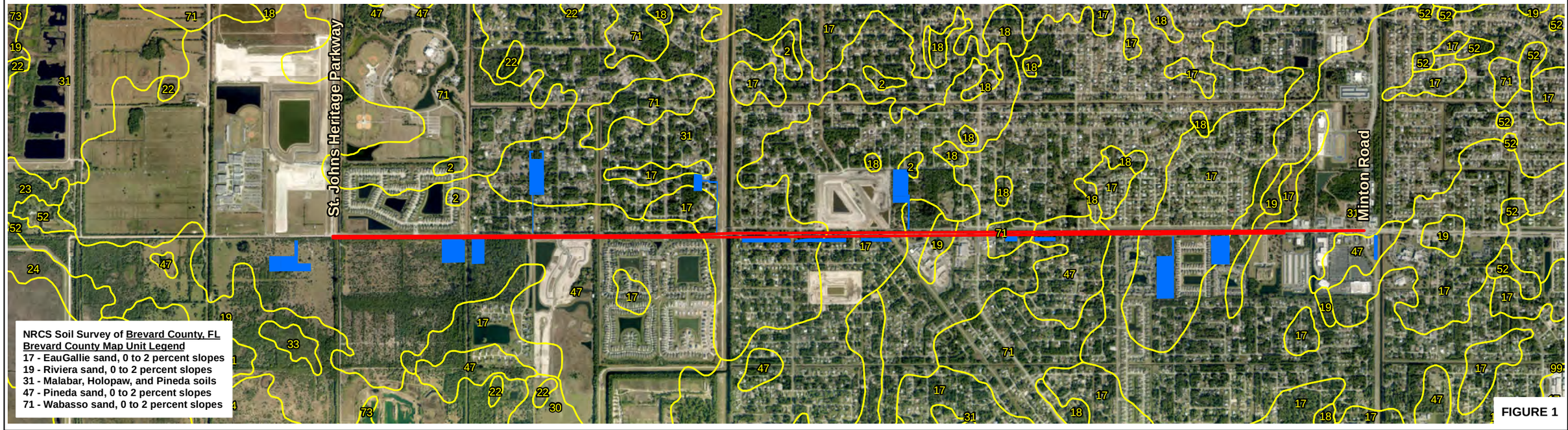


FIGURE 1

N

0 1,000 2,000
Feet

RACHEL F. ANDRE, P.E.
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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
919 LAKE BALDWIN LANE
ORLANDO, FL 32814

STATE OF FLORIDA
DEPARTMENT OF TRANSPORATATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 514	BREVARD	437210-1-28-01

USGS QUADRANGLE AND NRCS SOIL SURVEY MAPS

SHEET NO.

