F I N A L

Concept, Feasibility & Mobility Study Report

Osceola Parkway Extension
Orange and Osceola Counties, Florida
Contract No.: 001248
Project Identification No.: 599-221

Prepared for

CENTRAL FLORIDA EXPRESSWAY AUTHORITY

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Acronyms and Abbreviations

AADT	annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
ACE	Alternative Corridor Evaluation
ACER	Alternative Corridor Evaluation Report
ac-ft	acre-feet
ACS	American Community Survey
APE	Area of Potential Effects
BCC	Board of County Commissioners
BEBR	Bureau of Economics and Business Research (University of Florida)
BFE	base flood elevation
CAAGR	compound annual average growth rate
CFRPM	Central Florida Regional Planning Model
CFX	Central Florida Expressway Authority
CLC	Cooperative Land Cover
CR	County Road
CRAS	Cultural Resources Assessment Survey
CUTR	Center for Urban Transportation Research
CWA	Clean Water Act
DDHV	directional design hour volume
DRI	Development of Regional Impact
E/P	employment/population
EAG	Environmental Advisory Group
ECFCTF	East Central Florida Corridor Task Force
Econ	Econlockhatchee
ETC	electronic toll collection
ETDM	Efficient Transportation Decision Making
EFH	Essential Fish Habitat
ERP	Environmental Resource Permit
ft^2	square feet
FCT	Florida Communities Trust
FDEM	Florida Division of Emergency Management
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FE	Federally designated endangered species
FEMA	Federal Emergency Management Agency
FGDL	Florida Geographical Data Library
FIRM	Flood Insurance Rate Map
FKA	Fiskkind and Associates, Inc.
FLUCCS	Florida Land Use and Cover Classification System
FMSF	Florida Master Site File
FNAI	Florida Natural Areas Inventory

FSUTMS	Florida Standard Urban Transportation Model Structure
FT	Federally threatened species
FTE	Florida's Turnpike Enterprise
FWC	Florida Fish and Wildlife Conservation Commission
FY	fiscal year
GIS	geographic information system
GOAA	Greater Orlando Aviation Authority
HSG	Hydrologic Soil Group
I-4	Interstate 4
IPAC	Information for Planning and Consultation
ITF	Intermodal Transit Facility
IWHRS	Integrated Wildlife Habitat Ranking System
LOS	Level of Service
LRTP	Long Range Transportation Plan
LSM	Land Suitability Mapping
MM	Methodology Memorandum
MOCF	Model Output Conversion Factor
mph	mile(s) per hour
N/A	not applicable
NAAQS	National Ambient Air Quality Standards
NAVD	North American Vertical Datum
NED	Northeast District
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OCX	Osceola County Expressway Authority
OD	origin-destination
OFW	Outstanding Florida Waters
OIA	Orlando International Airport
OOCEA	Orlando Orange County Expressway Authority
OPE	Osceola Parkway Extension
OSWCD	Osceola Soil and Water Conservation District
OUC	Orlando Utilities Commission
PAG	Project Advisory Group
PD	planned developments
PD&E	Project Development and Environment
PEIR	Preliminary Environmental Impact Report
PPM	Plans Preparation Manual
PV	present value

RMSE	root-mean squared error
ROW	right of way
SE	socioeconomic
SEIR	State Environmental Impact Report
SFWMD	South Florida Water Management District
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SIS	Strategic Intermodal System
SOFWEA	Split Oak Forest Wildlife and Environmental Area
SPUI	single-point urban interchange
SR	State Road
SSC	species of special concern
STRAHNET	Strategic Highway Network
T&R	Traffic and Revenue
TAZ	traffic analysis zone
TBA	to be announced
TBD	to be determined
TLFD	trip length frequency distribution
TIP	Transportation Improvement Program
TM	technical memorandum
Toho	Tohopekaliga
TSM&O	Transportation System Management and Operation
US	United States (route)
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
V/C	volume/count
WBID	Water Boundary Identification Number

Executive Summary

The Central Florida Expressway Authority (CFX) is conducting Concept, Feasibility & Mobility Studies of four transportation corridors to determine if they are viable and fundable in accordance with CFX policies and procedures. The corridors are in Osceola, Orange, and Polk Counties. As part of an interlocal agreement, CFX has incorporated portions of the Osceola County Expressway Authority Master Plan 2040 into CFX's *Visioning + 2040 Master Plan* (CFX, 2016). CFX began the concept studies in April 2017. All projects are listed in MetroPlan Orlando's *2040 Long Range Transportation Plan* (MetroPlan Orlando, 2017a) as four-lane facilities. Figure ES-1 provides a general location map of the Study Area.

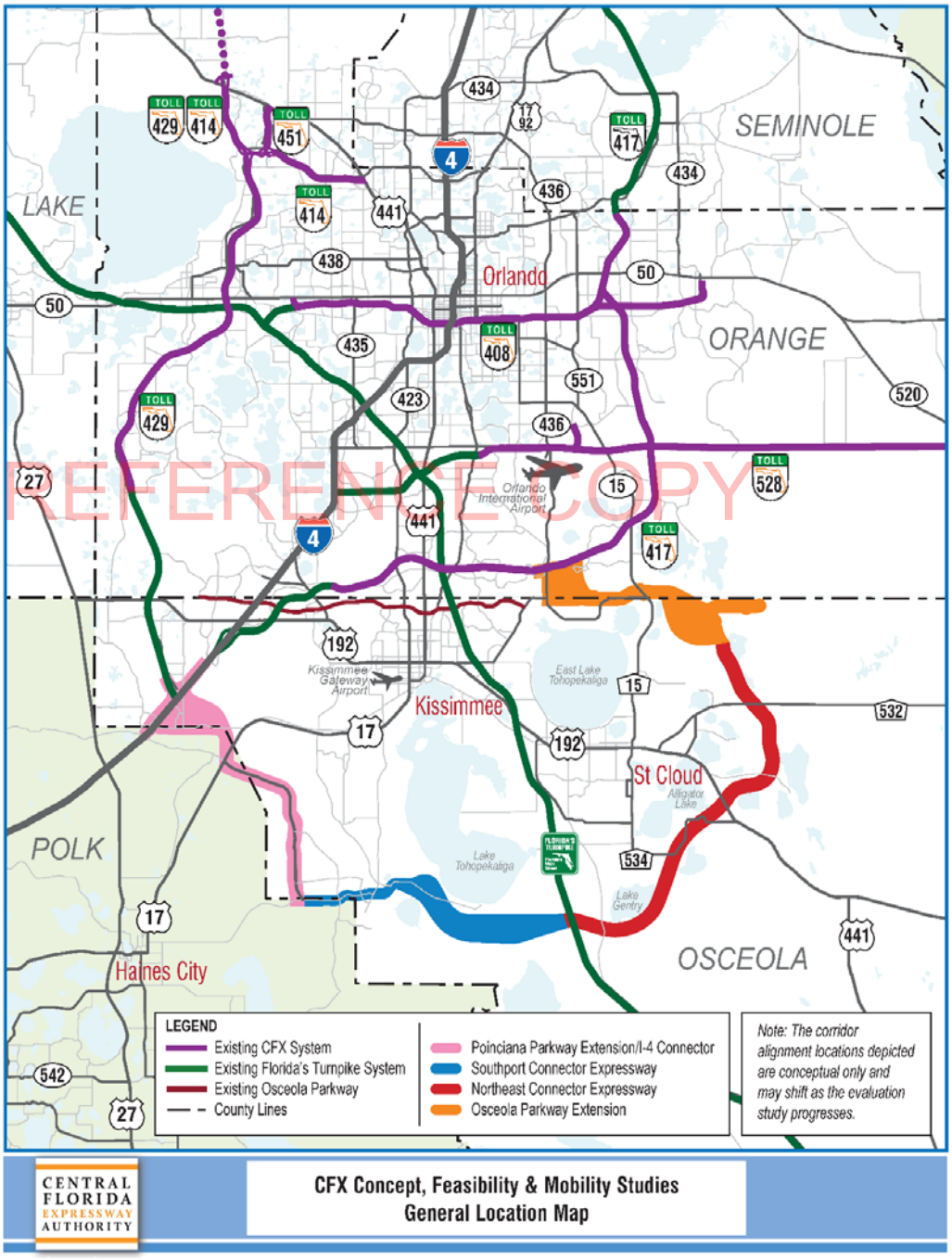

Figure ES-1. General Location Map

Project Purpose and Location

This report focuses on the Osceola Parkway Extension (OPE). The OPE is intended to provide additional east-west capacity between SR 417 and US 192 along the Orange/Osceola County line to relieve congestion on both roadways and on the surrounding local roadway network. This Concept, Feasibility & Mobility Study evaluates the physical, natural, social, and cultural environment of the proposed OPE, assesses current and future transportation demands, develops and evaluates a range of mobility options, and analyzes feasible alignments that could then be carried forward to a Project Development and Environmental (PD&E) study.

The Study Area begins approximately 1 mile 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, with an easterly leg extending into the planned Northeast District development. The project also includes a potential north-south link to SR 417 near the Boggy Creek Road interchange. Figure ES-2 presents the project location map.

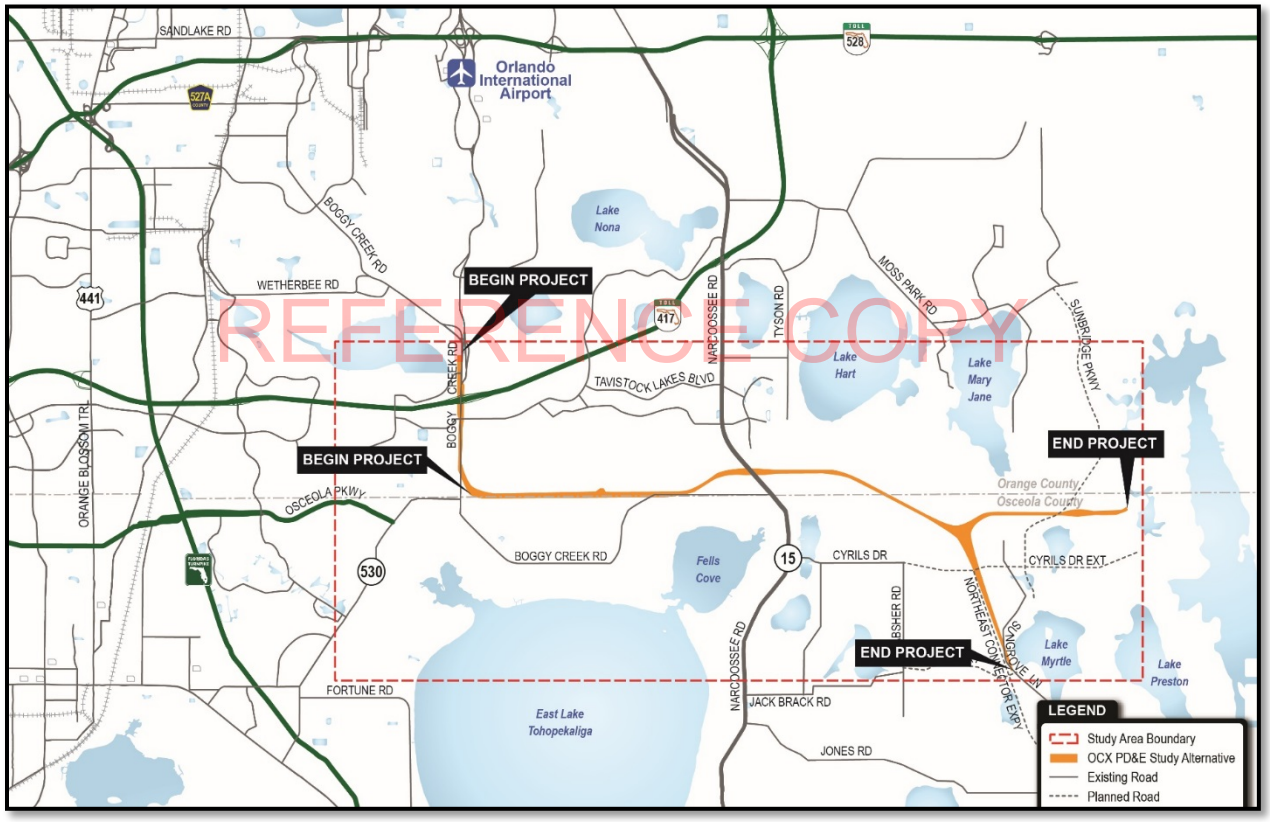

Figure ES-2. Project Location Map

Study Process

Throughout the 12-month study, multiple initial and viable alignments, typical sections, pond locations, and other aspects of the project were investigated. Primary considerations included:

- Potential impacts to natural resources
- Potential impacts to cultural resources
- Potential impacts to existing and planned residences

- Projected traffic and toll revenues
- Estimated construction, right-of-way (ROW), and mitigation costs
- Public and cooperating agency input
- CFX viability criteria and policies

As each prospective segment or alignment was developed, its impacts were assessed. Where impacts were high, the segment was refined to lessen or eliminate impacts. Where impacts could not be avoided, they were minimized or mitigation strategies were identified. This iterative process resulted in many of the initial alignments being eliminated because of fatal flaws or unacceptable impacts. Current alignments, though still having both positive and negative aspects, resulted from this continual improvement effort.

Public and Agency Input

Concurrent with the biological, cultural, and engineering analyses of the initial and current alignments, the study team sought continuous input from the public, cooperating agencies, area citizens' groups, and other project stakeholders. These efforts included multiple meetings with the study's Environmental Advisory Group, Project Advisory (planning and engineering) Group, neighborhood associations, individual land owners, and multiple agencies. Primary among the cooperating agencies were Osceola County, Orange County, and Greater Orlando Aviation Authority. Two rounds of public meetings were held – one round in late summer/early fall of 2017 and another in early 2018. These comprised three meetings each held in Poinciana Village, St. Cloud, and Lake Nona. Written notices were sent to 61 elected officials (or their aides), 50 appointed officials, 30 regional agencies, and 33 federal agencies as well as more than 12,000 individual property owners among the four corridors. Participation at the public meetings ran into the hundreds, with extensive written comments as well. Among the active citizens groups commenting on OPE were Friends of Split Oak, Lake Mary Jane Alliance, and Lake Ajay Village Homeowners Association. Media coverage included numerous newspaper articles, television news reports, and press releases to commercial media outlets as well as postings on agency websites. CFX set a high priority on reaching the public and reflecting their input in the OPE and other corridor studies.

Findings and Recommendations

The Osceola Parkway Extension Concept, Feasibility & Mobility Study has resulted in potential expressway alignments that could be viable and fundable in accordance with CFX policies and procedures. Using Narcoossee Road as a dividing line, multiple west segments and multiple east segments were studied. Any west segment can be combined with any east segment to provide a "full project" alignment. Considering potential natural and social impacts, public input, agency input, engineering constraints, projected traffic and toll revenue, and stakeholder input, these potentially viable alignments are recommended for further study. That further study will more thoroughly examine the viable segments through additional field investigation, improvements to alignment geometry, more detailed construction and ROW cost estimates, and continuing coordination with the public, cooperating agencies, and other stakeholders. This study, called a PD&E study, will further refine the prospective alignments and result in a Preferred Alternative. Should CFX then decide to proceed, the Preferred Alternative would proceed to final design, ROW acquisition, and ultimately construction.

SECTION 1

Introduction

The Central Florida Expressway Authority (CFX) is conducting Concept, Feasibility & Mobility Studies of four transportation corridors to determine if they are viable and fundable in accordance with CFX policies and procedures. The corridors are in Osceola, Orange, and Polk Counties. As part of an interlocal agreement, CFX has incorporated portions of the Osceola County Expressway Authority (*OCX) Master Plan 2040* into *CFX's Visioning + 2040 Master Plan* (CFX, 2016). CFX began the concept studies in April 2017. All projects are listed in MetroPlan Orlando's *2040 Long Range Transportation Plan* (LRTP) (MetroPlan Orlando, 2017a) as four-lane facilities. Figure 1-1 provides a general location map of the Study Area.

Each corridor segment has been previously studied to varying degrees of detail. The four corridor projects incorporated into CFX's *Visioning + 2040 Master Plan* (CFX, 2016) are listed below along with their respective preceding study.

- Osceola Parkway Extension (OPE) – 9 miles
  - OCX (Project Development and Environment) PD&E Study – May 2017
- Northeast Connector Expressway – 25 miles
  - *Preliminary Alignment Evaluation for Southport Connector East from Canoe Creek Road to SR 528* (Kimley-Horn and Associates, 2010) – June 2010 (Osceola County and OCX Smart Growth Office)
- Southport Connector Expressway – 13 miles
  - *Alternative Corridor Evaluation Report* – October 2015, Florida Department of Transportation (FDOT)
- Poinciana Parkway Extension/I-4 Connector – 10 miles
  - *Alternative Corridor Evaluation Report* – November 2015 (FDOT)

1.1 Project Description

The OPE would be a new expressway providing additional east-west capacity within the Study Area. The study corridor of the proposed OPE begins approximately 1 mile 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 potential north-south segment linking State Road (SR) 417 near the Boggy Creek Road interchange. Proposed improvements or refinements may include upgrades to existing roadways and alternatives on a new alignment.

