

Geotechnical and Environmental Consultants, Inc. (GEC)
Osceola Parkway Extension Re-evaluation
CFX Project No. 599-223
CFX Contract No. 001250

Project Description

The study corridor of the proposed Osceola Parkway Extension begins west of the Boggy Creek Road and Simpson Road intersection and extends eastward along the Orange / Osceola County line for approximately 6 miles before turning south into Osceola County to meet the northern terminus of the proposed Northeast Connector Expressway. The project also includes a north/south segment linking to SR 417 in the general vicinity of the Boggy Creek Road interchange. The four alternative alignments under review (405, 404B, 207D-1 and 107C-1) are shown on excerpts of the U.S. Geological Survey (USGS) Narcoossee, St. Cloud North, and Pine Castle, Florida Quadrangle maps (**Figure 1**).

The key geotechnical issue will be identifying the potential for deep, highly compressible, organic soils (muck) that could impact the expressway alignment and cost. These deep muck deposits are typically found within wetlands or water features. Further, shallow groundwater levels will be a major factor in determining expressway grades, stormwater pond sizes and construction cost estimates.

USGS Quadrangle Map

According to the USGS Narcoossee, St. Cloud North, and Pine Castle, Florida Quadrangle maps, reproduced in **Figure 1**, natural ground surface elevations range from +70 to +80 feet NGVD along the western alignments (Alternatives 405 and 404B) and from +60 to +80 feet NGVD along the eastern alignments (Alternatives 207D-1 and 107C-1). The USGS Quadrangle map depicts several wetlands along the project corridor. The locations where the alignments cross wetlands, as depicted on the USGS Quadrangle map, are summarized in the following table:

**Summary of Wetlands along the Project Corridor
As Depicted on the USGS Quadrangle Map**

Alignment Alternative	Approximate Length Affected (ft)
405 (Boggy Creek)	5,000
404B (Lake Nona)	4,700
207D-1 (Avoid Split Oak / Wetland)	12,100
107C-1 (Split Oak Impact)	12,400

NRCS Soil Survey

The Natural Resources Conservation Service (NRCS) Soil Surveys for Osceola and Orange counties were reviewed for near-surface soil and groundwater information. The NRCS Soil Survey maps of the four alternatives are shown on **Figures 2-5**. The NRCS Soil Survey soil types along the alternative alignments are provided in the following tables. The organic soils (muck) which are most likely to impact alignment selection are shown in bold type.

ALTERNATIVE 405 (BOGGY CREEK)

Unit No.	Soil Name
Osceola County	
32	Placid fine sand, frequently ponded, 0 to 1 percent slopes
42	Smyrna fine sand, 0 to 2 percent slopes
Orange County	
2	Archbold fine sand, 0 to 5 percent slopes
3	Basinger fine sand, 0 to 5 percent slopes
26	Ona fine sand, 0 to 2 percent slopes
34	Pomello fine sand, 0 to 5 percent slopes
37	St. Johns fine sand
42	Sanibel muck
43	Seffner fine sand, 0 to 2 percent slopes
44	Smyrna- Smyrna, wet, fine sand, 0 to 2 percent slopes

ALTERNATIVE 404B (LAKE NONA)

Unit No.	Soil Name
Orange County	
2	Archbold fine sand, 0 to 5 percent slopes
3	Basinger fine sand, 0 to 5 percent slopes
5	Candler fine sand, 5 to 12 percent slopes
20	Immokalee fine sand
22	Lochloosa fine sand
24	Millhopper Urban land complex, 0 to 5 percent slopes
32	Pinellas fine sand, 0 to 2 percent slopes
34	Pomello fine sand, 0 to 5 percent slopes
37	St. Johns fine sand
42	Sanibel muck
43	Seffner fine sand, 0 to 2 percent slopes
44	Smyrna- Smyrna, wet, fine sand, 0 to 2 percent slopes
54	Zolfo-Urban land complex

ALTERNATIVE 207D-1 (AVOID SPLIT OAK / WETLAND)