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BORING LOCATION PLAN

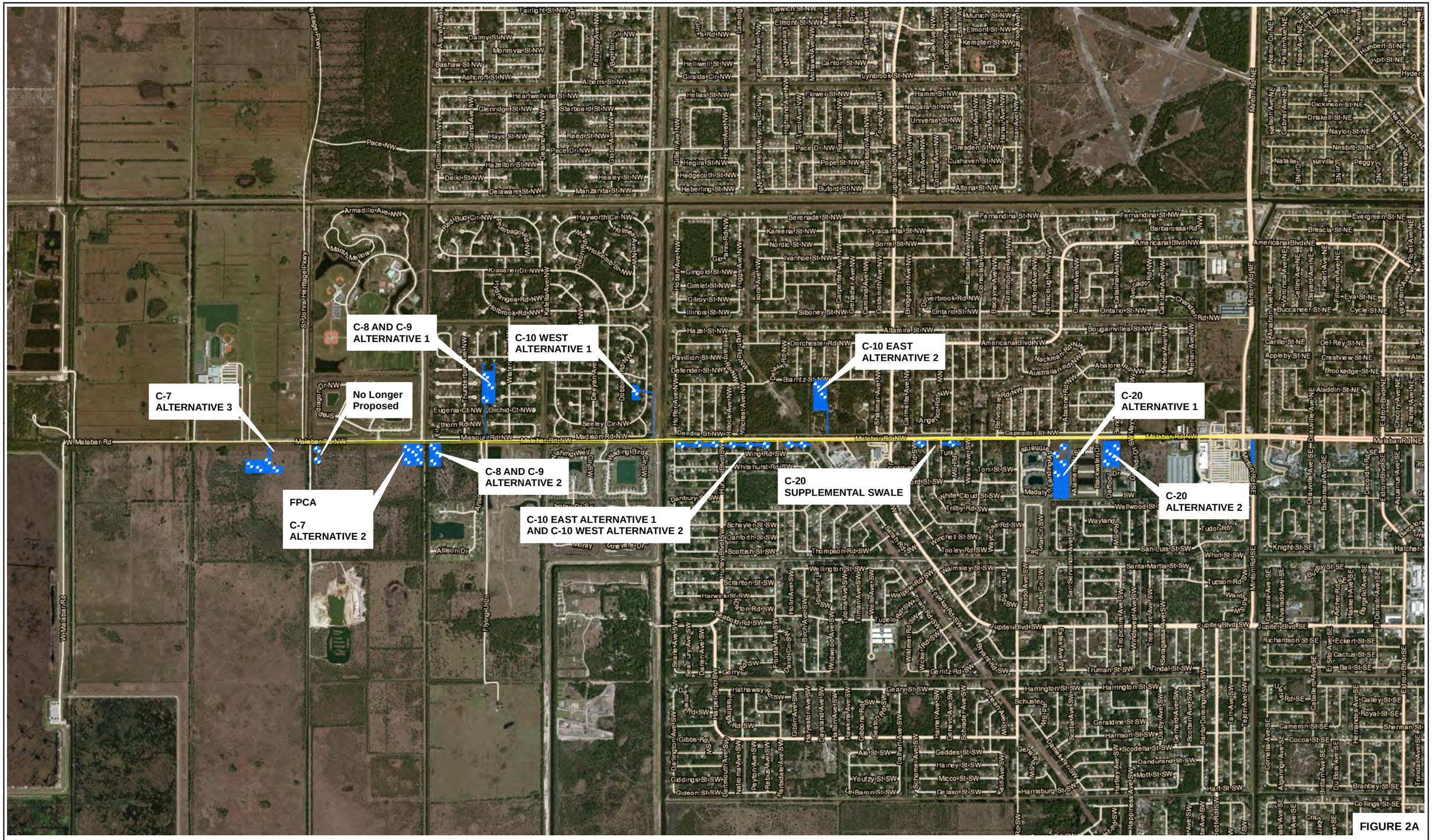

FIGURE 2A

APPROXIMATE AUGER BORING LOCATION

N

0 1,000 2,000
Feet

RACHEL F. ANDRE, P.E.
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ORLANDO, FL 32814

STATE OF FLORIDA
DEPARTMENT OF TRANSPORATATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 514	BREVARD	437210-1-28-01

BORING LOCATION PLAN (OVERALL MAP)

SHEET NO.

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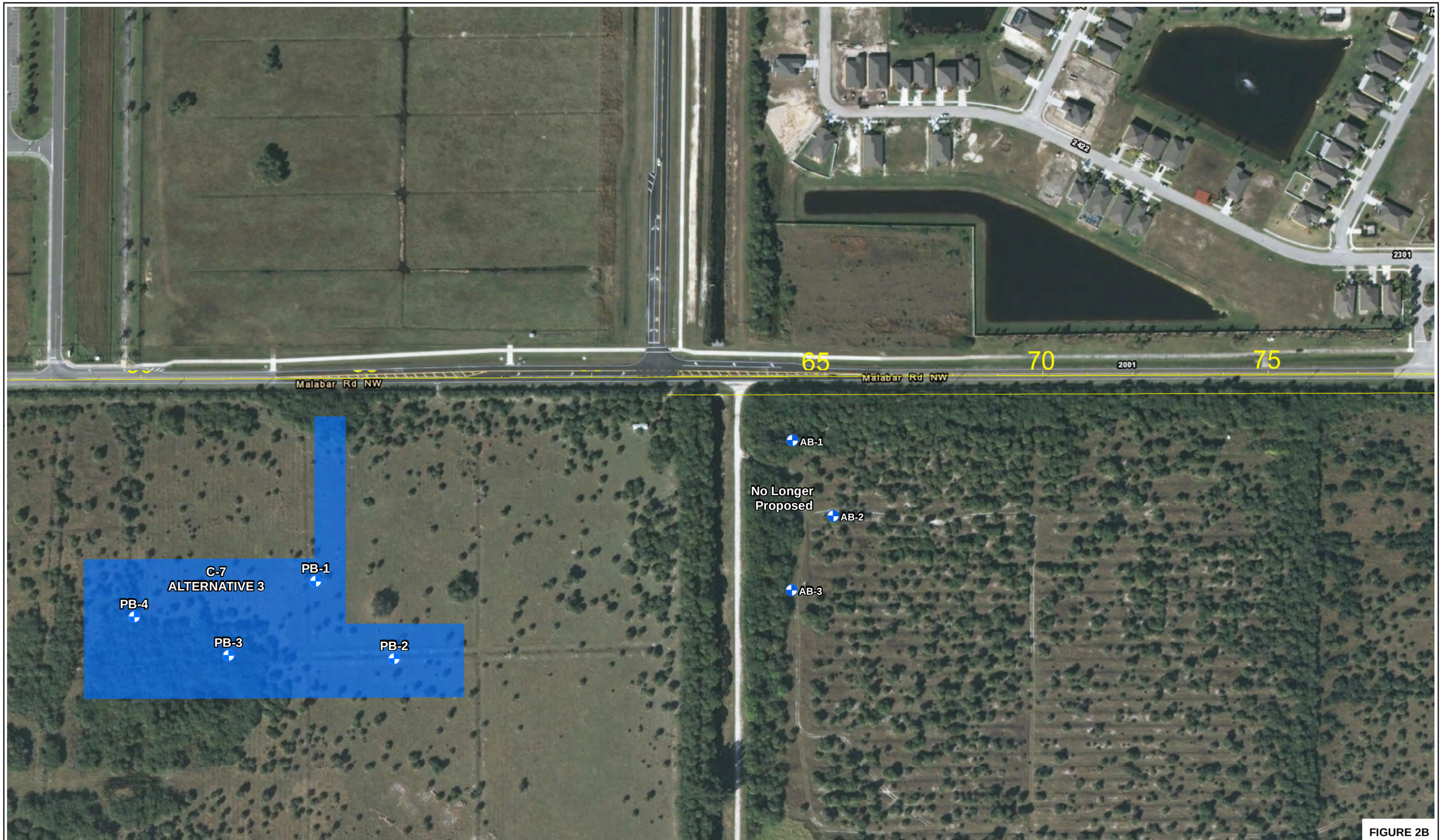

FIGURE 2B

APPROXIMATE AUGER BORING LOCATION

N

0 100 200
Feet

RACHEL F. ANDRE, P.E.
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORATATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 514	BREVARD	437210-1-28-01

BORING LOCATION PLAN

SHEET NO.