The OPE was originally conceived to extend the existing Osceola Parkway that begins on the Disney World Resort property and ends approximately 20 miles east near the intersection of Boggy Creek Road and Simpson Road. The proposed OPE, as originally conceived, would have extended the Osceola Parkway 9 miles east to the proposed Northeast Connector Expressway. During the 2017 OCX PD&E study process, it was determined that a direct connection from the existing Osceola Parkway to the proposed OPE was not viable due to high residential and community cohesion impacts. Therefore, the alternatives herein do not directly connect to the existing Osceola Parkway.

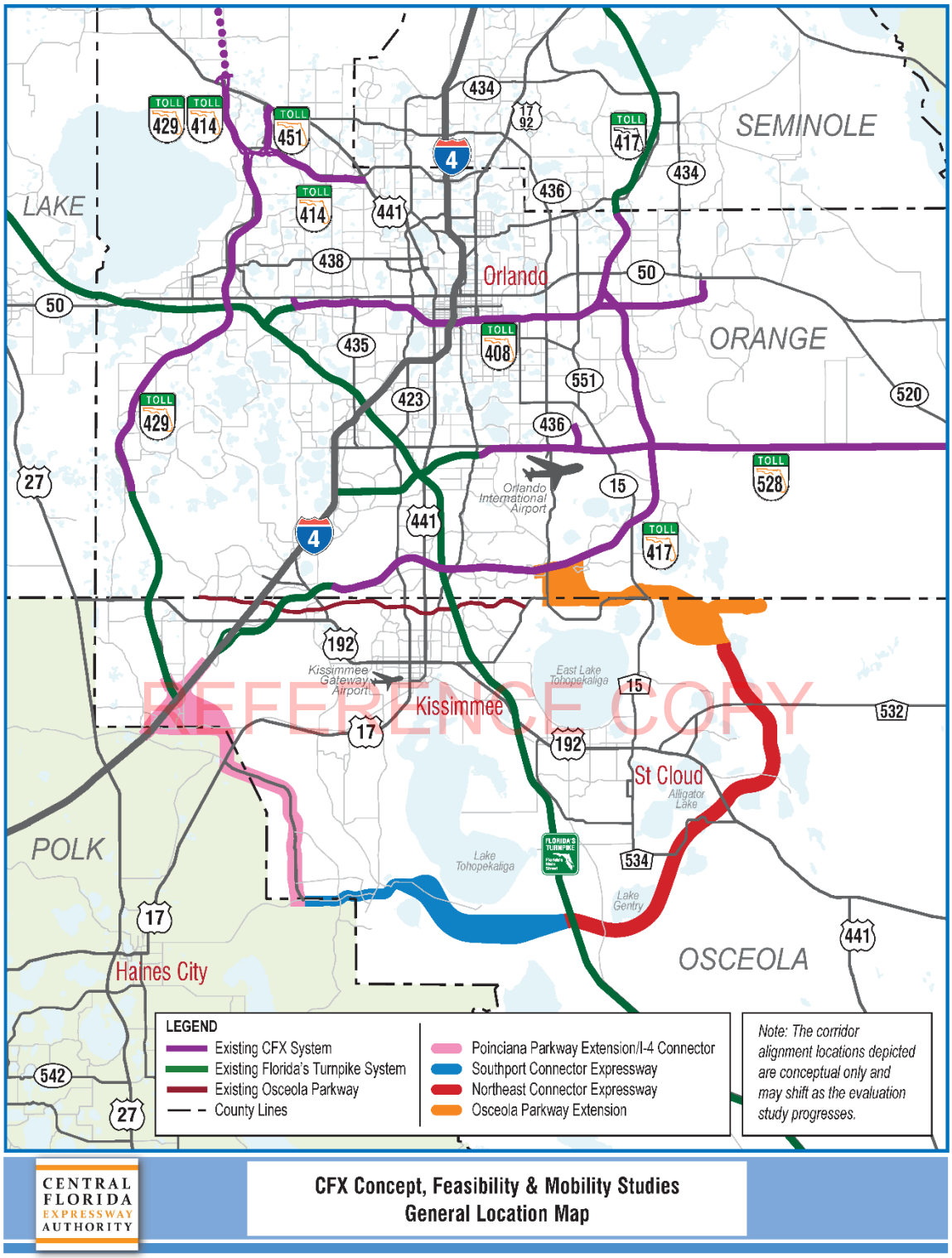

Figure 1-1. General Location Map

1.2 Purpose of Report

This Concept, Feasibility & Mobility Study evaluates the physical, natural, social, and cultural environment of the proposed OPE, assesses current and future transportation demands, develops and evaluates a range of mobility options, and analyzes feasible corridors that could then be carried forward to a PD&E study.

1.3 Project Location

The Study Area of the proposed OPE begins approximately 1 mile 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, with an easterly leg extending into the planned Northeast District (NED) development. The project also includes a potential north-south link to SR 417 near the Boggy Creek Road interchange. Figure 1-2 presents the project location map.

1.4 Previous Studies Related to the Project

In 2012, Osceola County completed a Preliminary Feasibility Study to evaluate an easterly extension of Osceola Parkway from west of Boggy Creek Road to east of the proposed Northeast Connector Expressway. This 9-mile-long road would cross northern Osceola County near the Orange County line and would act as a major east-west corridor, relieving congestion on local roads, on US 192/Irlo Bronson Memorial Highway to the south, and on SR 417/Central Florida Greeneway to the north. The *Preliminary Feasibility Study* (Osceola County, 2012) referenced the *SR 417 Southern Extension Concept Development and Evaluation Study* completed in 2008 (Orlando Orange County Expressway Authority [OOCEA] [predecessor to CFX], 2008).

After the *Preliminary Feasibility Study* (Osceola County, 2012), OCX, in coordination with Florida's Turnpike Enterprise (FTE), initiated the 2017 OCX PD&E study (OCX, 2017a) to further evaluate alternatives, develop preliminary estimates of project impacts and cost, and solicit public and agency input. A public hearing was held on January 24, 2017, and the *Final Preliminary Environmental Impact Report* (PEIR) (OCX, 2017b) was approved by OCX in May 2017.

1.5 Other Projects in or Near Study Area

1.5.1 Additional CFX Feasibility Studies

As noted in the Introduction, CFX is conducting Concept, Feasibility & Mobility studies of four previously studied transportation corridors. All four studies began in April 2017 and should be completed early 2018. In addition to the Osceola Parkway Extension, the Concept, Feasibility & Mobility Studies include the proposed independent projects (see Figure 1-1) listed below.

1.5.1.1 Poinciana Parkway Extension/I-4 Connector Expressway

The study corridor for the Poinciana Parkway Extension/I-4 Connector begins at the southern terminus of the existing Poinciana Parkway at Cypress Parkway, extends along the existing Poinciana Parkway alignment to the Osceola/Polk County line, and then extends in a north/northwest direction to connect with Interstate 4 (I-4). The study corridor includes portions of both Osceola and Polk Counties.

Corridor Length: 13 miles

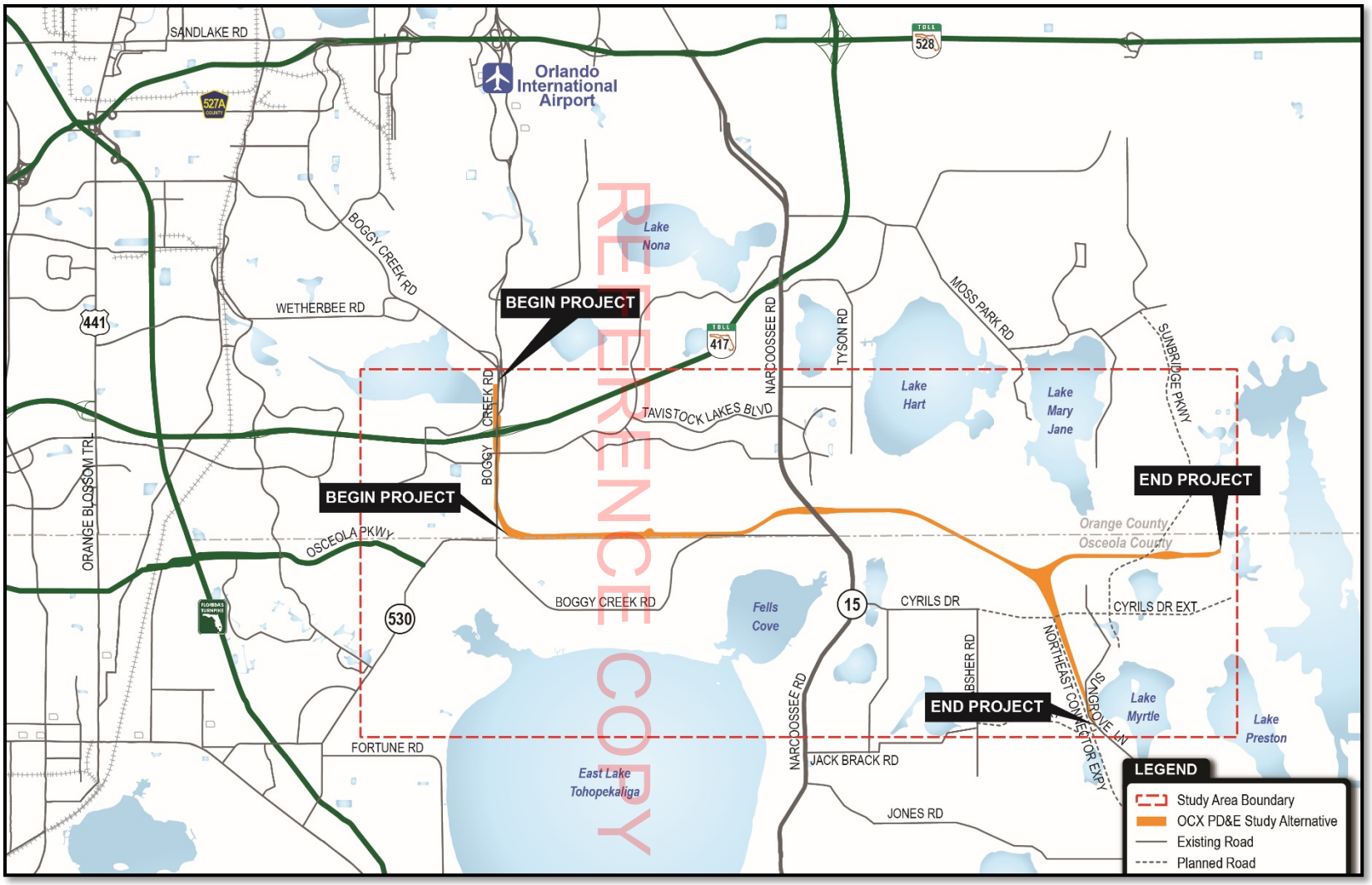

Figure 1-2. Project Location Map

1.5.1.2 Southport Connector Expressway

The study corridor for the Southport Connector Expressway begins at the current southern terminus of the Poinciana Parkway at Cypress Parkway and extends eastward to Florida's Turnpike. The study corridor encompasses portions of both Osceola and Polk Counties.

Corridor Length: 13 miles

1.5.1.3 Northeast Connector Expressway

The study corridor for the Northeast Connector Expressway extends from the proposed terminus of the Southport Connector at Florida's Turnpike to the vicinity of the Osceola/Orange County line. The study includes a proposed interchange with Florida's Turnpike. The Northeast Connector Expressway has been known as the "Southport Connector East" and the "State Road 417 Southern Extension" in previous studies and discussions.

A separate analysis was completed for the Northeast Connector Expressway in February 2016 for OCX, and summarized in the *Preliminary Alignment Feasibility Study Tier 1 Corridor Analysis Memorandum* (OCX, 2016). This study evaluated corridors in a narrowed study area between Alligator Lake and Harmony to provide a connection from Florida's Turnpike to US 192 and the OPE. OCX adopted a reduced corridor width to be shown in its Master Plan in this area. However, the reduced corridor width was not adopted by Osceola County. Through an evaluation of previous studies, CFX determined that the alignments identified in the *Preliminary Alignment Evaluation* Report (Kimley-Horn and Associates, 2010) be carried forward.

Corridor Length: 25 miles

1.5.2 Other Area Projects

Several independent projects within the OPE Study Area are in various stages of project development, and are proposed as separate actions. Attachment A-1 presents the locations of the other related studies within the Study Area.

1.5.2.1 Sunbridge Parkway

To improve connectivity to SR 528 (Beachline Expressway) in east Orange County and to accommodate planned development of the Innovation Way Corridor, CFX is building a new interchange on SR 528 at Innovation Way. Attachment A-2 presents the project's construction fact sheet that details the first segment of the Sunbridge Parkway connecting to the south side of the new interchange and to Aerospace Parkway. Construction of the interchange began in July 2016 and is estimated to be complete by early 2018.

The future Sunbridge development is a mixed-use, master-planned community, located in the southeast quadrant of Central Florida in both Orange and Osceola Counties. The development will occupy 4,787 acres in Orange County and 19,111 acres in Osceola County (Tavistock Development Co., 2018a). In Orange County, the Sunbridge development is in the county's Innovation Way Overlay (originally adopted in 2006 and amended on January 26, 2016). In Osceola County, the future Sunbridge development is in the county's Northeast District Conceptual Master Plan area. Attachment A-3 presents the developer's map (Tavistock Development Co., 2018b), which depicts the Orange and Osceola segments of the development and the proposed north-south road between them. The Sunbridge Parkway (north-south road) is proposed as the connecting roadway facility in the Sunbridge (Orange County) proposed development, and further intended to provide access to the Sunbridge development (Osceola County) and the NED planning area.

Attachment A-4 presents the Orange County District 4 Future Roadway Program map (revised June 8, 2017), which shows the Sunbridge Parkway as a Future Partnership Project. The Orange County Board of County Commissioners (BCC) adopted the privately initiated Future Land Use Amendment for the Sunbridge Planned Development Regulating Plan on November 29, 2016.

The Osceola County BCC adopted the Northeast District Transportation Element on August 16, 2010. On July 19, 2017, the Osceola County Development Review Committee approved the Sunbridge Concept Plan. Attachment A-5 presents a map from the Sunbridge Concept Plan that details the Sunbridge Parkway alignment within the Sunbridge development and the NED planning area.

The Sunbridge Parkway is listed in MetroPlan Orlando 2040 LRTP, FY 2021/22 – 2039/40 Prioritized Project List, Off-State Road System Projects, as Project Priority Number One from the Orange/Osceola County Line to Aeronautical Circle in Orange County. It states the proposed parkway is unfunded for preliminary engineering, right-of-way (ROW), and construction costs. The Sunbridge Parkway is also listed in the Orange County Public Works Department 10-Year Roadway Program (2017–2026), with final design, ROW, and construction to be announced (TBA).

On April 25, 2017, the Orange County BCC approved and executed a Transportation Agreement between Tavistock (Sunbridge developer) and Orange County for construction of the Sunbridge Parkway from Dowden Road to the Osceola/Orange County line. Under the Agreement, Tavistock is to complete design, engineering, and permitting work and construction for four segments as a two-lane rural facility.

Attachment A-5 presents the Transportation Agreement and “Exhibit E” from the Agreement that details the segment locations.

1.5.2.2 Cyrils Drive

Osceola County is conducting a Conceptual Design Study for the Widening, Rehabilitation, and Reconstruction of Roadways in the Narcoossee Community. Attachment A-6 presents the Narcoossee Roadways Conceptual Design Study Roadway Map. Cyrils Drive is within the OPE Study Area and is planned as a connection to the OPE and the Northeast Connector Expressway. Cyrils Drive is an existing two-lane roadway between Narcoossee Road (CR 15) and Absher Road in Osceola County. The Transportation Element of the Osceola County *Comprehensive Plan 2025* (Osceola County, Adopted 2010, Updated 2016) states that the existing Cyrils Drive is planned to be widened to four lanes and extended 1.05 miles (as part of its Ideal Transportation System [Tindale-Oliver & Associates, Inc., 2012).

Attachment A-6 includes excerpts from the Osceola County *Comprehensive Plan 2025* (Osceola County, Adopted 2010, Updated 2016) Transportation Element and the proposed typical sections for Cyrils Drive.

1.5.2.3 Jack Brack Road

Osceola County plans to extend Jack Brack Road to meet the planned Northeast Connector Expressway and to connect to streets in the Sunbridge development. The Jack Brack Road extension is part of the Narcoossee Roadways Conceptual Design Roadways Study Map (Attachment A-6).

1.5.2.4 Boggy Creek Road

Orange County has a project underway to widen Boggy Creek Road from two lanes to four lanes from the Orange/Osceola County Line to SR 417. Project design is complete and ROW is being acquired. The widening will include sidewalks, bicycle lanes, roadway lighting, and median landscaping.