Unit No.	Soil Name
Osceola County	
1	Adamsville sand, 0 to 2 percent slopes
5	Basinger fine sand, 0 to 2 percent slopes
6	Basinger fine sand, depressional, 0 to 1 percent slopes
15	Hontoon muck, frequently ponded, 0 to 1 percent slopes
16	Immokalee fine sand, 0 to 2 percent slopes
22	Myakka fine sand, 0 to 2 percent slopes
24	Narcoossee fine sand, 0 to 2 percent slopes
32	Placid fine sand, frequently ponded, 0 to 1 percent slopes
34	Pomello fine sand, 0 to 5 percent slopes
40	Samsula muck, frequently ponded, 0 to 1 percent slopes
42	Smyrna fine sand, 0 to 2 percent slopes
Orange County	
1	Arents, nearly level
3	Basinger fine sand, 0 to 5 percent slopes
5	Candler fine sand, 5 to 12 percent slopes
19	Hontoon muck, frequently ponded, 0 to 1 percent slopes
20	Immokalee fine sand
32	Pinellas fine sand, 0 to 2 percent slopes
34	Pomello fine sand, 0 to 5 percent slopes
37	St. Johns fine sand
40	Samsula muck, frequently ponded, 0 to 1 percent slopes
42	Sanibel muck
44	Smyrna- Smyrna, wet, fine sand, 0 to 2 percent slopes
54	Zolfo-Urban land complex

ALTERNATIVE 107C-1 (SPLIT OAK IMPACT)

Unit No.	Soil Name
Osceola County	
5	Basinger fine sand, 0 to 2 percent slopes
6	Basinger fine sand, depressional, 0 to 1 percent slopes
15	Hontoon muck, frequently ponded, 0 to 1 percent slopes
16	Immokalee fine sand, 0 to 2 percent slopes
20	Malabar fine sand, frequently ponded, 0 to 1 percent slopes
22	Myakka fine sand, 0 to 2 percent slopes
32	Placid fine sand, frequently ponded, 0 to 1 percent slopes
34	Pomello fine sand, 0 to 5 percent slopes
40	Samsula muck, frequently ponded, 0 to 1 percent slopes
42	Smyrna fine sand, 0 to 2 percent slopes
44	Tavares fine sand, 0 to 2 percent slopes
Orange County	
3	Basinger fine sand, 0 to 5 percent slopes
19	Hontoon muck, frequently ponded, 0 to 1 percent slopes
34	Pomello fine sand, 0 to 5 percent slopes
37	St. Johns fine sand

Unit No.	Soil Name
40	Samsula muck, frequently ponded, 0 to 1 percent slopes
42	Sanibel muck
44	Smyrna- Smyrna, wet, fine sand, 0 to 2 percent slopes
54	Zolfo-Urban land complex

Sand and Groundwater

The NRCS Soil Survey maps predominantly depict soils made up of fine sand (A-3) to silty fine sand (A-2-4) with shallow groundwater levels. These materials are generally suitable for roadway construction and are classified by FDOT as Select material. However, the sands are poorly drained and sensitive to moisture compact during compaction efforts. The seasonal high water table (SHWT) is typically within 3.5 feet of the natural ground surface. Sands with shallow groundwater (<1 foot) are highlighted in pink on the NRCS Study Area maps. As shown on **Figures 2-5**, the majority of the alignments are characterized by shallow groundwater levels.

Muck and Water Features

The NRCS Soil Survey also depicts Sanibel, Hontoon, and Samsula muck. Muck is predominantly visible at the intersection of SR 417 and Boggy Creek Road, just east of Narcoossee Road, and along the eastern portions of Alternatives 207D-1 and 107C-1. Muck soils are highlighted in green on **Figures 2-5** and consist of highly decomposed organic material to a depth of more than 65 inches. Muck is classified as A-8 in the AASHTO system and has severe limitations for roadway construction. It is generally unsuitable for embankment support and typically requires removal and replacement with engineered fill. The NRCS soil survey predicts the seasonal high groundwater levels for these soil types to be from 2.0 feet above ground surface to natural ground surface. Water features, highlighted in blue on Figures 2-5, can also contain muck deposits that are not identified on the NRCS maps.

Relic Sinkholes

The critical geologic hazard to roadway development in the study area is the presence of relic sinkholes within the wetland and water features that can contain muck to depths greater than 100 feet. Avoidance of these relic sinkholes is the most effective way to reduce project risk. If avoidance is impractical, the muck would have to be mitigated during construction by its removal or improvement, or a combination thereof.

Subsurface Drainage

The soils present within the project corridor are generally identified by a dual hydrologic soil group A/D; however, Group D soils are predominant. Group A soils are used to identify drained areas and Group D soils represent undrained areas. Group A soils possess low runoff potential due to their sandy, permeable nature. Group D soils have high runoff potential due to a shallow groundwater table and/or impervious near-surface silt, clay or organic fines. Group A

soils can be conducive to stormwater infiltration and design of dry retention ponds. Group D soils indicate poor infiltration characteristics and are more conducive to design of wet detention ponds.

Alternatives Ranking

To compare corridor alternatives from a geotechnical engineering perspective, we have quantified the length of Sanibel, Hontoon and Samsula muck deposits along each of the four corridors in the table below.