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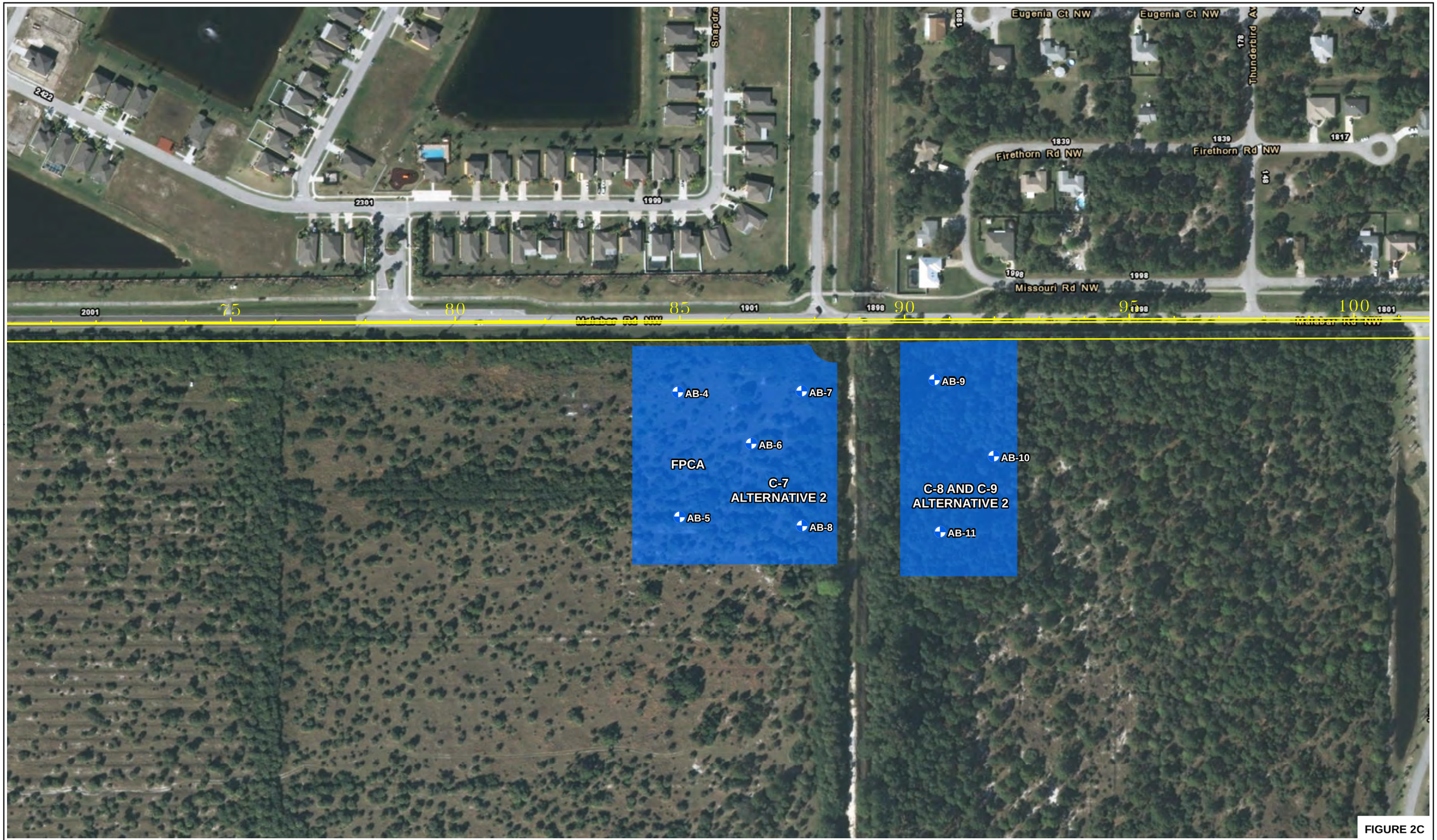

FIGURE 2C

APPROXIMATE AUGER BORING LOCATION

N

0 100 200
Feet

RACHEL F. ANDRE, P.E.
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORATATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 514	BREVARD	437210-1-28-01

BORING LOCATION PLAN

SHEET NO.