1.5.3 Additional Capacity Projects (FDOT, MetroPlan Orlando, Local Projects)

Tables 1-1 and 1-2 list several capacity projects in or near the project area. These projects are included in the future no-build and build scenarios for travel demand forecasting.

Table 1-1. MetroPlan Orlando 2040 LRTP (Adopted June 11, 2014; Amended May 10, 2017)

County	Project Name	From	To	Description	Notes
County Projects					
Orange	Jeff Fuqua Boulevard	0.13 miles South of Boggy Creek Road	Heintzelman Boulevard	Widen to 4 Lanes	Funded by 2025
Orange	Lake Nona Boulevard	Tavistock Lakes Boulevard	SR 417	Widen to 6 Lanes	Funded by 2030
Orange	CR-527A (Boggy Creek Road)	Beacon Park Boulevard	SR 417	Widen to 6 Lanes	Funded by 2040
Orange	CR-527A (Boggy Creek Road)	SR 417	Wetherbee Road	Widen to 4 Lanes	Unfunded Need
Osceola	CR 530 (Boggy Creek Road)	Boggy Creek E/ Orange County Line	Narcoossee Road	Widen to 4 Lanes	Funded by 2025
CFX Unfunded Needs					
Orange	SR 417	Boggy Creek Road	SR 528/Beachline	Widen to 6 Lanes	
Orange	SR 417		Narcoossee Road	Interchange Improvement	
***Transportation Improvement Program* (TIP)[a] Bicycle and Pedestrian Projects**					
Osceola	Boggy Creek Road	E of Fells Cove Boulevard	W of Narcoossee Road	Sidewalk	Funded in 2017
TIP Locally Funded Highway Projects					
Orange	Boggy Creek Road	Orange/Osceola County Line	SR 417	Widen to 4 Lanes	Funded through 2020/21
Orange	Boggy Creek Road	SR 417	Wetherbee Road	Widen to 4 Lanes	Funded through 2020/21
Prioritized Project List, Approved July 12, 2017					
Orange	Boggy Creek Road	CR 530/Simpson Road	SR 417	Widen to 4 lanes	Priority Project #3

[a] *Transportation Improvement Program* (TIP) (MetroPlan Orlando, 2017c)

Table 1-2. Local Agency Projects

County	Project Name	From	To	Description	Notes
Orange County Public Works Ten-Year Work Program (2017–2026)					
Orange	Boggy Creek Road	Orange/Osceola County Line	SR 417	Widen to 4 Lanes	Funded through construction with Orange County Invest Funds
Orange	Boggy Creek Road	SR 417	Wetherbee Road	Widen to 4 Lanes	Funded through construction with Orange County Invest Funds
Osceola County Comprehensive Plan 2025 (Adopted August 16, 2010), Transportation Element (effective August 19, 2013 and October 22, 2015, updated November 2016)					
Osceola	Jack Brack Road Extension	E of McMichael Road	Northeast Connector Expressway	2 Lanes	Part of Narcoossee Conceptual Design Study 2025
Osceola	Cyrils Drive	Absher Road	East of Northeast Connector Expressway	Extend and Widen to 4 Lanes	Part of Narcoossee Conceptual Design Study 2025

Table 1-2. Local Agency Projects

County	Project Name	From	To	Description	Notes
Osceola	McMichael Road Extension	Rummell Road Extension	Cyrils Drive	n/a	Extend South to the Rummell Road Extension
Osceola	Rummell Road Extension	Cyrils Drive Extension	Narcoossee Road	n/a	Extend from the Cyrils Drive Extension Southwest to Narcoossee Road

SECTION 2

Project Purpose and Need

A defined purpose and need is vital to determining the alternatives considered for any proposed project. After the purpose and need for the proposed project is established, alternatives are developed to meet them. An alternative that does not satisfy the project's purpose and need may be eliminated from further consideration. This section defines the purpose and need that the proposed project is intended to accomplish.

Under Osceola County's study of the OPE, the project purpose and need statement was originally made available for review through FDOT's Efficient Transportation Decision Making (ETDM) Programming Screen, as a non-federally funded project.

The updated purpose and need statement was provided in Attachment 1 of the PEIR (OCX, 2017b) as: *The purpose of this project is to respond to future travel demand, provide system linkage/network connectivity and address social and economic needs. The need for the project is based on several factors including travel demand, increasing traffic volumes, historical growth and existing and planned development, roadway network/system linkage, social and economic needs, and consistency with long range planning efforts.*

Further consideration of alternative mobility needs for the CFX concept study has led to the development of a revised purpose and need for the OPE project, as detailed below.

2.1 Need for Improvement

The proposed project is needed to create system linkages and accommodate future travel demand and capacity needs. Current infrastructure will not adequately accommodate the planned development in east Osceola County and Orange County. Future growth and travel demand is anticipated in the region because of approved proposed developments including NED in Osceola County, planned development in the Innovation Way Planned Overlay Area in Orange County, and planned development in the Narcoossee Planning Initiative area. As a result, local and regional facilities are expected to exceed capacity, creating a gap between proposed developments and a regional transportation system. Additionally, the *East Central Florida Corridor Task Force Summary Report* (East Central Florida Corridor Task Force [ECFCTF], 2014) recommended potential study areas for new or significantly upgraded east-west corridors in the OPE study area region.

The following sections describe the need for the project in more detail.

2.1.1 System Linkage

System linkage indicates how well the project fits into the area's existing and future transportation system. The proposed OPE provides a key linkage in CFX's *Visioning + 2040 Master Plan* to the existing expressway system in the region via its connection to SR 417. Together, the OPE, the Northeast Connector Expressway, the Southport Connector Expressway, and the Poinciana Parkway Extension/I-4 Connector are a significant part of the CFX *Visioning + 2040 Master Plan*. The proposed expressway system connects existing and emerging cities and centers to the regional interstate (I-4 and Florida's Turnpike) and existing CFX expressway system (SR 417, SR 528, and SR 429). The OPE will provide a vital east-west direct connection between planned development and SR 417.

Table 2-1 summarizes the No-Build (2045) travel routes and times estimated from the future intersection of the Cyrils Drive extension and Sunbridge Parkway to the Orlando International Airport (OIA) south parking lot at Jeff Fuqua Boulevard. The No-Build (2045) network assumes that the OPE is not

constructed and includes only those projects included in the *2040 LRTP* (MetroPlan Orlando, 2017a) and *Transportation Improvement Program* (MetroPlan Orlando, 2017c).

Table 2-1. No-Build Travel Times to OIA South Parking Lot Entrance

Alternative Network	Beginning Travel Point	Route Via[a]	Distance (miles)	One-way Travel Time (minutes)[b]
No-Build Alternative[b]	Future Intersection of Cyrils Dr. extension and Sunbridge Parkway (unfunded)	Cyrils Dr./Narcoossee Rd./SR 417	16	27
Build Alternative[c]	Future Intersection of Cyrils Dr. extension and Sunbridge Parkway (unfunded)	Proposed OPE new expressway	11–15	16-18

[a] All routes end at the OIA south parking lot using SR 417 to Boggy Creek Rd. to Jeff Fuqua Blvd.
[b] The No-Build route assumes average speed along the arterial streets at Level of Service (LOS) C at 31 miles per hour (mph) and 65 mph along SR 417 (*Quality/Level of Service Handbook* [FDOT, 2013], 2012 Generalized Service Volume Tables (Class I Arterials at LOS C, the achievable speed is >23 mph and up to 31 mph (LOS B >31 mph)).
[c] Build Alternative estimated route and travel times varying depending on alignment. The Build Alternative route assumes average speed along OPE at 65 mph.

Table 2-1 illustrates the project benefits for the regional/future traveler (approximately 30 percent decrease in travel time). Considering that parts of Narcoossee Road and most of SR 417 are expected to fail in the No-Build condition, the time savings could be greater.

2.1.2 Regional Connectivity and Mobility

The 2017 OCX PD&E Study originally proposed the OPE western terminus begin at Osceola Parkway. After review of multiple alternatives, a connection to the Osceola Parkway was eliminated from further study because of impacts to existing and planned residential developments including the Boggy Creek/ Wyndham Lakes Estates Development of Regional Impact (DRI) (Ward Road Planned Development and Boggy Creek Enclave). It was determined that a direct connection to SR 417 be analyzed as part of this study.

The two eastern termini are consistent with local plans and policies and promote regional connectivity. The southeastern terminus connects to the future Northeast Connector Expressway as part of CFX's *Visioning + 2040 Master Plan* for better mobility to US 192 and Florida's Turnpike. The eastern terminus connects to the future Sunbridge Parkway for further north-south connectivity and mobility to SR 528 and the future NED, as well as the ECFCTF-recommended future Corridor I that is presented on Figure 2-1.

The East Central Florida Corridor Task Force (hereafter, the "Task Force") was created in 2013 through Executive Order 13-319 to develop consensus recommendations for future transportation corridor planning in portions of Brevard, Orange, and Osceola Counties. The Task Force findings (ECFCTF, 2014) as it relates to the OPE study area include:

- The population of the three counties is projected to nearly double from 2 to 3.8 million residents during the next 50 years.
- Multiple trends point to significant increases in demand for travel between the three counties during the next 50 years including: planned development of mixed-use centers on the eastern edge of existing concentration of urban development in Orange and Osceola Counties; ongoing development under Florida's sector planning law of a long-term master plan for 133,000 acres of Deseret Ranches in eastern Osceola County; and the emergence of life sciences and related technology-based clusters in central Orlando, Innovation Way, Lake Nona, Cape Canaveral, and Melbourne.

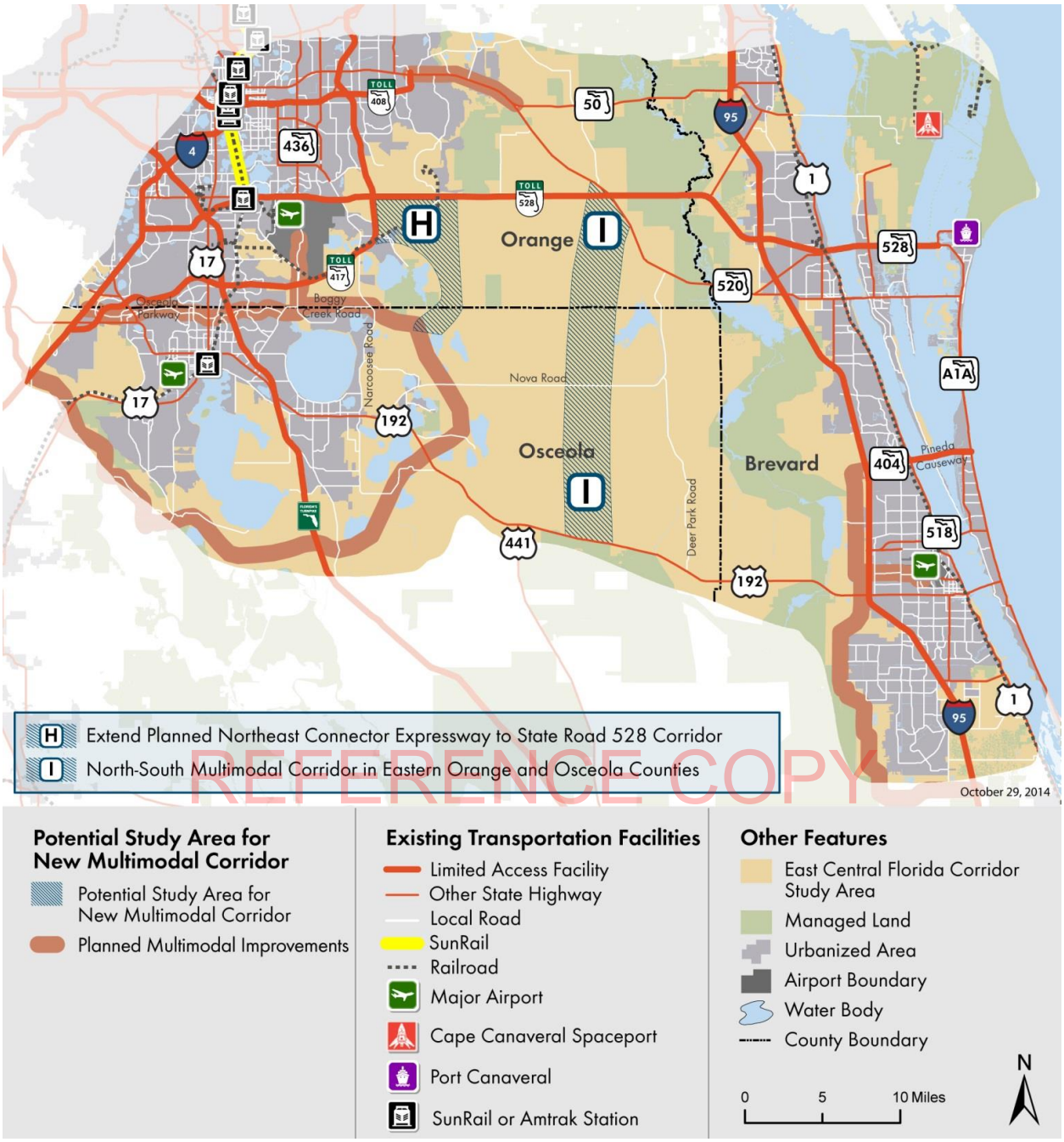

Figure 2-1. ECFCTF Recommendation for New North-South Transportation Corridors

- The Task Force noted concerns about the region's ability to achieve economic opportunities and to support growing populations related to planned growth resulting from limited options for both east-west and north-south travel. Of particular concern was the ability to support effective evacuation and response during extreme weather events and other emergencies, especially to and from Brevard County. Limitations include:
  - Of the three east-west highway connections between the three counties (SR 520, SR 528, and SR 50), only SR 528 is a high-speed, high-capacity corridor.
  - Only one east-west highway connection (US 192) exists between Orange, Osceola, and southern Brevard County.

The Task Force recommended a new or significantly upgraded, multimodal corridor along the Orange/ Osceola County line from the OIA/Lake Nona area to the SR 520 corridor to serve the NED and portions of Deseret Ranches. Also recommended is a multimodal corridor from the OIA/Lake Nona area to central/southern Brevard County to provide a more direct connection between their economic centers, and to serve the emerging population centers in NED and Deseret Ranches.

Florida's Strategic Intermodal System (SIS) is a statewide network of high-priority transportation facilities, including highways, freight rail lines, airports, seaports, and other key intermodal facilities. Within the region of the study area (shown on Figure 2-2), SR 417, SR 528, Florida's Turnpike, and the CSX Railway Corridor are designated SIS corridors that link Florida's economic regions to other regions and states. Access to SIS facilities from Lake Nona, Narcoossee, and NED areas is provided through a network of county roads. The only designated SIS connector within the study area is SR 417.

The Strategic Highway Network (STRAHNET) is a designation given to roads that provide defense access and emergency capabilities for movements of personnel and equipment. STRAHNET includes routes (for long-distance travel) and connectors (to connect individual installations to the routes). Near the proposed project, STRAHNET routes include I-4, Florida's Turnpike, and SR 528.

2.1.3 Social and Economic Needs

This section provides an overview of population, employment, economics, and land use characteristics of Orange and Osceola Counties, which includes the project study area. In August 2017, Fishkind and Associates (FKA) developed socioeconomic data for the OCX Master Plan projects for the 2015 base year and 2025, 2035, and 2045 forecast years for the pertinent traffic analysis zones (TAZs) (FKA, 2017). The study area for the FKA analyses includes all of Osceola County and the southern portion of Orange County (hereafter, the "Orange Study Area"). Attachment B-2 summarizes the data.

2.1.3.1 Population and Employment

According to the FKA report, Orange County and specifically the City of Orlando represent the major population and employment center for the FKA study area market. Overall, Orange County added approximately 390,000 people between 2000 and 2015. During that same period, Osceola represented the tenth fastest-growing county in Florida, adding an estimated 150,000 people.

Population

Table 2-2 summarizes the base year population (2015) in Orange County (within the Orange Study Area) and Osceola County, as well as the population forecast for the select forecast years of 2025, 2035, and 2045. In 2015, Osceola County had a population of approximately 324,000. By 2045, the population of Osceola County is expected to increase to almost 635,000, an increase of 96 percent. Within the Orange Study Area, the population is expected to increase 120 percent.