**Summary of Muck Areas along the Project Corridor
As Depicted on the NRCS Soil Survey Maps**

Corridor Alternative	Approximate Length Affected (ft)
405 (Boggy Creek)	3,200
404B (Lake Nona)	3,000
207D-1 (Avoid Split Oak / Wetland)	14,800
107C-1 (Split Oak Impact)	14,000

Based on this review, the geotechnical conditions along the western alternatives 405 and 404B pose the least geotechnical risk to project development. Eastern alternatives 207D-1 and 107C-1 pose a significantly higher risk than the western alternatives.

Since the geotechnical risk assessments for the western alternatives are essentially the same, as are the risk assessments for the eastern alternatives, any combination of the western and eastern alternatives would result in roughly equivalent geotechnical risk.

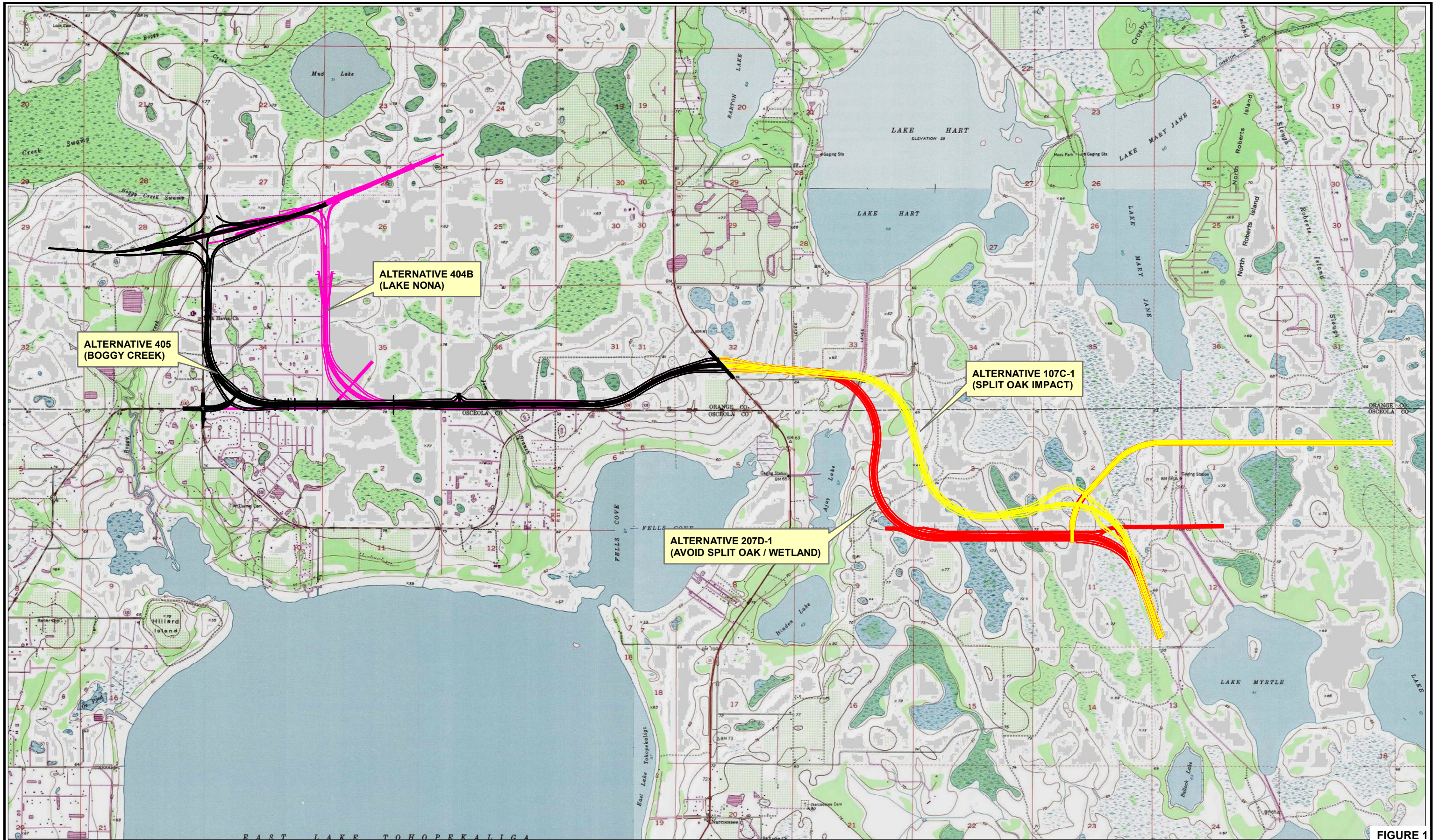
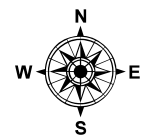
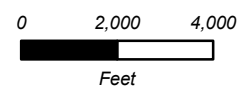