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FIGURE 2D

APPROXIMATE AUGER BORING LOCATION

N

0 100 200
Feet

RACHEL F. ANDRE, P.E.
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORATATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
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BORING LOCATION PLAN

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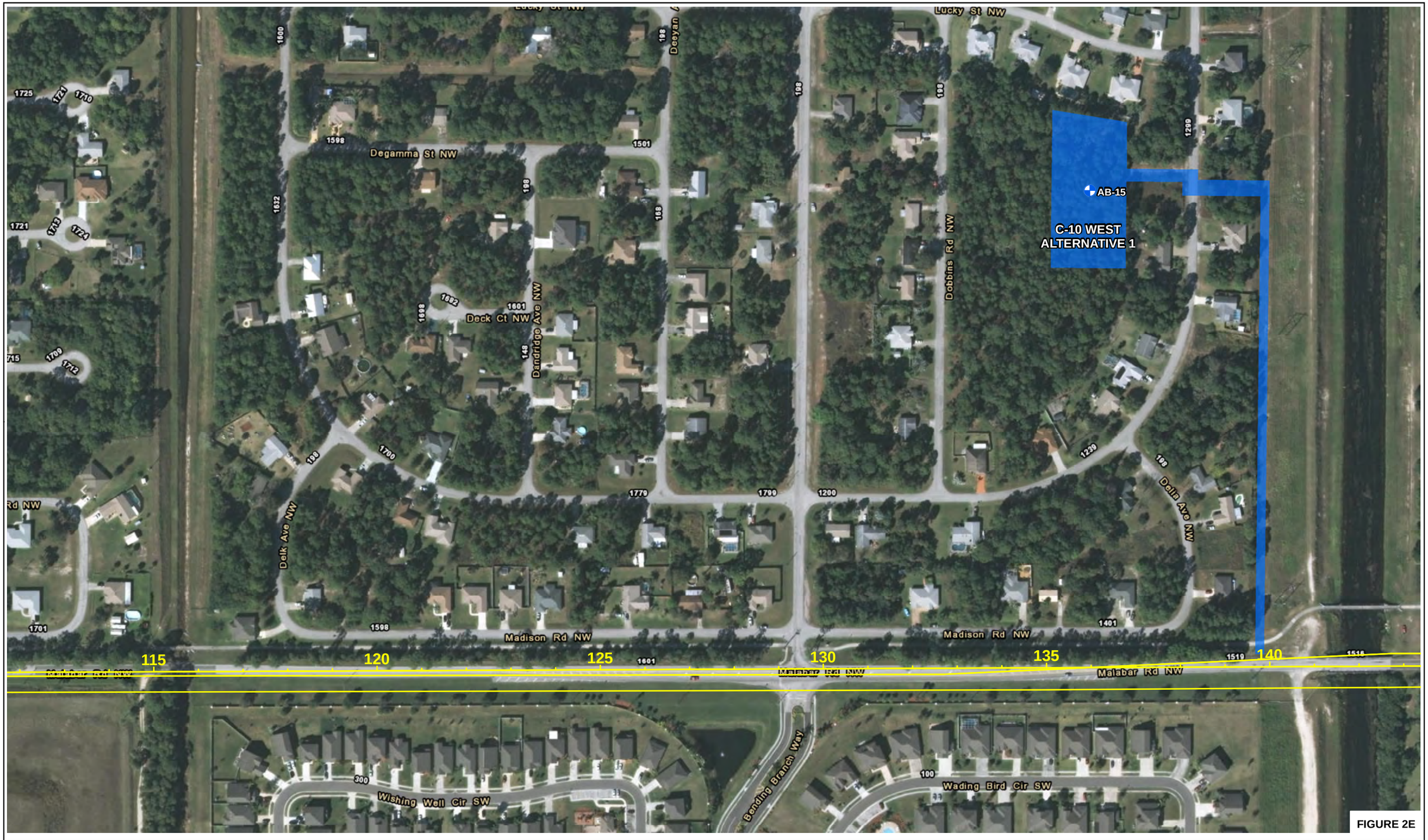

FIGURE 2E

APPROXIMATE AUGER BORING LOCATION

N

0 100 200
Feet

RACHEL F. ANDRE, P.E.
P.E. LICENSE NUMBER 62418
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORATATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 514	BREVARD	437210-1-28-01

BORING LOCATION PLAN

SHEET NO.

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FIGURE 2F

APPROXIMATE AUGER BORING LOCATION

N

0 100 200
Feet

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORATATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 514	BREVARD	437210-1-28-01

BORING LOCATION PLAN

SHEET NO.