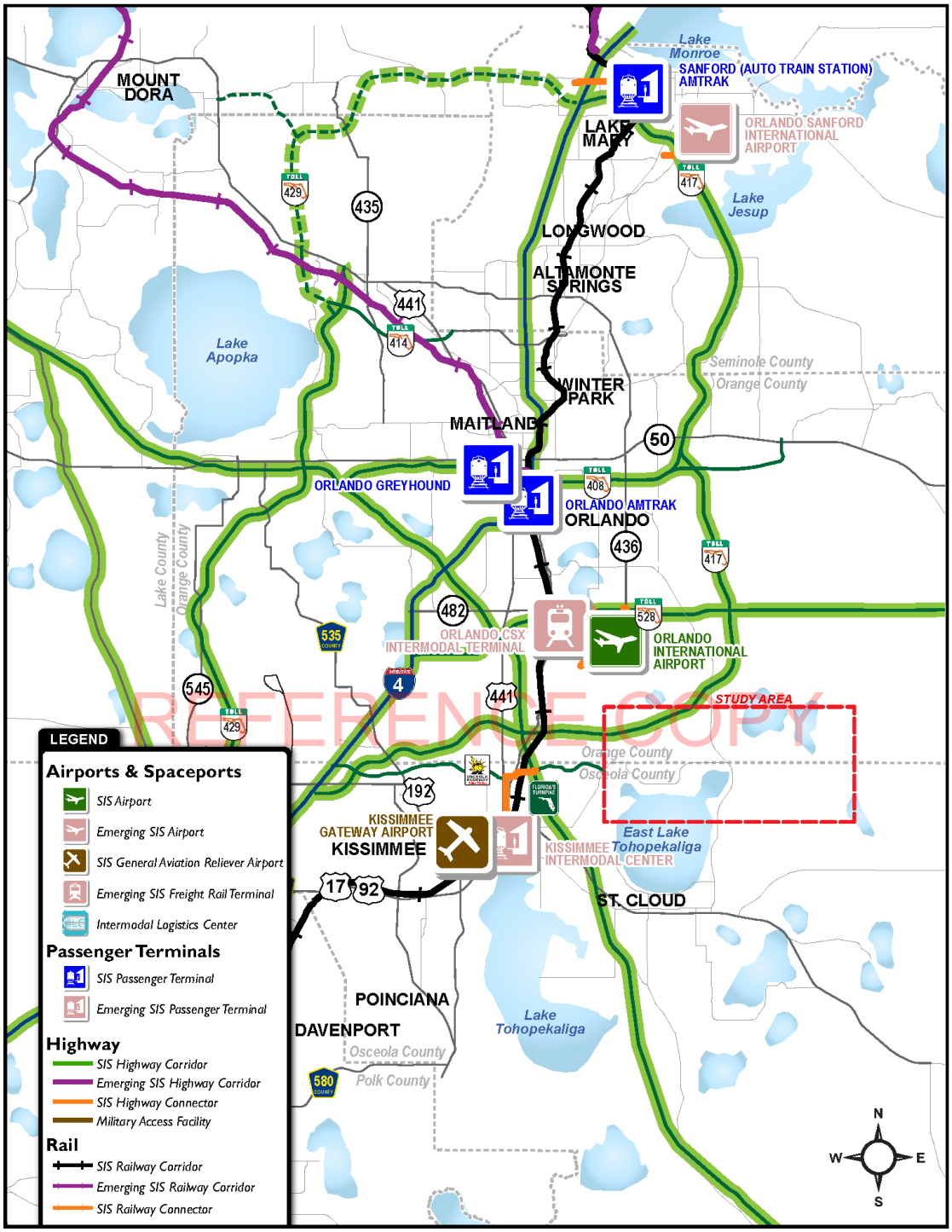

Figure 2-2. SIS Facilities

Table 2-2. County-level Base Year and Projected Years Population Estimates

County	2015 Base Year	2025	2035	2045	Increase from Base Year
Orange Study Area	106,795[a]	151,181	193,563	234,908	120%
Osceola	323,993	436,348	537,245	634,366	96%

Source: FKA (2017)
[a] Orange Study Area (southern portion) – not entire County

Employment and School Enrollment

Table 2-3 summarizes the base year employment (2015) in the Orange Study Area and Osceola County, as well as the forecasted employment and the employment/population (E/P) ratio data for the forecast years of 2025, 2035, and 2045. The E/P ratios are a function of the economic linkages from community to community and the pace at which economic development occurs. According to FKA (2017), the Osceola County E/P ratios indicate that Osceola County functions economically as a "bedroom" community for Orange County. By 2045 employment in Orange County and Osceola County is expected to increase by almost 66 percent and 36 percent, respectively.

FKA identified the existing 2015 enrollments for Orange and Osceola County public schools and private schools within their study area (see Table 2-3). By 2045 student enrollments are expected to increase in the Orange Study Area and Osceola County by 34 percent and 97 percent, respectively.

Table 2-3. County-level Base Year and Forecast Employment and Student Enrollment Estimates

	Employment/ E/P Ratio[a]				Student Enrollments				
County	2015 Base Year	2025	2035	2045	2015 Base Year[b]	2025	2035	2045	Increase from Base Year
Orange Study Area[c]	74,403/ 68.7%	102,576/ 67.9%	129,397/ 66.9%	154,687/ 65.9%	34,347	32,123	41,293	46,160	34%
Osceola	115,035/ 35.5%	156,213/ 35.8%	192,114/ 35.8%	227,612/ 35.9%	68,070	96,539	113,775	134,095	97%

Source: FKA (2017)
[a] E/P ratio = total county employment divided by total county population
[b] Includes university students
[c] Orange Study Area (southern portion) – not entire County

2.1.3.2 Developments of Regional Impacts and Proposed Developments

The FKA report identified nine "Super Zones" (four in Orange Study Area and five in Osceola County) that represent areas that attract future development growth and that include criteria such as transportation access (highway, rail and/or airports), coastal development/retiree activity, and/or collocation to current employment centers. The Super Zone drivers in or near the study area include OIA, SR 528, SR 417, Florida's Turnpike, interchange at SR 417 and Florida's Turnpike, Jetport Industrial Park, Lake Nona/Medical City, Eastern Orange County (predominantly rural), Kissimmee, St. Cloud, Eastern Osceola Parkway, and Irlo Bronson Highway. Figure 2-3 presents the Super Zone locations relative to the OPE study area.

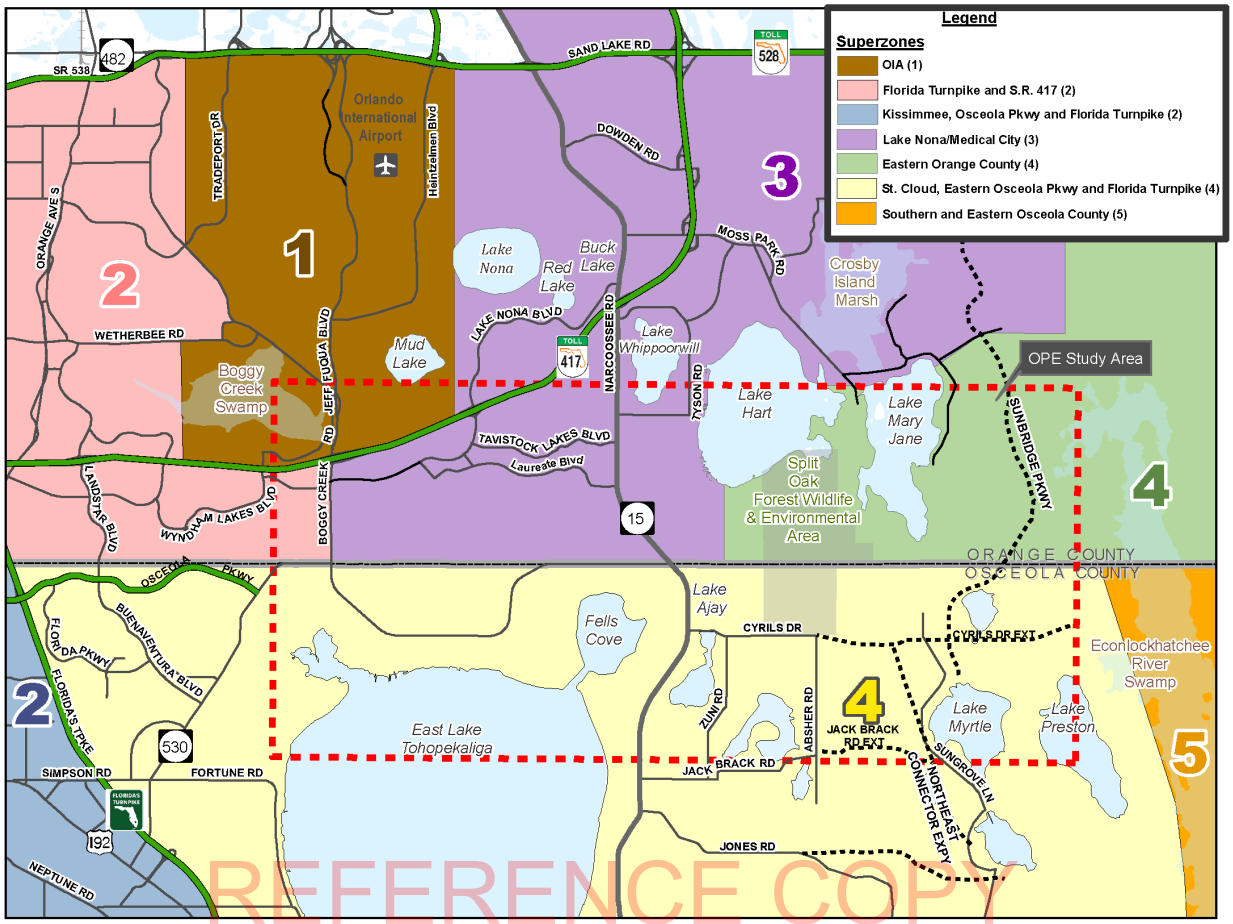

Figure 2-3. FKA Super Zone Locations

To better forecast development, FKA reviewed the status of DRIs and planned developments (PD) within the Orange Study Area and Osceola County. Table 2-4 summarizes dwelling unit estimates by Super Zones within the OPE study area. While only portions of Super Zones 1, 2, 3, 4 (Orange County), and Super Zone 4 (Osceola County) lie within the OPE study area, many DRIs and planned developments in the study area comprise a large portion of the undeveloped land in these Super Zones. The average increase in dwelling units within the study area is more than 100 percent, with the Lake Nona/Medical City area expected to see more than 200 percent increase in dwelling units by 2045.

Table 2-4. County-level Base Year and Forecast Dwelling Units by Super Zones within the OPE Study Area

	Dwelling Units Estimates				
Super Zone	2015 Base Year	2025	2035	2045	Increase from Base Year
Orange Study Area 1[a]	1,402	2,026	2,698	3,252	132%
Orange Study Area 2[a]	25,773	32,261	36,727	40,105	56%
Orange Study Area 3[a]	14,296	24,996	36,290	48,276	238%
Orange Study Area 4[a]	445	591	615	801	80%
Osceola County - 2	37,952	50,032	60,979	71,006	87%

Table 2-4. County-level Base Year and Forecast Dwelling Units by Super Zones within the OPE Study Area

Super Zone	Dwelling Units Estimates				Increase from Base Year
	2015 Base Year	2025	2035	2045	
Osceola County - 4	44,011	61,103	77,363	93,479	112%
Osceola County - 5	1,178	1,545	1,844	2,227	89%
Totals	125,057	172,554	216,516	259,146	107%

Source: FKA (2017)
[a] Orange Study Area (southern portion) – not entire County

2.1.4 Capacity Constraints

Primary needs for the proposed OPE are to provide additional roadway capacity in the study area, distribute local and regional trips, and relieve congestion on the local roadway network. The Task Force recommended a multimodal corridor along the Orange/Osceola County line to give NED and portions of Deseret Ranches better access to the OIA/Lake Nona area and the SR 520 corridor. Planned growth related to the Narcoossee Planning Initiative area and the NED is anticipated to reduce the mobility within these areas as well as in the Lake Nona DRI. Section 3.6, Human Environment, discusses these planning areas in further detail.

A preliminary capacity analysis was conducted to determine the future (2045) No-Build and Build network capacity. Because the four segments of the CFX *Visioning + 2040 Master Plan* facilities being studied are connected, travel demand modeling on the four segments as a connected system was conducted by CFX's traffic modeling consultant. CFX's consultant provided the annual average daily traffic (AADT) for the future (2045) No-Build and Build alternatives. Section 4, Traffic Considerations, provides details on the traffic analysis.

2.1.4.1 No-Build Scenario: Year 2045

The No-Build scenario assumes no changes to the transportation facilities beyond currently planned and programmed projects already committed in MetroPlan Orlando's 2040 LRTP and *Transportation Improvement Program* (TIP) (MetroPlan Orlando, 2017c). The system network for the 2045 No-Build condition includes the proposed Sunbridge Parkway and the Northeast Connector Expressway. Attachment B-3 provides details of the No-Build analysis.

The Level of Service (LOS) was determined for the major facilities in the study area in accordance with the procedures outlined in the *Quality/Level of Service Handbook* (FDOT, 2013) using the 2012 Generalized Service Volumes Tables. Attachment B-4 includes 2045 No-Build volumes and LOS. This analysis indicates that in the 2045 No-Build condition, several facilities in the study area are likely to fail (LOS E/F) including: SR 417, Boggy Creek Road near Simpson Road, Jeff Fuqua Boulevard, Narcoossee Road – south of Orange/Osceola county line, and the Sunbridge Parkway.

2.1.4.2 Build Scenario: Year 2045

The 2045 AADT for the OPE alignment alternatives were analyzed (see Section 4, Traffic Considerations). While the eastern segments have some minor geometric differences, they are the same from a travel demand forecasting perspective: they all have the same access points and there are no competing routes available. The two western segments have similar but not identical access points and the same competing routes. To simplify the 2045 Build analysis from eight alignments to just two, West 1B was combined with a generic east segment, and West 2 was combined with a generic east segment. Attachment B-5 presents the 2045 Build traffic volumes for these two alignments. Based on the

preliminary traffic model volume analysis conducted for this study, the following observations were made:

- The 2045 AADT and directional design hour volumes (DDHV) on all west segments and on all east segments only show slight differences. Thus, the analysis results are consistent among the segments.
- The OPE freeway mainlines and frontage roads require two lanes in each direction to achieve an LOS C or better.
- The 2045 future Build of the OPE appears to improve the LOS of the 2045 future No-Build failing facilities to an LOS D or better, as presented in Table 2-5.

Table 2-5. Comparison of Future No-Build and 2045 Build Level of Service Values

		Future No-Build		2045 Build	
Roadway	**Segment**	**AADT**	**LOS**	**AADT**	**LOS**
SR 417	Intersection with Future OPE	--	--	104,700	D
SR 417	Boggy Creek Road and Narcoossee Road	113,700	E	--	--
Narcoossee Road	Future Interchange with OPE	--	--	57,100	C
Narcoossee Road	South of Boggy Creek Road	74,800	E/F	--	--
Narcoossee Road	North of Boggy Creek Road	48,200	C or >	--	--
Sunbridge Parkway	North of Cyrils Drive Extension	41,500	E/F	35,500	C
Sunbridge Parkway	South of Cyrils Drive	--	--	53,000	C

2.1.5 Consistency with Transportation Plans

The OPE is documented in the local and regional plans listed below. MetroPlan Orlando's TIP notes that the project study limits are from SR 417 to the Northeast Connector Expressway, and further notes that the FDOT's FY 2016/17-2020/21 Tentative Five-Year Work Program includes the segment of the OPE from the end of the existing Osceola Parkway to the proposed Northeast Connector Expressway and the connection to SR 417. Some discrepancy exists in the western terminus of the project in the documented plans. The discrepancies between the MetroPlan project limits and FDOT's project limits should be resolved prior to the next phase of the study. Additionally, as the OCX PD&E Study ruled out Osceola Parkway as the western terminus of the project because of extensive residential impacts, public confusion would be minimized by renaming the project to the future state road number.

- *CFX Visioning + 2040 Master Plan* (CFX, 2016).
- CFX Five-Year Work Plan FY 2018 - FY 2022 (CFX, 2017) for the OPE Feasibility Study; Project No. 599-221.
- FDOT's Adopted Five Year Work Program FY 2017 – FY 2022 (July 1, 2017) (FDOT, 2017a); New Road Construction, Preliminary Engineering and Right of Way.
- OCX *Master Plan 2040* (OCX, 2013), from west of Boggy Creek Road to the proposed Northeast Connector Expressway and includes the Boggy Creek Road/SR 417 Access Road.
- Osceola County *Comprehensive Plan 2025*, Transportation Element (effective August 19, 2013) (Osceola, 2016).