FIGURE 1

USGS Narcoossee, FL Quadrangle Map
 USGS St. Cloud North, FL Quadrangle Map
 USGS Pine Castle, FL Quadrangle Map



GARY L. KUHN, P.E.
 P.E. LICENSE NUMBER 38704
 GEOTECHNICAL AND ENVIRONMENTAL
 CONSULTANTS, INC.
 2510 MICHIGAN AVENUE, SUITE D
 KISSIMMEE, FL 34744-1933
 CERTIFICATE OF AUTHORIZATION 00005882

CFX PROJ. NO.
 599-223

CENTRAL
 FLORIDA
 EXPRESSWAY
 AUTHORITY

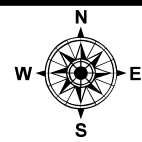
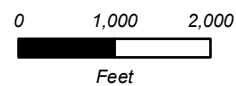
USGS QUADRANGLE MAP

SHEET
 NO.



FIGURE 2

- ORGANIC SOILS (MUCK) / SHALLOW GROUNDWATER
- SAND / SHALLOW GROUNDWATER
- WATER FEATURE



GARY L. KUHN, P.E.
P.E. LICENSE NUMBER 38704
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS, INC.
2510 MICHIGAN AVENUE, SUITE D
KISSIMMEE, FL 34744-1933
CERTIFICATE OF AUTHORIZATION 00005882

CFX PROJ. NO.

599-223

CENTRAL
FLORIDA
EXPRESSWAY
AUTHORITY

**NRCS SOIL SURVEY MAP
ALTERNATIVE 405
(BOGGY CREEK)**

SHEET
NO.



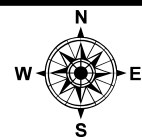
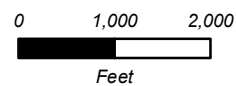
FIGURE 3

<ul style="list-style-type: none"> ORGANIC SOILS (MUCK) / SHALLOW GROUNDWATER SAND / SHALLOW GROUNDWATER WATER FEATURE 	<p>0 1,000 2,000 Feet</p>		<p>GARY L. KUHNS, P.E. P.E. LICENSE NUMBER 38704 GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC. 2510 MICHIGAN AVENUE, SUITE D KISSIMMEE, FL 34744-1933 CERTIFICATE OF AUTHORIZATION 00005882</p>	<p>CFX PROJ. NO. 599-223</p>	<p>CENTRAL FLORIDA EXPRESSWAY AUTHORITY</p>	<p>NRCS SOIL SURVEY ALTERNATIVE 404B (LAKE NONA)</p>	<p>SHEET NO.</p>
--	-------------------------------	--	--	----------------------------------	---	---	----------------------



FIGURE 4

- ORGANIC SOILS (MUCK) / SHALLOW GROUNDWATER
- SAND / SHALLOW GROUNDWATER
- WATER FEATURE



GARY L. KUHNS, P.E.
 P.E. LICENSE NUMBER 38704
 GEOTECHNICAL AND ENVIRONMENTAL
 CONSULTANTS, INC.
 2510 MICHIGAN AVENUE, SUITE D
 KISSIMMEE, FL 34744-1933
 CERTIFICATE OF AUTHORIZATION 00005882

CFX PROJ. NO.
 599-223

CENTRAL
 FLORIDA
 EXPRESSWAY
 AUTHORITY

**NRCS SOIL SURVEY
 ALTERNATIVE 207D-1
 (AVOID SPLIT OAK / WETLAND)**

SHEET
 NO.



FIGURE 5

<ul style="list-style-type: none"> ORGANIC SOILS (MUCK) / SHALLOW GROUNDWATER SAND / SHALLOW GROUNDWATER WATER FEATURE 	<p>0 1,000 2,000 Feet</p>		<p>GARY L. KUHNS, P.E. P.E. LICENSE NUMBER 38704 GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC. 2510 MICHIGAN AVENUE, SUITE D KISSIMMEE, FL 34744-1933 CERTIFICATE OF AUTHORIZATION 00005882</p>	<p>CFX PROJ. NO. 599-223</p>	<p>CENTRAL FLORIDA EXPRESSWAY AUTHORITY</p>	<p>NRCS SOIL SURVEY ALTERNATIVE 107C-1 (SPLIT OAK IMPACT)</p>	<p>SHEET NO.</p>
--	-------------------------------	--	--	----------------------------------	---	--	----------------------