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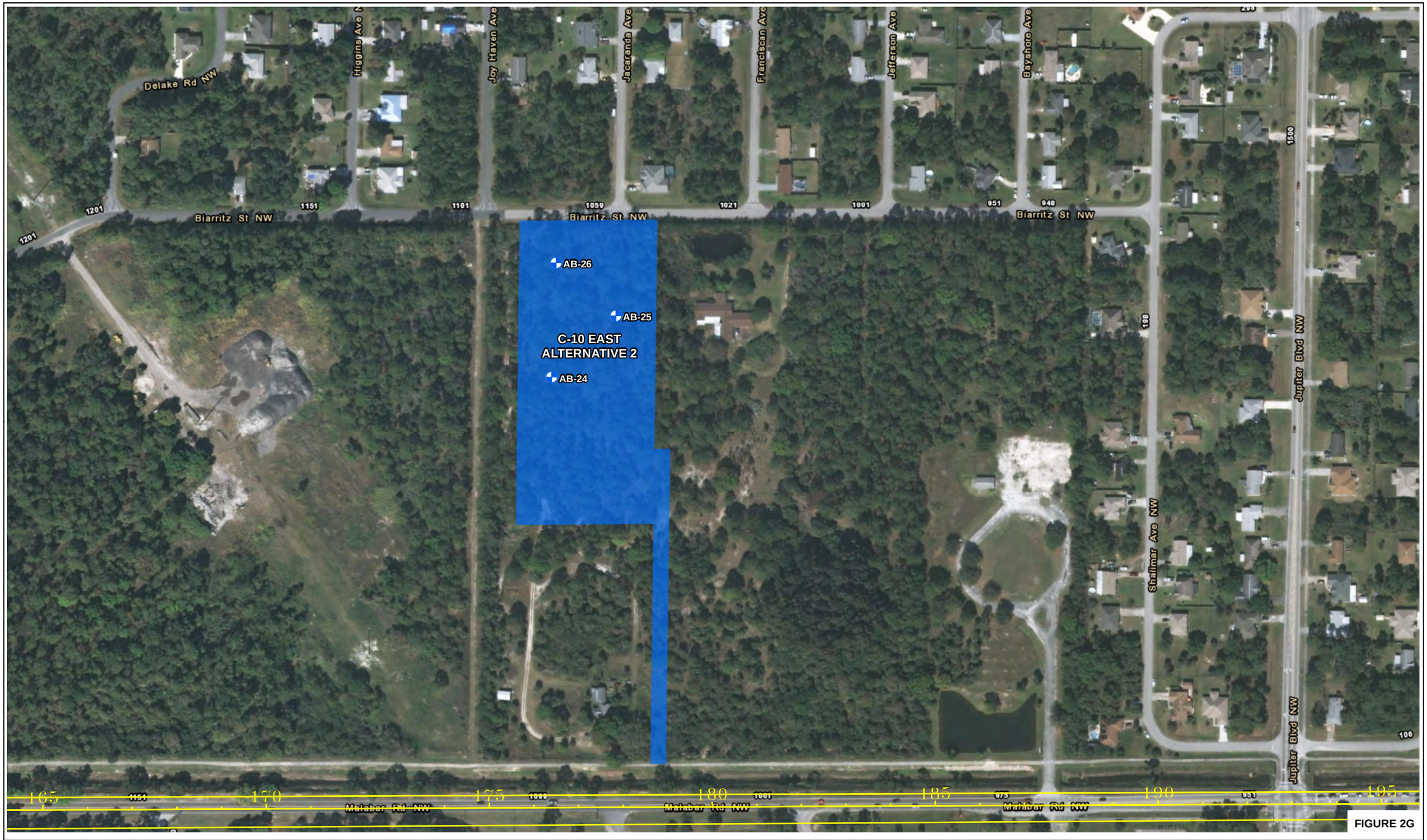

FIGURE 2G

APPROXIMATE AUGER BORING LOCATION

N

0 100 200
Feet

RACHEL F. ANDRE, P.E.
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORATATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
MALABAR	BREVARD	437210-1-28-01

BORING LOCATION PLAN

SHEET NO.

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FIGURE 2H

APPROXIMATE AUGER BORING LOCATION

N

0 100 200
Feet

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORATATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
MALABAR	BREVARD	437210-1-28-01

BORING LOCATION PLAN

SHEET NO.

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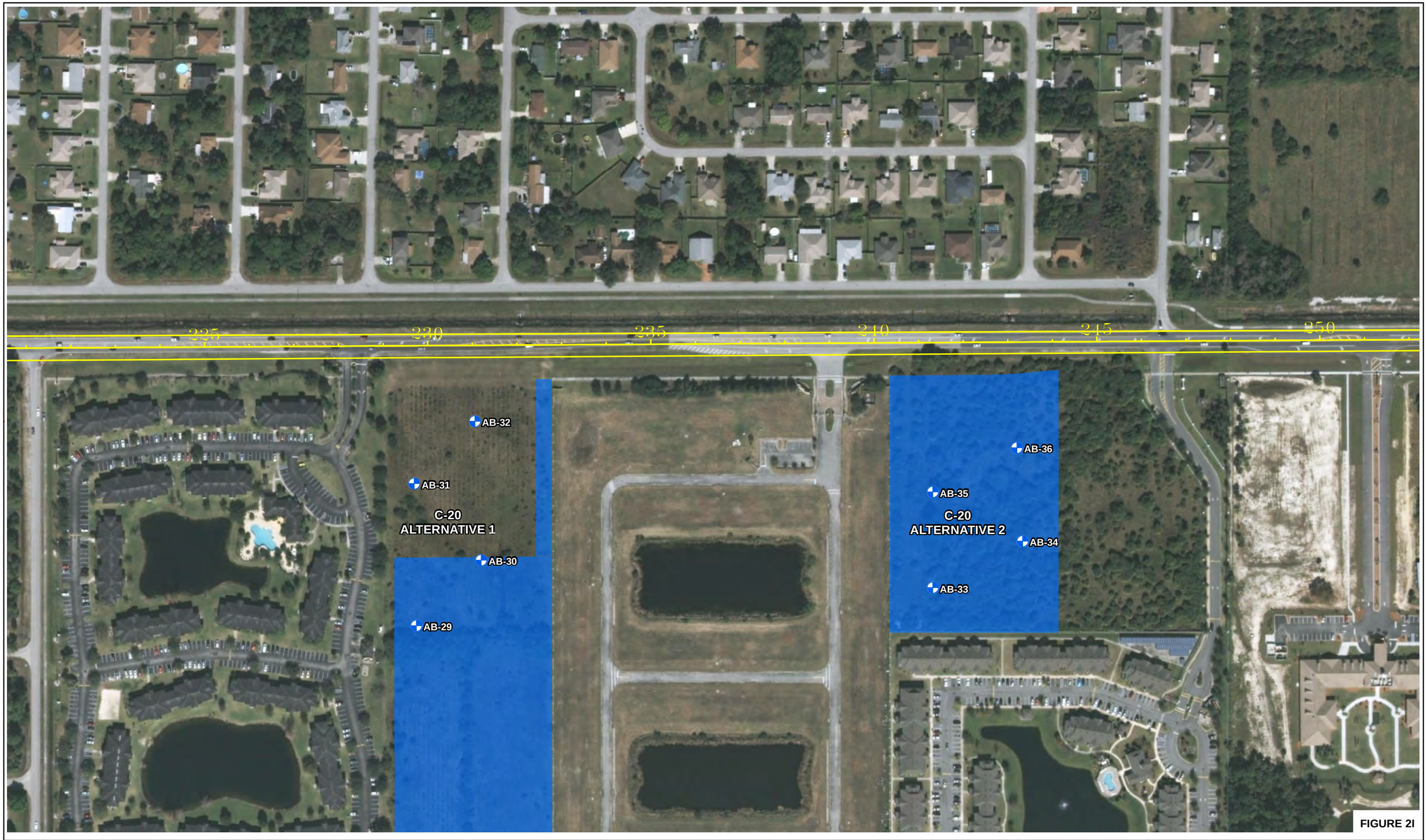