- Northeast District Element of the Osceola County *Comprehensive Plan 2025* and the NED District Adoption Ordinance, 2010
- MetroPlan Orlando's *2040 LRTP* (MetroPlan Orlando, 2017a) as a new four-lane facility (OCX - Funded Projects by 2025).
- MetroPlan Orlando's Transportation Improvement Program FY 2017/2018 – 2021/2022 (MetroPlan Orlando, 2017c) as a new four-lane facility from SR 417 to Northeast Connector Expressway. The following is noted: "*The $33 million for the Osceola Parkway Extension project was added to FDOT's FY 2016/17-2020/21 Tentative Five-Year Work Program as a legislative allocation. This project includes the segment of the Osceola Parkway Extension from the end of the existing Osceola Parkway to the proposed Northeast Connector Expressway and the connection to SR 417, which is included in MetroPlan Orlando's 2040 LRTP. The Osceola County Expressway Authority will be requesting an amendment to the 2040 LRTP to include an additional extension of the Osceola Parkway 2 miles further east, and this additional extension will also be included in this project once the LRTP amendment has been approved.*"
- East Central Florida Corridor Task Force (ECFCTF, 2014): Found a need for new multimodal corridor along Orange/Osceola County Line and for improved connection between the OIA/Lake Nona area and Central Brevard County.
- Orange County *Comprehensive Plan 2010 – 2030: Destination 2030* (Orange County, 2017), Transportation Element (Adopted 2009, Amended 2017).

2.1.6 Multimodal Opportunities

Osceola County's NED Plan created a Multimodal Transit District as part of the NED. Development in the area will follow principles of smart growth and seek to reduce automobile use by enabling multimodal travel. The design will place transit stations within the dense central core with multimodal access via pedestrian and bicycle trails. A significant portion of residents will have reasonable pedestrian or bike trail access to the transit station in the central core.

The OPE will connect this Multimodal Transit District to other multimodal facilities including OIA and Lake Nona/Medical City. It will provide a connection to the Innovation Way Corridor envisioned by Orange County. The Innovation Way Corridor would connect the University of Central Florida to the OIA/Medical City area. Transit connections from the NED to OIA and Medical City would be able to use the Innovation Way transit corridor to access the University of Central Florida and the associated Research Park area.

The NED Multimodal Transit District will also be connected to the Innovation Way Corridor in Orange County by a separate roadway, Sunbridge Parkway, to be constructed by others.

The OIA's Intermodal Transit Facility (ITF) is due to open in 2018. This facility will be a Superstop for LYNX buses, including express buses from Kissimmee and Lake Nona. The ITF will be the Orlando station for the Brightline higher-speed rail service from Miami beginning in the next few years. Planning is underway for a SunRail station at the ITF and for possible connections to the International Drive area by elevated maglev (magnetic levitation) trains or light rail. All the above projects are described in MetroPlan Orlando's 2040 LRTP.

By offering better connections to OIA, the OPE will give users access to a wide range of multimodal transit options. Once these facilities are complete, a NED resident could:

- walk or bike to a transit station in the NED's Central Core
- ride transit along the OPE to the ITF at OIA and then travel by SunRail to any part of its line
- travel by maglev or light rail to the International Drive area

- travel by Brightline higher-speed rail to Miami
- travel by air to hundreds of destinations around the world

As development continues eastward from NED into the Deseret Ranches property, an extension of the OPE could provide similar intermodal connectivity.

In keeping with the recommendations of the Center for Urban Transportation Research's (CUTR, 2017), potential locations exist along the OPE alignment for intermodal transfers, such as park and ride lots collocated with transit stops. CFX's Multimodal Policy authorizes CFX to develop such facilities within its ROW in partnership with others. CUTR specifically references park and ride lots and express bus facilitation as projects worth considering and suggests possible financing by CFX, if costs are found to equal user benefits. Exact locations will be defined as trends in property development and transit use develop within the study area.

In concept, such intermodal facilities along the OPE ROW could include parking lots/garages, vanpool/carpool staging areas, and transit stops for express buses and local feeder lines. As technology and business models develop further, car sharing and automated vehicle areas could be included for last mile service. Where feasible and safe, these lots should also connect to pedestrian and bicycle trails. Details of such facilities would need to be coordinated with transit operators and nearby developers.

2.1.7 Safety and Evacuation Support

SR 417 is a designated evacuation route by the Florida Division of Emergency Management (FDEM). The closest FDOT-identified evacuation routes to the study area other than SR 417 (westbound) are SR 528 (westbound) east of SR 520, SR 528 (westbound) west of Boggy Creek Road, Florida's Turnpike (northbound), and CR 532 (westbound). The OPE, in conjunction with the Northeast Connector Expressway, could enhance evacuation to the north from the CR 532 evacuation route, which is south of the study area and intersects with SR 520 to the east.

The proposed project would likely enhance overall safety by improving traffic flow and relieving congestion along SR 417, Boggy Creek Road, Sunbridge Parkway, and Narcoossee Road. Also, by improving traffic flow along SR 417, which is an evacuation route designated by FDEM, the proposed project is expected to facilitate the movement of increased traffic during emergency evacuations. As noted above, the Task Force expressed concern over the region's ability to support effective evacuation and response during extreme weather events and other emergencies, especially to and from Brevard County. With its potential to extend farther east toward Brevard County, the OPE would enhance the region's emergency evacuations.

2.2 Purpose of the Proposed Project

The primary purpose of the OPE is to respond to and prepare for future growth planned and approved in Orange County's Innovation Way Overlay and Osceola County's Narcoossee Planning Initiative area and the NED planning areas. Additionally, the OPE purpose is to promote regional system linkage and network connectivity to existing SR 417 and SR 528 in east Orange County and the proposed Northeast Connector Expressway that is planned to provide further connectivity to Florida's Turnpike and US 192. The secondary objectives of OPE include: enhancing mobility of the area's growing population and economy; relieving worsening congestion on local roads by providing a limited-access transportation option; providing transportation infrastructure to support economic growth and to be consistent with local plans and policies; and promoting regional connectivity particularly to central/southern Brevard County with an additional crossing of the St. John's River.

SECTION 3

Existing Conditions

Existing conditions are documented in this section to identify engineering and environmental conditions along the proposed corridors that may have a bearing on the selection of a feasible alignment. The existing condition base year is 2017.

3.1 Existing Roadway Network

The existing roadway network comprises primarily rural, two-lane roadways that are rapidly being upgraded to four- and five-lane urban roadways with bike lanes and sidewalks. The primary roadways in or crossing the Study Area are detailed below and are shown in Attachment A-1:

- Simpson Road – a rural, two-lane collector roadway connecting the existing eastern terminus of Osceola Parkway with Boggy Creek Road at the Orange/Osceola County line
- Boggy Creek Road (Osceola County) – a rural, two-lane collector roadway that approximately parallels the Orange/Osceola County line and connects numerous large, rural residential tracts and multiple subdivisions
- Boggy Creek Road (Orange County) – a rural, two-lane collector roadway connecting Simpson Road and the portion of Boggy Creek Road in Osceola County with SR 417 and the southern entrance to OIA; Orange County is scheduled to start reconstruction of this segment of Boggy Creek Road in late 2018 to a four-lane urban roadway
- SR 417 – a four-lane, limited-access freeway that is the eastern beltway around Orlando
- Lake Nona Boulevard – a six-lane, urban curb-and-gutter roadway with bike lanes and sidewalks on both sides; it is the major roadway through the Medical City development south of SR 417
- Laureate Boulevard – a four-lane, urban curb-and-gutter roadway with bike lanes and sidewalks on both sides; it is the secondary roadway through the Medical City development south of SR 417 and runs approximately parallel to and south of Lake Nona Boulevard
- Narcoossee Road – a six-lane, urban curb-and-gutter roadway with bike lanes and sidewalks on both sides running north-south through Orange County and into Osceola County
- Cyrils Drive – a rural, two-lane roadway running east from Narcoossee Road along the southern boundary of Split Oak Forest; Osceola County is designing a four-lane urban reconstruction of Cyrils Drive from Narcoossee Road into the Sunbridge development (part of the NED)

In addition to these primary roadways, numerous residential subdivisions have recently been constructed, are under construction, or are expected to break ground in the next 12 to 24 months.

3.1.1 Functional Classification

FDOT assigns each roadway a functional classification based on expected traffic volumes, adjacent land uses, and the roadway's operation within the overall network. FDOT classifies each primary roadway in the Study Area as follows:

- SR 417 – Urban principal arterial - freeway
- Osceola Parkway - Urban principal arterial
- OIA South Access Road - Urban principal arterial
- Boggy Creek Road (Osceola County) – Urban major collector
- Sunbridge Parkway (planned) – Urban major collector

- Simpson Road – Urban major collector
- Boggy Creek Road (Orange County) – Urban minor arterial
- Lake Nona Boulevard – Urban minor collector
- Laureate Boulevard – Urban minor collector
- Cyrils Drive – (not classified by FDOT)

3.1.2 Access Classification

FDOT uses seven Access Management Classifications (1–7) as defined in the Florida Administrative Code Chapter 14-97.003. In general, lower class numbers have more restrictions to access while higher numbers have fewer restrictions. SR 417 is a limited-access freeway that FDOT categorizes as an Access Management Class 1. As a Class 1 facility, access to SR 417 is only through interchanges. There are no driveways, side streets, or signalized intersections. Narcoossee Road, Lake Nona Boulevard, and Laureate Boulevard would be categorized as Access Class 5 "… where adjacent land has been extensively developed … (and) these roadways are distinguished by existing or planned restrictive medians." Simpson Road, Boggy Creek Road (Osceola County), and existing Cyrils Drive are all Access Class 6 (non-restrictive medians). When reconstructed as planned, Boggy Creek Road (Orange County) and Cyrils Drive will both be reclassified as Class 5. Other roadways—typically neighborhood roads—would be categorized as Class 7, the least restrictive category.

3.2 Existing Roadway Characteristics

The following sections discuss the characteristics of primary roadways in the Study Area. Deficiencies of these existing roadways that may influence the functionality, purpose, and need for the OPE project were identified.

3.2.1 Design and Posted Speeds

Table 3-1 lists the current design and posted speeds for the primary roadways within the Study Area moving from west to east.

Table 3-1. Roadway Speeds

Roadway Name	Design Speed[a] (mph)	Posted Speed (mph)
Simpson Road	55	50
Boggy Creek Road (Osceola County)	50/60	45/55
Boggy Creek Road (Orange County) - Existing	50	45
Boggy Creek Road (Orange County) – Planned[a]	55	N/A
State Road 417	70	65
Lake Nona Boulevard	35	30
Laureate Boulevard	35	30
Narcoossee Road	50	45
Cyrils Drive - Existing	45	40
Cyrils Drive – Planned[a]	50	N/A
Sunbridge Parkway	N/A	N/A

[a] Where design speed could not be determined by existing standards or plans, it was assumed to be 5 mph greater than the current posted speed
Note: N/A = not applicable

3.2.2 Right-of-Way

Table 3-2 lists ROW widths for the primary roadways within the Study Area. For existing corridors, the widths were approximated from Google Earth aerial photography.

Table 3-2. Roadway Rights-of-Way

Roadway Name	Right-of-Way (feet)
Simpson Road	90
Boggy Creek Road (Osceola County)	90/125
Boggy Creek Road (Orange County) - Existing	55
Boggy Creek Road (Orange County) - Proposed	170
State Road 417	320/Varies
Lake Nona Boulevard	200
Laureate Boulevard	75/155
Narcoossee Road	150
Cyrils Drive - Existing	60
Cyrils Drive - Planned	119

3.2.3 Typical Sections

Table 3-3 lists the primary roadways within the Study Area and their typical section descriptions. For proposed roadways, these descriptions were taken from documents published on the respective counties' websites.

Table 3-3. Roadway Typical Sections

Roadway Name	Typical Section (number of lanes)	Urban (Curb and Gutter) or Rural (Swales)
Simpson Road (between existing Osceola Parkway and Boggy Creek Road)	2 4 with Turn Lanes	Rural (Urban at Boggy Creek Road and existing Osceola Parkway)
Boggy Creek Road (Osceola County)	2	Rural with intermittent turn lanes
Boggy Creek Road (Orange County) – Existing	2	Rural without turn lanes
Boggy Creek Road (Orange County) – Proposed	4	Urban with turn lanes, bike lanes and sidewalks
SR 417	4	Rural freeway with interchanges at approximately 2 miles
Lake Nona Boulevard	6	Urban with turn lanes, bike lanes and sidewalks
Laureate Boulevard	2 and 4	Urban with turn lanes, bike lanes and sidewalks

Table 3-3. Roadway Typical Sections

Roadway Name	Typical Section (number of lanes)	Urban (Curb and Gutter) or Rural (Swales)
Narcoossee Road	6	Urban with turn lanes, bike lanes and sidewalks
Cyrils Drive – Existing	2	Rural
Cyrils Drive – Planned	4	Urban with turn lanes, bike lanes and sidewalks
Sunbridge Parkway	4	Rural with multi-use path

3.2.4 Pavement Conditions

Table 3-4 lists the primary roadways within the Study Area and their existing pavement conditions as observed during field reviews.

Table 3-4. Existing Roadway Pavement Conditions

Roadway Name	Pavement Type	General Condition
Simpson Road (between existing Osceola Parkway and Boggy Creek Road)	Asphalt	Fair/Good approaching Boggy Creek Road and existing Osceola Parkway
Boggy Creek Road (Osceola County)	Asphalt	Fair with rutting in places
Boggy Creek Road (Orange County) - Existing	Asphalt	Poor with major rutting
Boggy Creek Road (Orange County) - Proposed	Asphalt	New
SR 417	Asphalt	Good
Lake Nona Boulevard	Asphalt	Good
Laureate Boulevard	Asphalt	Good
Narcoossee Road	Asphalt	Newer with little wear
Cyrils Drive - Existing	Asphalt	Fair with some rutting
Cyrils Drive - Planned	Asphalt	New
Sunbridge Parkway	Asphalt	New

3.2.5 Horizontal Alignment

Table 3-5 lists the primary roadways within the Study Area and their general horizontal alignment characteristics.

Table 3-5. Roadway Horizontal Alignments

Roadway Name	Alignment Straight or Curved	Description
Simpson Road (between existing Osceola Parkway and Boggy Creek Road)	Curved	One large curve designed for higher speed and two slight curves
Boggy Creek Road (Osceola County)	Curved	Multiple curves designed for higher speeds
Boggy Creek Road (Orange County) - Existing	Straight	Little or no curvature

Table 3-5. Roadway Horizontal Alignments

Roadway Name	Alignment Straight or Curved	Description
Boggy Creek Road (Orange County) - Proposed	Straight	Little or no curvature
SR 417	Curved	Generally curved toward the northeast and designed for highway speeds
Lake Nona Boulevard	Curved	Multiple curves designed for slower speeds
Laureate Boulevard	Curved	Multiple curves designed for slower speeds
Narcoossee Road	Mostly Straight	Multiple curves separated by long tangents and designed for higher speeds and visibility
Cyrils Drive - Existing	Straight	One pair of reverse curves, otherwise straight
Cyrils Drive - Planned	Straight	One pair of reverse curves, otherwise straight

3.2.6 Vertical Alignment

Except for SR 417, none of the primary roadways within the Study Area has significant vertical alignment variability. SR 417 is generally flat except where it overpasses local roadways, such as Boggy Creek Road, Narcoossee Road, and Moss Park Road. Vertical profiles are generally in the 1 to 3 percent range along SR 417. The rural-section roadways such as Boggy Creek Road have little to no vertical variations as should be expected with older rural swale sections. Urban curb-and-gutter roadways, such as Narcoossee Road, Lake Nona Boulevard, and Laureate Boulevard, have sufficient vertical profiles for effective drainage (0.5 percent typical, 0.3 percent minimum) but not significantly more.

3.2.7 Interchanges, Intersections, and Signalization

Table 3-6 lists the primary roadways within the Study Area and interchange locations, the overall number of intersections, and signalized intersections. Only locations in the Study Area are listed.

Table 3-6. Interchanges, Intersections, and Signalized Intersections

Roadway Name	Interchanges	Total No. of Intersections	Signalized Intersections
Simpson Road (between existing Osceola Parkway and Boggy Creek Road)	None	6	Osceola Parkway Boggy Creek Road
Boggy Creek Road (Osceola County)	None	31	Simpson Road Turnberry Blvd. Narcoossee Road
Boggy Creek Road (Orange County) - Existing	SR 417	6	Simpson Road SR 417 NB Ramps
Boggy Creek Road (Orange County) - Planned	SR 417	6	Simpson Road SR 417 NB Ramps

Table 3-6. Interchanges, Intersections, and Signalized Intersections

Roadway Name	Interchanges	Total No. of Intersections	Signalized Intersections
SR 417	Boggy Creek Road/Jeff Fuqua Blvd. Lake Nona Blvd. Narcoossee Road	N/A	N/A
Lake Nona Boulevard	SR 417	8	Boggy Creek Road Veterans Way Tavistock Lakes Blvd. Nemours Parkway SR 417 NB Ramps
Laureate Boulevard	None	18	Veterans Way Narcoossee Road
Narcoossee Road (between SR 417 and Cyrils Drive)	SR 417	23	SR 417 NB Ramps Kirby Smith Road Tyson Road/Lake Nona High School Emerson Lake Blvd./Tavistock Lakes Blvd. Lake Nona Middle School Tindall Road/Laureate Boulevard Boggy Creek Road
Cyrils Drive - Existing	None	4	Narcoossee Road
Cyrils Drive - Planned	None	5	Narcoossee Road

3.2.8 Lighting

Table 3-7 lists the primary roadways in the Study Area and the type of lighting.