FIGURE 2I

APPROXIMATE AUGER BORING LOCATION

N

0 100 200
Feet

RACHEL F. ANDRE, P.E.
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORATATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
MALABAR	BREVARD	437210-1-28-01

BORING LOCATION PLAN

SHEET NO.

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POND SOIL SURVEY

DATE OF SURVEY: JANUARY 2021 AND MAY 2023
SURVEY MADE BY: GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
SUBMITTED BY: RACHEL F. ANDRE, P.E.

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

DISTRICT: 5
ROAD NO.: SR 514
COUNTY: BREVARD

FINANCIAL PROJECT ID: 437210-1-28-01
PROJECT NAME: MALABAR ROAD PD&E STUDY FROM ST. JOHNS HERITAGE PARKWAY TO MINTON ROAD

CROSS SECTION SOIL SURVEY FOR THE DESIGN OF PONDS

APPROXIMATE BEGIN STA.: 37+00 APPROXIMATE END STA.: 274+62

STATIONS REFERENCE: ALTERNATIVE B CENTERLINE OF CONSTRUCTION

	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	2	1.4-4.9	2	8-20	9	100	80-92	48-61	14-29	2-8	0	-	-	A-3	LIGHT GRAY TO BROWN TO LIGHT BROWN TO GRAY FINE SAND TO FINE SAND WITH SILT, OCCASIONAL TRACE ORGANIC MATERIAL AND TRACE TO SOME ROOTS	0	-	-	-	-
2	0	-	0	-	2	80-100	66-89	48-65	29-38	13-14	0	-	-	A-2-4	GRAY TO LIGHT GRAY SILTY FINE SAND, SOME CEMENTED SAND	0	-	-	-	-
3	0	-	6	12-34	6	97-100	85-95	63-75	37-64	20-56	6	27-34	11-23	A-2-6, A-6	LIGHT BROWN TO BROWN TO LIGHT GRAY TO GRAY CLAYEY FINE SAND TO SANDY CLAY, TRACE SHELL	0	-	-	-	-
4	0	-	2	14-16	3	88-100	80-95	58-69	32-39	16-25	2	NP-32	NP-14	A-2-4	LIGHT GRAY TO GRAY TO BROWN SILTY FINE SAND, TRACE TO SOME SHELL	0	-	-	-	-

NOTES

1. STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY. SUBSURFACE VARIATIONS BETWEEN BORINGS SHOULD BE ANTICIPATED AS INDICATED IN ARTICLE 2-4 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION. FOR FURTHER DETAILS SEE ARTICLE 120-3.
2. WATER TABLE SHOWN AS ▼ WHERE ENCOUNTERED AT TIME OF SURVEY. GROUNDWATER NOT ENCOUNTERED SHOWN AS "GNE". ESTIMATED SEASONAL HIGH SHOWN AS ▽ .
3. REMOVAL OF MUCK AND PLASTIC MATERIAL SHALL BE ACCOMPLISHED IN ACCORDANCE WITH FDOT INDEX NO. 120-002 OF THE FDOT DESIGN STANDARDS UNLESS OTHERWISE SHOWN ON PLANS. THE MATERIAL USED IN EMBANKMENT CONSTRUCTION SHALL BE IN ACCORDANCE WITH INDEX NO. 120-002 OF THE FDOT DESIGN STANDARDS.
4. SOIL ANALYSIS INCLUDES DATA FROM POTENTIAL POND AREAS ONLY.
5. THE SYMBOL "-" REPRESENTS AN UNMEASURED PARAMETER.
6. STRATA 1, 2, AND 4 SHALL BE TREATED AS SELECT (S) MATERIAL IN ACCORDANCE WITH FDOT INDEX 120-001.
7. STRATA 2 AND 4 MAY RETAIN EXCESS MOISTURE AND MAY BE DIFFICULT TO DRY AND COMPACT.
8. STRATUM 3 SHALL BE TREATED AS PLASTIC (P) MATERIAL IN ACCORDANCE WITH INDEX 120-001.
9. THE SYMBOL "NP" REPRESENTS NON-PLASTIC.

FIGURE 3

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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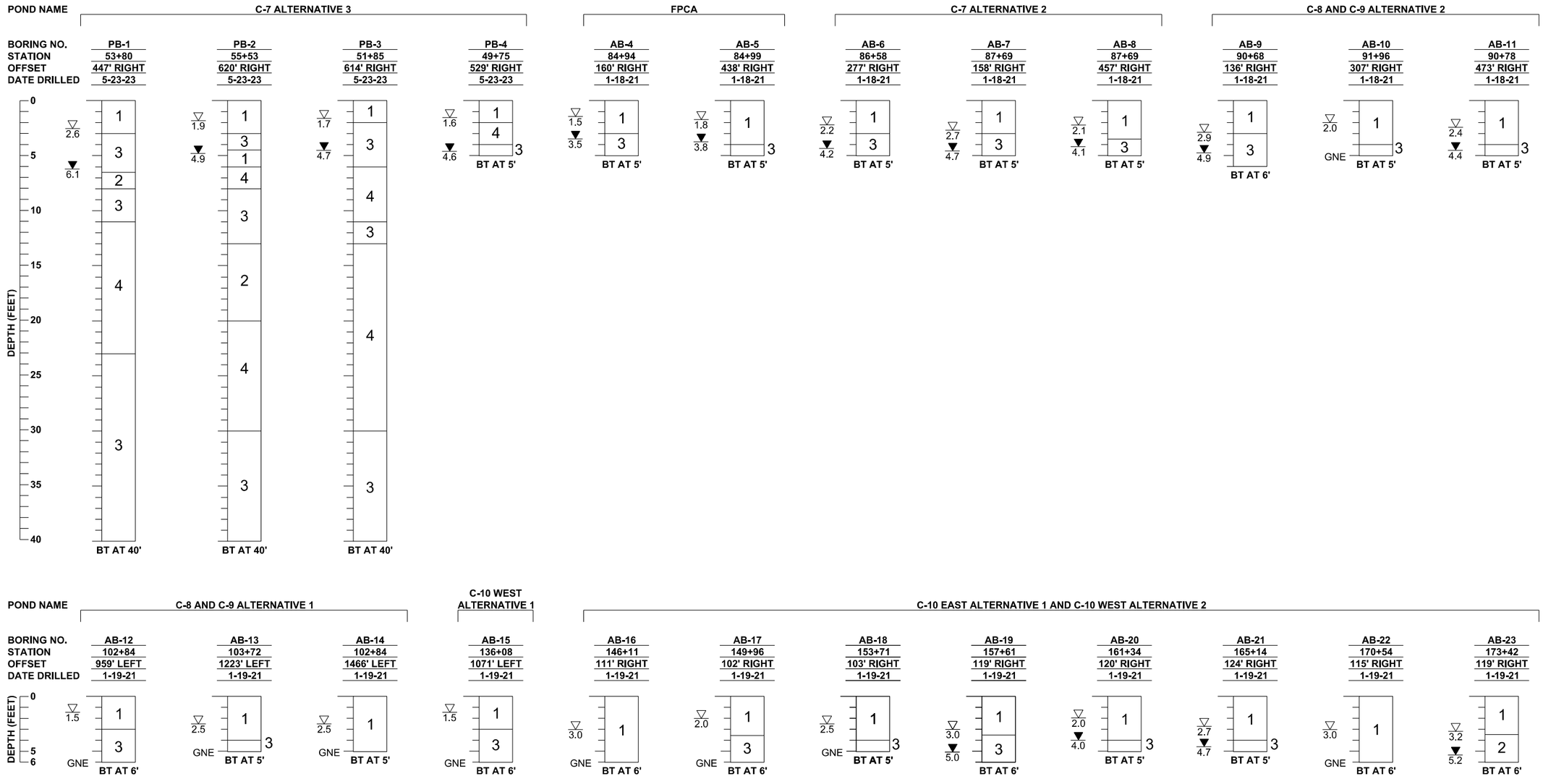
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 514	BREVARD	437210-1-28-01

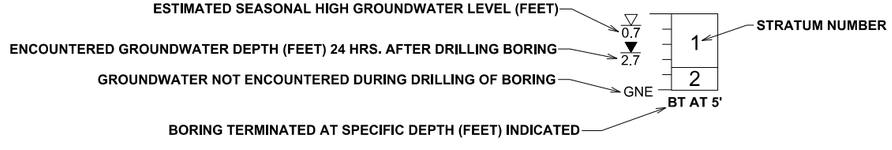
POND SOIL SURVEY

SHEET NO.

POND SOIL BORING RESULTS



BORING LEGEND



STRATUM NO.	AASHTO CLASSIFICATION	SOIL DESCRIPTION
1	A-3	LIGHT GRAY TO BROWN TO LIGHT BROWN TO GRAY FINE SAND TO FINE SAND WITH SILT, OCCASIONAL TRACE ORGANIC MATERIAL AND TRACE TO SOME ROOTS
2	A-2-4	GRAY TO LIGHT GRAY SILTY FINE SAND, SOME CEMENTED SAND
3	A-2-6, A-6	LIGHT BROWN TO BROWN TO LIGHT GRAY TO GRAY CLAYEY FINE SAND TO SANDY CLAY, TRACE SHELL
4	A-2-4	LIGHT GRAY TO GRAY TO BROWN SILTY FINE SAND, TRACE TO SOME SHELL