Table 3-7. Roadway Lighting

Roadway Name	Lighted (Y/N)	Type of Lighting
Simpson Road (between existing Osceola Parkway and Boggy Creek Road)	N	N/A (cobra heads near existing Osceola Parkway only)
Boggy Creek Road (Osceola County)	N	N/A
Boggy Creek Road (Orange County) - Existing	N	N/A
Boggy Creek Road (Orange County) - Proposed	Y	Proposed
State Road 417	Y	Cobra heads on mainline and at interchanges
Lake Nona Boulevard	Y	Standard cobra head
Laureate Boulevard	Y	Standard cobra head
Narcoossee Road	N	N/A

Table 3-7. Roadway Lighting

Roadway Name	Lighted (Y/N)	Type of Lighting
Cyrils Drive - Existing	N	N/A
Cyrils Drive - Planned	N/A	

Note:
N/A = not applicable

3.3 Geotechnical Data

For this feasibility study, no new geotechnical field data, such as soil borings or pavement corings, were obtained. All analyses were based on Florida Land Use and Cover Classification System (FLUCCS) Maps, National Wetlands Inventory (NWI) data, and floodplain mapping from the Federal Emergency Management Agency (FEMA) using readily available geographic information system (GIS) data sources. Should the study move forward to the PD&E phase, field data will be collected along the viable corridors to verify the GIS data used to date.

3.4 Water Resources

3.4.1 Surface Waters

The project is located within the Kissimmee River Watershed within the jurisdiction of the South Florida Water Management District (SFWMD), and more specifically within the Lake Tohopekaliga basin. There is a linear conservation area near the Study Area that includes Eagles Roost, Split Oak Forest Wildlife and Environmental Area (SOFWEA), Moss Park, Crosby Island Marsh Preserve, and the Isle of Pine Preserve. Because of the proximity of the Study Area to surrounding lakes and conservation areas, the lands in and around the Study Area include numerous wetlands and floodplains, as well as natural creeks and tributaries. The major hydrologic features within the Study Area are discussed below. Attachment C-1 presents the Flood Hazard Map.

3.4.1.1 Boggy Creek

Boggy Creek is a FEMA-designated regulatory floodway that is 19 miles long and in the Boggy Creek Watershed. Its headwaters are multiple sources that include Lake Mare Prairie and Mud Lake. It flows southward and eastward to East Lake Tohopekaliga (East Lake Toho). Boggy Creek occurs along the west end of the Study Area and is considered as “Non-Navigable Waters of the United States” for purposes of the U.S. Coast Guard (USCG) Bridge Permitting jurisdiction. However, it is used by kayakers, canoers, etc. Any proposed structures would be required to maintain the current navigability standards.

3.4.1.2 Jim Branch

Jim Branch is a 4-mile-long tributary located within the East Lake Toho and Jim Branch Watersheds. Its source is a swamp south of SR 417 and east of Boggy Creek Road in Orange County. It flows southeast to Fells Cove, which is connected to Lake Ajay and Lake Hart. Jim Branch is navigable by canoes and kayaks. Jim Branch is also considered as “Non-Navigable Waters of the United States” for purposes of USCG Bridge Permitting jurisdiction. Any proposed structures would be required to maintain the current navigability standards.

3.4.1.3 SFWMD Canals

There are multiple SFWMD canals in and near the Study Area including Canals C-29, C-29A, C-29B, and C-30. These are channelized canals east of Narcoossee Road that are part of the existing SFWMD flood

control and stormwater management system. These canals were originally dug in the latter part of the 19th century and early part of the 20th century to connect lakes and aquatic systems to increase the amount of usable farmland. Canals C-29, C-29A, C-29B, and C-30 are included in the Lakes Hart-Mary Jane reservation waterbody and are regulated by SFWMD under Section 3.3 of the *Applicant's Handbook for Water Use Permit Applications within the South Florida Water Management District* (SFWMD, 2015a). Reservation waterbodies include surface waters and contiguous wetland habitats where identified fish and wildlife reside, feed, nest, den, or forage, etc. The criteria in Section 3.3 of the *Applicant's Handbook* protect wetlands and other surface water resources using a "no harm" threshold. The U.S. Army Corps of Engineers (USACE) Jacksonville District exercises regulatory jurisdiction under the authority of both Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (CWA) on both the Lakes Mary Jane-Hart Canal and the Lakes Myrtle-Mary Jane Canal. Full access through existing maintenance easements will need to be preserved with any overpasses.

3.4.2 Existing Drainage

The Study Area consists of residential, open land, and conservation land with a flat topography where elevations range from 71 feet to 80 feet (North American Vertical Datum 88 [NAVD 88]). The soils in the Study Area consist mainly of Hydrologic Soil Group (HSG) A/D because of a high water table. Section 3.5.2 discusses soil conditions further.

The existing basins in the Study Area are open, discharging to creeks, canals, wetlands, and ultimately to the adjacent receiving water bodies. Receiving water bodies in the western portion of the Study Area (west of Narcoossee Road), are Boggy Creek and Jim Branch, which ultimately outfall to East Lake Toho. The eastern portion of the Study Area receiving water bodies are Lake Ajay and Lake Myrtle. Lake Ajay flows into Fells Cove, which outfalls to East Lake Toho. Further east, Lake Myrtle outfalls to Alligator Lake.

Within the eastern portion of the Study Area are the SFWMD C-29A, C-29B, and C-30 Canals. Canal C-29A connects Lake Hart (upstream) to Lake Ajay, Fells Cove, and ultimately East Lake Toho. Further east, the Study Area traverses a series of interconnected wetlands that ultimately outfall to Lake Myrtle. Stormwater discharge will be conveyed in this segment through Canal C-30 downstream to Lake Myrtle. Further coordination with SFWMD will be necessary for desired discharge rates for the canals, and canal ROW requirements.

Though East Lake Toho and Alligator Lake are not classified as Outstanding Florida Waters (OFW), the Kissimmee River Watershed is a part of the greater Lake Okeechobee Basin and therefore is classified as an impaired waterbody subject to additional treatment requirements per SFWMD *Environmental Resource Permit Information Manual* Volume II (SFWMD, 2014).

3.4.3 Floodplains

The Study Area is located within the following Water Body Identification Numbers (WBID): WBID 3172A (Jim Branch), WBID 3172C (East Lake Toho), WBID 3171E (Hart Branch), WBID 3168B (Boggy Creek) and WBID 3147F (Lake Center Outlet). These WBIDs are not listed as being impaired but there is a Nutrient Reduction Plan for East Lake Toho (CDM, 2011).

The project limits are within FEMA's Flood Insurance Rate Map (FIRM) Panel Numbers: 12095C0650F, 12095C0675F, 12097C0085G, 12097C0105G, and 12097C0110G. The anticipated major floodplain impacts are floodplains associated with Boggy Creek, Jim Branch, Lake Myrtle, and Lake Preston. In areas where FEMA mapping or a Letter of Map Revision are unavailable, an overlay of the U.S. Geological Survey (USGS) quadrangle maps was used for determination of elevations for Flood Zone A.

The 100-year floodplain is identified by FEMA as being either of two floodplain zones types, defined as follows:

- Zone AE – Base flood elevation (BFE) determined (quantified).
- Zone A – No BFE determined (approximated).

A review of FEMA's FIRM maps for the project indicates that portions of the project lie in the 100-year floodplain, within flood zones AE (elevations range from 63 to 80 NAVD), and A. In the eastern section of the Study Area, roadside swales along Boggy Creek Road discharge into unnamed creeks or ditches that drain into Boggy Creek. As noted earlier, Boggy Creek is a FEMA Regulatory Floodway, which means that the waterbody and the adjacent land areas must be reserved to discharge the base flood (100-year floodplain) without cumulatively increasing the water surface elevation more than the designated height.

The PD&E phase of this project should include an evaluation of floodplain impacts and should consider alternatives to avoid adverse effects and incompatible development in the floodplains.

3.4.4 Groundwater

Groundwater from the Floridan aquifer system is the main source of water supply in central Florida. Groundwater from the surficial and Floridan aquifer systems discharges to surface-water bodies, such as lakes, springs, and streams, which provide aquatic habitat and recreation. The hydrogeology of the Study Area consists of three major hydrogeologic units: the surficial aquifer system, the intermediate confining unit, and the Floridan aquifer system. Groundwater depths vary from 0 to 1 feet to greater than 6 feet. The seasonal high water table is estimated to be 1 foot below the existing ground (SFWMD, 2015b).

3.5 Natural Environment

A desktop review of the natural environment resources within the Study Area was performed using GIS and literature reviews, where appropriate. Various GIS databases including those within the Florida Geographical Data Library (FGDL), SFWMD, Florida Fish and Wildlife Conservation Commission (FWC), and city/county data sources were used. Attachment C-2 lists GIS data layers used in the assessment of the Study Area. Attachment C-3 illustrates the results of the desktop review of the natural environment resources in the Study Area. Data collection methods and efforts included published and online data. In general, the available data from prior studies for the OPE and available GIS data reflect differences between these data sets resulting from:

- A larger/greater Study Area as compared with the OCX (2017a) PD&E Study
- Development throughout the area identified by photo-interpretation of current aerials
- Differences in the land use designations between data sources, such as the Florida Natural Areas Inventory (FNAI)-Cooperative Land Cover (CLC), used for the desktop analysis, and the SFWMD, used during the PD&E Study

3.5.1 Wetlands and Hydric Soils

Wetlands in the Study Area were determined through GIS analysis using the NWI database. Because the NWI data are limited, it was supplemented through review of Study Area soils data, aerial photograph interpretation (which indicates an expansion of surface waters resulting from new development and infrastructure changes), existing permitted wetlands in the Study Area, and inclusion of changes to the FLUCCS maps from previous Study Area mitigation. The wetlands presented on Attachment C-4 represent the desktop analysis wetland data (supplemented NWI data).

Soils within the Study Area have been mapped by the U.S. Department of Agriculture Natural Resource Conservation Service (NRCS, 2018a). Hydric soils are defined by the National Technical Committee for Hydric Soils as "*soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions"* near the ground surface (NRCS, 2018b). These soils typically support vegetation that has an affinity for water and are thus a positive indicator of wetlands. Hydric soils develop specific conditions and characteristics that can be identified in the field; these are used to determine the degree of hydric properties of a soil. The NRCS custom soils report prepared for the Study Area is provided in Attachment C-4. The soil surveys of Orange and Osceola Counties, Florida, published by the NRCS (2018a) have been reviewed for the project vicinity and are presented in Table 3-8 and Attachment C-5. The most common soil types in the Study Area are Smyrna-Smyrna Wet, Fine Sand (18.5 percent), Basinger Fine Sand, Depressional/Frequently Ponded (8.1 percent), Samsula Muck, Frequently Ponded (7.6 percent), Pomello Fine Sand (6.1 percent), and Smyrna Fine Sand (6.1 percent). Most of these soils have drainage characteristics that range from somewhat poorly drained to very poorly drained. The HSG for most of the soils in the Study Area is A/D, which means that the Soil Type A (soils with high infiltration rates even when thoroughly wetted) can be adequately drained (when drainage is feasible and practical) but are considered poorly drained under saturated natural conditions because of high water table.

Table 3-8. Soils in the OPE Study Area

Map Unit Symbol	Soil Name/Map Unit Name	Hydrologic Soil Group	Drainage Characteristics	Acres of Soil Type within Area of Interest	Percent of Area of Interest
Orange County					
1	Arents, nearly level	A	Somewhat Poorly Drained	46	0.1
2	Archbold fine sand, 0 to 5 percent slopes	A	Moderately Well Drained	63	0.2
3	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	A/D	Very Poorly Drained	1,175	3.5
19	Hontoon muck, frequently ponded, 0 to 1 percent slopes	A/D	Very Poorly Drained	534	1.6
20	Immokalee fine sand	B/D	Poorly Drained	502	1.5
26	Ona fine sand, 0 to 2 percent slopes	B/D	Poorly Drained	290	0.9
34	Pomello fine sand, 0 to 5 percent slopes	A	Moderately Well Drained	1,281	3.8
37	St. Johns fine sand	B/D	Poorly Drained	1,411	4.2
40	Samsula muck, frequently ponded, 0 to 1 percent slopes	A/D	Very Poorly Drained	1,406	4.2
41	Samsula-Hontoon-Basinger association, depressional	A/D	Very Poorly Drained	363	1.1
42	Sanibel muck	A/D	Very Poorly Drained	1,028	3.0
44	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	A/D	Very Poorly Drained	6,259	18.5
46	Tavares fine sand, 0 to 5 percent slopes	A	Moderately Well Drained	56	0.2

Table 3-8. Soils in the OPE Study Area

Map Unit Symbol	Soil Name/Map Unit Name	Hydrologic Soil Group	Drainage Characteristics	Acres of Soil Type within Area of Interest	Percent of Area of Interest
54	Zolfo fine sand, 0 to 2 percent slopes	A	Somewhat Poorly Drained	158	0.5
Osceola County					
1	Adamsville sand, 0 to 2 percent slopes	A	Somewhat Poorly Drained	487	1.4
2	Adamsville variant fine sand, 0 to 5 percent slopes	A	Somewhat Poorly Drained	135	0.4
4	Arents, 0 to 5 percent slopes	A	Somewhat Poorly Drained	43	0.1
5	Basinger fine sand, 0 to 2 percent slopes	A/D	Poorly Drained	1,381	4.1
6	Basinger fine sand, depressional, 0 to 1 percent slopes	A/D	Very Poorly Drained	1,544	4.6
9	Cassia fine sand, 0 to 2 percent slopes	A/D	Somewhat Poorly Drained	30	0.1
15	Hontoon muck, frequently ponded, 0 to 1 percent slopes	A/D	Very Poorly Drained	665	2.0
16	Immokalee fine sand, 0 to 2 percent slopes	B/D	Poorly Drained	1,425	4.2
22	Myakka fine sand, 0 to 2 percent slopes	A/D	Poorly Drained	1,517	4.5
24	Narcoossee fine sand, 0 to 2 percent slopes	A	Moderately Well Drained	422	1.2
27	Ona fine sand, 0 to 2 percent slopes	B/D	Poorly Drained	107	0.3
32	Placid fine sand, frequently ponded, 0 to 1 percent slopes	A/D	Very Poorly Drained	1,225	3.6
33	Placid variant fine sand	A/D	Somewhat Poorly Drained	164	0.5
34	Pomello fine sand, 0 to 5 percent slopes	A	Moderately Well Drained	766	2.3
36	Pompano fine sand, 0 to 2 percent slopes	A/D	Poorly Drained	172	0.5
37	Pompano fine sand, frequently ponded, 0 to 1 percent slopes	A/D	Very Poorly Drained	39	0.1
39	Riviera fine sand, frequently ponded, 0 to 1 percent slopes	A/D	Very Poorly Drained	62	0.2
40	Samsula muck, frequently ponded, 0 to 1 percent slopes	A/D	Very Poorly Drained	1,140	3.4
42	Smyrna fine sand, 0 to 2 percent slopes	A/D	Poorly Drained	2,076	6.1
43	St. Lucie fine sand, 0 to 5 percent slopes	A	Excessively Drained	343	1.0
44	Tavares fine sand, 0 to 5 percent slopes	A	Moderately Well Drained	434	1.3

3.5.2 Soil Classifications

The Unified Soil Classification System classifies mineral and organic mineral soils for engineering purposes based on particle-size characteristics, liquid limit, and plasticity index. It identifies three major soil divisions: coarse-grained soils, fine-grained soils, and highly organic soils. These divisions are further subdivided into 15 basic soil groups (see Attachment C-6). Most of the soils in the Study Area are classified as SP-SM (SP: poorly graded sands, gravelly sands, little or no fines; SM: silty sands, sand-silt mixtures).

3.5.3 Farmlands

To identify the extent and location of important farmlands, the NRCS coordinated with other interested federal, state, and local government organizations to inventory land that can be used to produce the nation's food supply. Farmland classification identifies map units as prime farmland, unique farmland, or statewide important farmland. Prime farmland is of major importance in meeting the nation's short- and long-range needs for food and fiber. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses.

Unique farmland is land other than prime farmland that is used to produce specific, high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. Land that does not meet the criteria for prime or unique farmland is statewide important farmland.

Attachment C-7 presents the farmlands within the Study Area. Most farmlands are located in the Osceola County portion of the Study Area and are rated as unique farmlands.

3.5.4 Threatened and Endangered and Listed Species

Wildlife traditionally refers to undomesticated animal species, but has come to include all plants, fungi, and other organisms that were not introduced by humans and that grow or live wild in an area. Wildlife species are protected by the federal Endangered Species Act of 1973, under enforcement responsibility of the U.S. Fish and Wildlife Service (USFWS). Protected species are listed and designated as Federally-designated Endangered and State-listed (FE), Federally-designated Threatened and State-listed (FT), Federally-designated Threatened species due to similarity of appearance (FT (S/A)), State-designated Threatened (ST), or State Species of Special Concern (SSC).

USFWS provides a planning resource tool called the Information for Planning and Consultation (IPAC) that allows a user to determine if listed species, critical habitat, migratory birds, other natural resources may be impacted by a proposed project. A custom IPAC report for the Study Area was prepared and is provided in Attachment C-8. Table 3-9 lists threatened and endangered species that have a high likelihood of occurrence in the Study Area. The imperiled wildlife species occurring on or near SOFWEA are listed in the SOFWEA Management Plan and while the list is smaller, the species correspond with the IPAC report for the Study Area. Note that the project is within the USFWS Consultation Area of the Audubon's crested caracara, Everglade snail kite, and red-cockaded woodpecker. The project is also located within the USFWS Consultation Area for the Lake Wales Ridge Plants.

FWC-Fish and Wildlife Research Institute maintains a wildlife occurrence system database (WILDOBS) that presents the noted location of species observed in Florida from 1988 to 2015. This database is a repository for data from planned surveys, contracted projects, and casual observations. Additionally, wildlife observations are documented in the OCX (2017a) PD&E Study from field surveys performed between 2012 and 2015, as well as species-specific surveys for Florida scrub-jay conducted in SOFWEA during October 2014 and in Deseret Ranches in October 2015. Attachment C-3 presents the locations of listed species observed during previous study field surveys.

Table 3-9. Federally Listed and State Listed Species with a High Likelihood of Occurrence in the Study Area

Scientific Name	Common Name	Status
Reptiles		
Eumeces egregius lividus	bluetail mole skink	FT
Alligator mississippiensis	American alligator	FT (S/A), ST
Drymarchon corais couperi	Eastern indigo snake	FT
Pituophis melanoleucus mugitus	Florida pine snake	ST
Gopherus Polyphemus	gopher tortoise	FT
Neoseps reynoldsi	sand skink	FT
Lampropeltis extenuate	short-tailed snake	ST
Birds		
Polyborus plancus audubonii	Audubon's crested caracara	FT
Rostrhamus sociabilis plumbeus	Everglade snail kite	FE
Athene cunicularia floridana	Florida burrowing owl	ST
Aphelocoma coerulescens	Florida scrub-jay	FT
Antigone canadensis pratensis	Florida sandhill crane	ST
Egretta caerulea	little blue heron	ST
Picoides borealis	red-cockaded woodpecker	FE
Platalea ajaja	roseate spoonbill	ST
Falco sparverius Paulus	southeastern American kestrel	ST
Egretta tricolor	tri-colored heron	ST
Mycteria Americana	wood stork	FT
Mammals		
Puma (=Felis) concolor coryi	Florida panther	FE
Sciurus niger shermani	Sherman's fox squirrel	SSC

Notes:
FE = Federally-designated Endangered and State-listed
FT = Federally-designated Threatened and State-listed
FT(S/A) = Federally-designated Threatened species due to similarity of appearance
ST = State-designated Threatened
SSC = State Species of Special Concern

3.5.5 Priority Habitat

FWC has identified six high-priority habitat categories that are declining in Florida, and are the focus of habitat protection and conservation efforts. These categories are sandhill, xeric scrub, softwater stream,

spring and spring run, coral reef, and seagrass. The FGDL database was reviewed to identify the presence of priority habitat areas within the project vicinity.

Three types of priority habitats were identified within the Study Area softwater streams, sandhill, and xeric scrub. Softwater streams originate from sandy flats with broad wetlands that collect rainfall and slowly release water into the stream. The water is characterized by low pH and low carbonate. Sandhill (Sandhill Ecological Complex) communities occur in north and central Florida in areas of gently rolling terrain on deep, well-drained soils. Xeric scrub habitat occurs on areas of deep, well-drained sandy soils, and typically provides habitat for several rare and listed species. Attachment C-3 presents the locations of priority habitat in the Study Area.

3.5.6 Essential Fish Habitat

Based on a review of the National Oceanic and Atmospheric Administration National Marine Fisheries Service database, there is no Essential Fish Habitat (EFH) in the Study Area. This project will not require an EFH assessment.

3.5.7 Conservation Areas

Multiple public conservation lands exist in the Study Area. These lands are part of a large conservation corridor in southeastern Orange County. The public conservation lands in the Study Area are presented in Attachment C-9. Parks and reserves in the study are listed in Table 3-10. The public conservation lands in proximity to the Study Area are SOFWEA, Moss Park, Eagles Roost, and Isle of Pine Preserve.

Table 3-10. Summary of Parks/Reserves

Name	Location	Public/Private Facility	Unique Characteristics
Eagles Roost	10525 Clapp Simms Duda Road, Orlando, FL 32832	Public – Orange County	232 acres; horseback riding, hiking, wildlife viewing
Split Oak Forest Wildlife and Environmental Area	Clapp Simms Duda Road, Orlando, FL 32832	Public – Orange and Osceola Counties	1,689 acres; hiking, fishing, horseback riding, wildlife viewing
Moss Park	Moss Park Road, Orlando, FL 32832	Public – Orange County	1,551 acres; boating, swimming, hiking, and biking; 54 RV/tent sites, five group camping sites; trails connect with SOFWEA
Isle of Pine Preserve	14032 Lacebark Pine Road, Orlando, FL 32832	Public – Orange County	464 acres; hiking, horseback riding, wildlife viewing, picnicking
Crosby Island Marsh Preserve	13601 Moss Park Road Orlando, FL 32832	Public – Orange County	243 acres; conservation of wetlands and uplands
Austin-Tindall Regional Park	4100 Boggy Creek Road Kissimmee, FL 34744	Public – Osceola County	115 acres; 8 recreational fields, 5,600 sq. ft. clubhouse

3.5.7.1 Eagles Roost

Eagles Roost is a 232-acre site located off Clapp Simms Duda Road to the west of SOFWEA. The parcel can be accessed at the end of Clapp Simms Duda Road. Eagles Roost is mainly composed of improved and unimproved pasture, with smaller communities of basin swamp and flatwoods lake. The property was acquired in May 2006 from Lake Hart Properties, LLC, by Orange County through its Green PLACE

program. The property is part of a large ecological corridor in the southeastern portion of Orange County. A trail in the park leads to an observation pier at Lake Hart, allowing the public to observe bird species. Other onsite recreational activities include horseback riding and hiking.

The *Eagles Roost Land Management Plan* (Orange County, 2014) provides the following land management goals:

- Maintain and restore, where appropriate, the natural hydrological regime and quality of surface waters
- Maintain and restore native natural communities (including control of exotic species)
- Enhance species diversity
- Maintain and protect listed species
- Protect archaeological and cultural resources
- Provide opportunities for public recreation where compatible with the goals listed above

3.5.7.2 Split Oak Forest Wildlife and Environmental Area

SOFWEA encompasses 1,689 acres and is managed by the FWC. Onsite recreational opportunities include horseback riding, fishing, hiking, bird watching, plant identification, and general nature study.

In 1991, Osceola and Orange Counties approved a partnership application with the FWC. Using Florida Communities Trust (FCT)-awarded grant funds, the two counties jointly acquired the parcel. Subsequently, the FCT approved the SOFWEA Partnership Application and Agreement in 1992 and in 1994, Orange and Osceola Counties approved an interagency agreement among the Counties and FWC. This agreement established FWC as the managing agency of SOFWEA, with the purpose of establishing the area as a Mitigation Park to protect vital habitat for the gopher tortoise. The interagency agreement stated that property owners and developers could apply for upland or wetland mitigation permits and credits to use as mitigation to offset development impacts on imperiled wildlife species and wetlands, respectively. The Orange County portion of SOFWEA served as a Wetland Mitigation Bank, where Orange County sold mitigation credits to private and public entities to offset wetland impacts. The Osceola County portion of SOFWEA was also used to offset wetland impacts. However, mitigation was granted through regulatory easements.

In 1995, the FCT approved a conservation easement vested in the FWC. FWC reimbursed both Counties for a part of the cost of acquiring the area with funds from the FWC Mitigation Park Program. In return, both Orange and Osceola Counties granted the FWC a perpetual conservation easement on the area and the Mitigation Park was discontinued. The 14 mitigation tracts acquired through the program continue to be actively managed by FWC for their original purposes of acquisition and conservation. A management plan for SOFWEA was approved by FWC in November 2016 (FWC, 2016).

3.5.7.3 Moss Park

Moss Park encompasses 1,551 acres between Lake Mary Jane and Lake Hart in Orange County and is part of the conservation corridor in southeast Orange County. It offers camping (RV/tent), boating, swimming, hiking, wildlife observation, biking and other outdoor activities. The park is managed by Orange County Parks and Recreation Department.

In 1927, Marcellus J. Moss purchased 51 acres of land and created Moss Park. The land was donated to Orange County by the Moss Family. In 1965, the water management district dredged a canal (Disston Canal), thus making Moss Park an island. The creation of the canal made it possible to access the lake from both sides of the island, creating the opportunity for increased boat usage on the lake. In 1974, Orange County purchased 1,500 acres of land adjacent to Moss Park, which made Moss Park the largest

park in Orange County. Soon after, ball fields, tennis courts, and half of the eastern boat ramp were added to the park. Today, the park has two boat ramps, two playgrounds, pavilions, swimming facilities, ball fields, camp sites, hiking trails, picnic areas with grills, recreation programs, recreational vehicle campsites, and volleyball courts.

Moss Park contains freshwater marshes, swamps, bogs, cypress domes, bayheads, oak hammocks, pine flatwoods, and pine forest areas. In 1976, Moss Park was designated as wildlife sanctuary. Moss Park is adjacent to SOFWEA, which is accessible from Moss Park through the Swamp Trail at the southern end of the park.

3.5.7.4 Isle of Pine Preserve

The Isle of Pine Preserve is a 535-acre site off Lake Mary Jane Road to the east of Moss Park. The property was acquired in April 2007 from Hampton Bay of Orlando, LLC, by Orange County through its Green PLACE program. The property is part of the conservation corridor.

Orange County notes that most of the preserve is in a natural condition but that some areas were altered from historic uses such as hunting and unauthorized all-terrain vehicle use prior to being acquired by the County. A drainage easement was granted by the previous landowner to Orange County. It allows drainage from the nearby Isle of Pines subdivision to flow from the subdivision south through the center of the property and out to Lake Mary Jane.

The last publicly documented management plan for the property is the *Hampton Bay Management Plan* (Orange County, 2008). The stated land management goals detailed in the plan are as follows:

- Maintain and restore, where appropriate, the natural hydrological regime and quality of surface waters
- Maintain and restore native natural communities (including control of exotic species)
- Enhance species diversity
- Maintain and protect listed species
- Protect archaeological and cultural resources
- Provide opportunities for public recreation where compatible with the goals listed above

3.5.8 Mitigation Banks

Mitigation within the western portion of the Study Area includes conservation easements in properties within GOAA, Poitras, and Greeneway Park DRI. No mitigation banks exist in the western portion of the study area.

The only mitigation banks in the eastern portion of the Study Area are the previous mitigation tracts acquired through the FWC Mitigation Park Program in the Orange County portion of SOFWEA, which continue to be actively managed by FWC for their original purpose of conservation.

3.5.9 Prescribed Burn Areas

The FWC employs a fire management regime to increase both species and habitat diversity within SOFWEA. The burning program uses different burning frequencies, intensities, and seasonality (dormant season vs. growing season) of prescribed burns to create habitat diversity and a variety of vegetation patterns. While prescribed burning is used to manage 95 percent of the conservation area, some areas contain mid-story brush buildup that lacks pyrogenic groundcover fuels. Therefore, mechanical control of brush is performed in these areas by roller chopping, logging, shredding, or incidentally by equipment

during commercial thinning operations. The mechanical control of the brush can reduce shading and encourage grasses and vegetation that are necessary to sustain prescribed fire.

3.6 Human Environment

A desktop review of the human environment resources within the Study Area was performed using GIS and literature reviews where appropriate. Various GIS databases including those within the FGDL and city/county data sources were used. The GIS data layers for the human environment for the Study Area are provided in Attachment C-2.

Existing human environment conditions vary across the Study Area. West of Narcoossee Road is primarily developed residential land with substantial conservation areas. Much of this area is planned for mixed-use development. The east side of the Study Area (east of Narcoossee Road) is much less developed, with a mix of residential and agricultural uses and substantial tracts of conservation land. The NED large planned development by Deseret Ranches is located at the southeastern edge of the Study Area. To the north of NED (in Orange County) is the Sunbridge development by Tavistock.

3.6.1 Existing Land Use

The existing land use within the Study Area, shown in Attachment C-10, is primarily agricultural, public/semi-public, residential, and recreational. The northern half of the Study Area is within the City of Orlando and unincorporated Orange County while the southern half is in unincorporated Osceola County. The following sections describe the land use characteristics within the Study Area by jurisdiction.

3.6.1.1 City of Orlando

The City of Orlando jurisdiction is within the Study Area between Narcoossee Road and Boggy Creek Road. The existing land use within the City of Orlando is primarily public/semi-public and agricultural lands. The Greater Orlando Aviation Authority (GOAA) is the governmental entity that operates the OIA, located just north of the Study Area. The southern tip of the GOAA property is within the Study Area and accounts for most of the public/semi-public lands. Land use to the east and west of the City of Orlando jurisdiction is primarily residential.

3.6.1.2 Orange County

The Study Area located within Orange County is mostly agricultural, public/semi-public lands, and residential. The southeastern portion of the Study Area is outside the Urban Service Area (as shown in Attachment C-10). However, it is in the Innovation Way Overlay Area and the Econlockhatchee (Econ) River Protection Area, which are reflected in Orange County's (2017) *Comprehensive Plan 2010 - 2030* as part of a growth management strategy that seeks to balance a diverse local economy and protect sensitive resources. Recreational land within the Study Area includes SOFWEA. This conservation area seeks to restore natural wildlife habitat for a wide range of imperiled wildlife species, with a primary focus on the conservation of gopher tortoise habitat. Hiking trails are provided in SOFWEA for recreational uses.

3.6.1.3 Osceola County

The existing land use within the Study Area in Osceola County is primarily residential and agricultural. The Study Area is within the County's Urban Growth Boundary. East Lake Toho consumes a large portion of the western side of the Study Area; this area is surrounded by mostly public/semi-public lands.

3.6.2 Future Land Use

Future land use within the Study Area was collected using future land use GIS files provided by Orange County, Osceola County, and the City of Orlando and is presented as Attachment C-11. The following sections describe the future land use characteristics within the Study Area by jurisdiction.

3.6.2.1 City of Orlando

Future land use within the City of Orlando portion of the Study Area is anticipated to be mostly urban village and conservation. It will also include a metropolitan activity center, a neighborhood activity center, and an airport support district-high intensity area. Relevant portions of the City of Orlando Future Land Use Map are included in Attachment C-12.

3.6.2.2 Orange County

Orange County future land use is defined in Orange County's *Comprehensive Plan 2010 - 2030* Future Land Use Map, which is presented in Attachment C-12.

Future land use in Orange County, just east and west of the City of Orlando, is anticipated to be mostly planned development. The most eastern edge of the Study Area is anticipated to be rural and low-density residential, with conservation/preservation. This area includes the Innovation Way Overlay and the Econ River Protection Area. The Innovation Way Overlay is a conceptual transect-based overlay designation where the County envisions a transit-ready, multimodal, mixed-use development including the protection and resource management of environmentally sensitive areas.

The Econ River Protection Area was formed by Orange County under the Econlockhatchee River Protection Ordinance Article XII, Chapter 15, Orange County Code, to protect and preserve the surface water quality and quantity, wildlife populations and habitat, aesthetics, open space, historical and archaeological resources, floodplains, wetland areas, native upland areas, and recreation lands of the Econ River Basin. The protection area is a 2,200-foot total width protection zone in Orange County only, and provides for upland buffers and specific restrictions that require:

- Habitat and historical/archaeological resource assessments and protection
- Mitigation, density, or open space credits for upland buffers
- Landscaping to include the use of native plant species
- Wetland areas incorporated into system designs (where feasible) to further enhance stormwater treatment while also providing wildlife habitat values
- State or federal listed species protection
- Clustering of development
- Restrictions of floodplain encroachment
- Limiting forested habitat fragmentation

3.6.2.3 Osceola County

The future land use is included in Osceola County's (2010) *Comprehensive Plan 2025* Future Land Use Map and is presented in Attachment C-12.

The future land use is anticipated to be mostly residential around East Lake Toho with mixed-use to the east. To the east of East Lake Toho is the Narcoossee Community Planning Area that began in 2009 as a community planning effort to gain control of growth pressures to the north and east. The planning effort explored changes in land use designation on specific properties and identified the public facilities and services that are fundamental to supporting a greater mix and level of development than shown on

Osceola's County's Future Land Use Map. In March 2012, Osceola County adopted the Narcoossee Community Development Intent and Standards, which were a direct result of the community outreach process.