FIGURE 4A

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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POND SOIL BORING RESULTS

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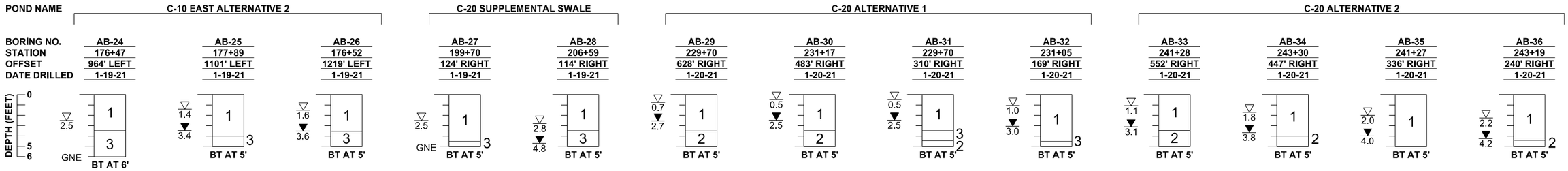

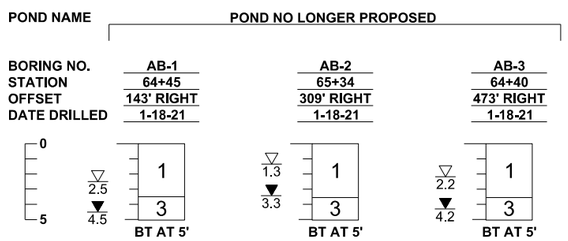

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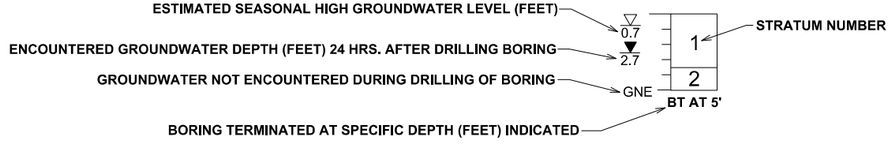

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4	A-2-4	LIGHT GRAY TO GRAY TO BROWN SILTY FINE SAND, TRACE TO SOME SHELL

FIGURE 4B

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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POND SOIL BORING RESULTS

SHEET NO.

SUMMARY OF LABORATORY TEST RESULTS

Table 5

Summary of Laboratory Test Results

Malabar Road PD&E Study

From St. Johns Heritage Parkway to Minton Road

GEC Project No. 4511G

Stratum No.	Station	Offset	Boring No.	Sample Depth (ft)	Percent Passing by Weight					Moisture Content (%)	Atterberg Limits		Organic Content (%)	AASHTO Class.
					#10 Sieve	#40 Sieve	#60 Sieve	#100 Sieve	#200 Sieve		Liquid Limit	Plasticity Index		
1	102+84	1466' LT	AB-14	0 - 5	100	87	50	14	2	---	---	---	---	A-3 [2]
1	136+08	1071' LT	AB-15	2.5 - 3	100	84	53	21	7	8	---	---	1.4	A-3 [3]
1	153+71	103' RT	AB-18	0 - 3	100	81	49	18	3	---	---	---	---	A-3 [2]
1	176+47	964' LT	AB-24	2.5 - 3.5	100	82	53	24	8	20	---	---	4.9	A-3
1	206+59	114' RT	AB-28	0 - 2.5	100	80	48	21	2	---	---	---	---	A-3 [3]
1	241+28	552' RT	AB-33	0 - 2	100	85	56	29	5	---	---	---	---	A-3 [2]
1	53+80	447' RT	PB-1	0 - 2	100	92	61	22	4	---	---	---	---	A-3
1	84+99	438' RT	AB-5	0 - 4	100	92	60	23	3	---	---	---	---	A-3 [1]
1	90+68	136' RT	AB-9	0 - 3	100	88	54	19	2	---	---	---	---	A-3 [2]
2	231+17	483' RT	AB-30	3.5 - 5	100	89	65	38	13	---	---	---	---	A-2-4
2	55+53	620' RT	PB-2	15 - 20	80	66	48	29	14	---	---	---	---	A-2-4 [5]
3	51+85	614' RT	PB-3	11 - 13	97	85	74	64	56	29	34	23	---	A-6 [4]
3	51+85	614' RT	PB-3	30 - 35	100	87	63	48	34	27	27	11	---	A-2-6 [4]
3	53+80	447' RT	PB-1	25 - 30	100	92	67	58	47	34	34	14	---	A-6 [4]
3	55+53	620' RT	PB-2	8 - 10	100	95	75	48	25	17	28	13	---	A-2-6
3	65+34	309' RT	AB-2	3.5 - 5	100	94	72	41	22	14	30	16	---	A-2-6
3	90+78	473' RT	AB-11	4 - 5	100	91	66	37	20	12	28	14	---	A-2-6
4	173+42	119' RT	AB-23	3.5 - 6	100	84	58	32	16	14	NP	NP	---	A-2-4
4	49+75	529' RT	PB-4	2 - 4	100	95	69	38	24	16	32	14	---	A-2-4
4	51+85	614' RT	PB-3	6 - 8	88	80	60	39	25	---	---	---	---	A-2-4 [4]

1 - Some Roots

2 - Trace Roots

3 - Trace Organic Material

4 - Trace Shell

5 - Some Cemented Sand