To the east of the Narcoossee Community Planning Area is the NED planning area that is regulated by the NED Element, which was adopted by Osceola County Board of County Commissioners in August 2010. The NED Element serves to guide future growth and development within the NED planning area and provides policy guidance on long-range, large-scale planning to accommodate economic development, reduce urban sprawl pressures, and reduce vehicle miles traveled by linking road and transit networks. The plan also provides for a variety of housing options while protecting environmentally sensitive lands, wildlife corridors, and upland habitat. On July 19, 2017, the Sunbridge Concept Plan, a mixed-use concept plan was approved. A graphic of the NED plan and its staging are presented in Attachment C-13. This plan encompasses Phase 1 of the NED Element and proposes 2,689 single-family dwelling units, 750 single-family attached dwelling units, 1,950 multi-family dwelling units, 380,000 square feet (ft^2) of commercial space, 2,010,000 ft^2 of office space, 450 hotel rooms, two school sites, and a civic space.

3.6.2.4 Future Development

As noted above, multiple residential/mixed-use developments are planned in the Study Area. Table 3-11 lists the approved DRIs and planned developments. While many of the developments have been approved, the downturn in the real estate market circa 2008 delayed their initiation. Development is complete for some of the parcels at Greeneway Park and Lake Nona. The planning process is underway for most of the others. Attachment C-14 presents the locations of the planned developments and DRIs.

Table 3-11. Summary of DRIs and Planned Developments

Development Name	Municipality	Application Status	Acreage	Anticipated Units	Retail/Office (ft^2)
Greeneway Park DRI (formerly Ginn)	Orange	Approved	1,418	1,634	2,279,999
Lake Nona DRI	City of Orlando	Approved	6,969	11,250	6,332,777
Eagle Creek DRI	Orange	Approved/Rescinded	1,241	1,945	
Orlando International Airport DRI	City of Orlando	Approved	11,365	N/A	N/A
Adventist Health System Proposed Development	Orange	N/A	115	N/A	N/A
Poitras Proposed Development	City of Orlando	Approved	8,803	4,800	2,400,000
Southeastern Oaks Planned Development	City of Orlando	Approved	149	500	N/A
Southern Oaks Area Proposed Development	Osceola	Approved	406	700	200,800
Sunbridge Proposed Development	Osceola	Approved	5,203	5,284	2,610,000

3.6.3 Community and Neighborhood Features

The social environment characteristics within the Study Area include existing residential developments, community cohesion, community facilities, and proposed residential and mixed-use developments. Attachment C-15 graphically illustrates the social characteristics including the individual neighborhoods in/near the Study Area. Attachment C-16 lists the neighborhoods and community associations in the Study Area.

Community facilities that provide social services include schools and higher education facilities, adult and child care centers, places of worship/religious centers, cemeteries, social service organizations, community centers, government facilities, medical facilities, and other emergency services, such as police, fire rescue stations, and emergency shelters. Table 3-12 summarizes the community facilities in the Study Area.

Table 3-12. Summary of Community Facilities

Name	Location	Public/Private Facility
Schools		
Lake Nona Middle School	13700 Narcoossee Road, Orlando, FL 32832	Public
Lake Nona High School	12500 Narcoossee Road, Orlando, FL 32832	Public
Eagle Creek Elementary School	10025 Eagle Creek Sanctuary Blvd., Orlando, FL 32832	Public
East Lake Elementary	4001 Boggy Creek Road, Kissimmee, FL 34744	Public
Narcoossee Elementary School	2690 N. Narcoossee Road, St. Cloud, FL 34771	Public
Narcoossee Middle School	2700 N. Narcoossee Road, St. Cloud, FL 34771	Public
Laureate Park Elementary School	7800 Laureate Blvd., Orlando, FL 32827	Public
The University of Central Florida College of Medicine	6850 Lake Nona Blvd., Orlando, FL 32827	Public
Amazing Explorers Academy	13635 Walcott Avenue, Orlando, FL 32827	Private
Bright Scholars Early Learning Academy	2580 N. Narcoossee Road, St. Cloud, FL 34771	Private
Places of Worship/Religious Organizations		
Iglesia Hispana Pentecostal Aic	14073 Boggy Creek Road, Orlando, FL 32824	Private
Lock Haven Baptist Church	14246 Boggy Creek Road, Orlando, FL 32824	Private
Iglesia Casa de Pan	14152 Boggy Creek Road, Orlando, FL 32824	Private
Worship & Praise Center	14152 Boggy Creek Road, Orlando, FL 32824	Private
UPC Lake Nona	10123 William Carey Drive, Orlando, FL 32832	Private
Disciple Makers Church	12525 Narcoossee Road, Orlando, FL 32822	Private
St. Catherine of Siena Catholic Church	2750 E. Osceola Parkway, Kissimmee, FL 34746	Private
Genesis Christian Center	5501 Boggy Creek Blvd., Orlando, FL 32824	Private
Iglesia CRNCD	3285 Boggy Creek Blvd., Kissimmee, FL 34744	Private
Movimiento Cristiano Cristo	3321 Morningside Drive, Kissimmee, FL 34744	Private

Table 3-12. Summary of Community Facilities

Name	Location	Public/Private Facility
Khmer Krom Buddhist Temple	2725 Zuni Road, St. Cloud, FL 34771	Private
Grace Lake Nona	10025 Eagle Creek Sanctuary Blvd., Orlando, FL 32832	Private
Hospitals/Medical Facilities		
University of Florida College of Pharmacy	6550 Sanger Road, Orlando, FL 32827	Public
Sanford Burnham Presbyterian Medical Discovery Institute	6400 Sanger Road, Orlando, FL 32827	Private
Orlando VA Medical Center	13800 Veterans Way, Orlando, FL 32827	Public
Nemours Children's Hospital	13535 Nemours Parkway, Orlando, FL 32827	Private
Florida Hospital Medical Group – Lake Nona	9975 Tavistock Lakes Blvd., #220, Orlando, FL 32827	Private
Trails		
Split Oak Forest Wildlife and Environmental Trail	Clapp Simms Duda Road, Orlando, FL 32832	Public
Florida National Scenic Trail	Planned Trail Priority	Public
Meadow Woods Trail Corridor	Planned Trail Opportunity	Public
Meadow Wood to Innovation/UCF Trail Corridor	Planned Trail Opportunity	Public
Innovation/UCF Trail Corridor	Planned Trail Opportunity	Public
Orlando Intermodal Terminal Connector Corridor	Planned Trail Opportunity	Public
Kissimmee-St. Cloud Loop (part of Florida of National Scenic Trail)	Planned Trail Opportunity	Public
Farms/Nursery		
Boggy Creek Tree Farms	6350 New Hope Road, Orlando, FL 32824	Private
Finca RR	3416 Great Oaks Blvd., Kissimmee, FL 34744	Private
Uncle Jutty's Nursery	3415 Boggy Creek Road, Kissimmee, FL 34744	Private
Lake Shore Tree Farm	10444 Kirby Smith Road, Orlando, FL 32832	Private
Fire Departments		
Orlando Fire Department Station 16	12375 Lake Nona Gateway Road, Orlando, FL 32827	Public
Cemetery		
East Lake Cemetery	3350 Great Oaks Blvd., Kissimmee, FL 34744	Public

3.6.4 Cultural Resources

A desktop analysis of the OPE Study Area was conducted with the purpose of identifying cultural resource potential and previously recorded historic properties near the proposed project that are listed, or may be eligible for listing, in the National Register of Historic Places (NRHP). Attachment C-17 includes a summary of the desktop analysis. Attachment C-9 presents the locations of historical resources.

The Study Area was defined as an approximately 37,300-acre swath of land. The Florida Master Site File (FMSF) database was reviewed for any previous surveys or previously recorded resources within the Study Area. In addition, the property appraiser databases for Orange and Osceola Counties, historic maps, and aerial photographs were reviewed to determine if potential historic resources constructed prior to 1973 are in the Study Area.

Examination of the FMSF database (updated April 2017) indicates that 39 previous cultural resource surveys intersect the Study Area. However, the existence of a previous survey in the area may not negate the need for an updated survey for the current project. Factors such as the date of the previous survey and the scope/intensity of the actual work performed in a previous survey would need to be considered.

A previous Cultural Resources Assessment Survey (CRAS) from the 2017 OCX PD&E was completed. The State Historic Preservation Officer (SHPO) concurred with the report but noted that archaeological testing would be necessary within SOFWEA should the preferred alignment intersect this preserve. Only an archaeological pedestrian survey was undertaken within SOFWEA as part of the CRAS. Attachment C-18 presents the SHPO letter dated August 17, 2016.

3.6.4.1 Historical

The FMSF data (April 2017) indicate that a total of 28 historic structures and five historic linear resources are within the OPE Study Area (Attachment C-9). Of these, eight historic structures and three historic linear resources have not been evaluated by the SHPO regarding eligibility for listing on the NRHP. These resources would need to be evaluated if located within the Area of Potential Effects (APE) of the recommended roadway alignment or ponds.

Review of the Orange County Property Appraiser's GIS database indicates there are 66 parcels containing at least one historic (pre-1973) building within the current Study Area that have not been previously recorded. Within Osceola County, there are 95 parcels of historic age that have not been previously recorded. Descriptions of the property types range from single-family and mobile homes to mixed-use, public school land, warehouses, grazing land, orchard groves/citrus, and acreage not zoned for agricultural. The cultural resources desktop analysis in Attachment C-17 shows the location of un-recorded parcels with potential historic structures within the OPE Study Area. Historic USGS quadrangle maps depict at least three potential historic resources in the Study Area that have not been previously recorded, including two gauging stations and a cemetery. However, the proposed OPE is unlikely to affect these resources as they are toward the edges of the Study Area.

3.6.4.2 Archaeological

The FMSF data (April 2017) indicates that a total of 29 archaeological sites are within the OPE Study Area. Of these, 10 archaeological resources have not been evaluated by the SHPO regarding eligibility for listing on the NRHP.

3.6.5 Demographic and Socioeconomic Characteristics

In addition to the social environment characteristics presented above (land use, neighborhoods, community features, approved and proposed developments), the socioeconomic characteristics in the Study Area were analyzed to identify the community characteristics of the population. These socio-economic features were identified using a desktop review of GIS databases based on U.S. Census Bureau, 2010–2014 American Community Survey (ACS) Five-Year Estimates data within the Study Area.

Demographic information was obtained at the census block level which provides more detailed datasets. The demographic information was compared to existing and proposed land uses to determine relevancy. The demographic information was also compared to the 2010-2014 ACS State of Florida data and to the county-wide data for the respective county. The following information summarizes the socioeconomic characteristics within the Orange County and Osceola County portions of the Study Area. Attachment C-19 presents the sensitive socioeconomic populations within Study Area.

3.6.5.1 Orange County

The census blocks for this portion of the project are large because of low-density populations and large park/conservation lands and extend beyond the Study Area. Therefore, the following data for the complete census block may not accurately reflect the populations within the immediate Study Area of the Lake Nona area and area east of Narcoossee Road:

- **Percent Minority Population**: as a reference, the overall Orange County and state average minority populations are 57.3 percent and 52 percent, respectively. The two census blocks west of Boggy Creek Road (76.8 percent/84 percent) are significantly greater than the county-wide and state averages. East of Boggy Creek Road (38.9 percent), the minority population is significantly less than the average, while east of Narcoossee Road (59.4 percent) is slightly above the county-wide and state averages.

- **Percent Below Poverty Level**: as a reference, the county-wide and state averages for populations less than the poverty level are 17.3 percent and 16.5 percent, respectively. The two census blocks west of Boggy Creek Road (18.1 percent/14.8 percent) are similar to the county-wide and state averages. East of Boggy Creek Road (5.9 percent) and east of Narcoossee Road (5.1 percent), the minority population is significantly less than both the county-wide and state averages, respectively.
- **Percent Disability Status**: as a reference, the county-wide and state averages for populations with disability are 8.7 percent and 38.3 percent, respectively. The two census blocks west of Boggy Creek Road (67.9 percent and 61.8 percent) are significantly greater than both the overall Orange County and state averages; all census blocks in the Study Area are significantly greater than both the county-wide and state averages.

Based on the socioeconomic analysis, there are higher minority populations west of Boggy Creek Road. The disabled population within the Orange County portion of the Study Area is significantly higher than both the county-wide and state averages.

3.6.5.2 Osceola County

The census blocks for the NED portion of the project are large because of low-density populations and large areas of undeveloped lands and extend beyond the Study Area. Therefore, the following data for the complete census block may not accurately reflect the populations within the immediate Study Area.

- **Percent Minority Population**: as a reference, the overall Osceola County and state average minority populations are 64.5 percent and 52 percent, respectively. The two census blocks north and west of East Lake Toho (69.9 percent/66.2 percent) are slightly greater than the county-wide average and significantly greater than the state average. The three census blocks east of East Lake Toho

(25.7 percent, 30.3 percent, and 26.4 percent) are significantly less than both the county-wide and state averages.

- **Percent Below Poverty Level**: as a reference, the overall Osceola County and state average minority populations less than the poverty level are 19.5 percent and 16.5 percent, respectively. The two census blocks north and west of East Lake Toho (20.1 percent/16.3 percent) are similar or slightly less than the county-wide and state averages. The census block east of East Lake Toho (25.7 percent) is significantly greater than both the county-wide and state averages, while the two census blocks farther east of East Lake Toho (1.9 percent/8.7 percent) are significantly less.
- **Percent Disability Status**: the overall Osceola County and state averages for populations with a disability are 13.1 percent and 38.3 percent, respectively. All census blocks in the Study Area are significantly greater than both the county-wide and state averages.

Based on the socioeconomic analysis, minority populations west of East Lake Toho are greater than the county-wide and state averages but decline to less than the state average as census data tracks east, possibly because of the low population in this part of the Study Area. The disabled population is significantly greater than both the county-wide and state averages.

3.6.6 Aesthetic Features

Transportation actions can affect communities and influence aesthetic qualities.

Review of the *ETDM Summary Report* (FTE, 2012) indicates that FTE assigned substantial and moderate degrees of effect for aesthetic issues for proposed alignments. FTE further noted that because the western portion of the Study Area is mostly residential and the eastern portion is largely rural/un-developed, any alignment would significantly impact the existing viewshed, community focal points, and general makeup of the community. FTE also noted that these areas would likely be noise-sensitive sites that would require the use of noise walls.

3.6.7 Mass Transit Facilities

Osceola County is served by LYNX regional bus service. Upon completion of Phase II of SunRail, it will also be served by the SunRail commuter rail. LYNX operates nine bus routes (Links), four express bus routes (FastLinks), and four Neighborlink routes within Osceola County, though none of them are in the Study Area. Southeast Orange County is served by four bus routes and two express routes. A SunRail extension to OIA is planned as part of SunRail Phase III. Numerous private bus and shuttle services operate within the Study Area and the surrounding region. These private services offer service to airports, seaports, and major attractions. Amtrak operates intercity rail from downtown Orlando and from Kissimmee. Intercity bus service is available from downtown Orlando and Kissimmee.

The *Osceola County Long Range Transit Plan* (RS&H and VHB, 2015) foresees the OPE as a route for premium transit service. The Transit plan also calls for a bus rapid transit line along Narcoossee Road from St. Cloud to Lake Nona. MetroPlan Orlando's *2040 LRTP* calls for a premium transit corridor connecting the Innovation Way Industrial Center near SR 528 to OIA and Lake Nona. The Intermodal Transportation Facility at OIA will ultimately include access to bus service, SunRail, and Brightline higher-speed rail service from Miami.

3.6.8 Freight and Intermodal Centers

MetroPlan Orlando's *2040 LRTP* analyzed regional freight and mobility needs in its *Technical Report 7.* The report identified primary freight corridors in the region. Corridors in or near the Study Area included Florida's Turnpike, SR 417, US 17-92, Osceola Parkway, SR 436 (Semoran Boulevard), Boggy Creek Road, and SR 15. More than 95 percent of freight in the region travels by truck on these and other corridors.

Additional freight capacity is provided by the CSX and Florida Central railroad lines. A spur railroad line is operated by the Orlando Utilities Commission (OUC) to transport coal along the northern edge of the Study Area. Air freight is handled by OIA, just north of the Study Area. In MetroPlan Orlando's *2040 LRTP*, the OIA area was targeted for future freight-oriented development and for projects to facilitate freight flow.

As presented in Section 2 of this report, SIS is Florida's high-priority network of transportation facilities important to the state's economy and mobility. OIA and the Orlando CSX Intermodal Facility are SIS facilities. SIS roadways relevant to this study include SR 417, which would form one terminus of the OPE; I-4, which connects to the western ends of the Osceola Parkway and SR 417; SR 528, which would connect to the northern end of the planned Sunbridge Parkway; and Florida's Turnpike.

3.6.9 Pedestrian and Bicycle Facilities

In accordance with Florida Statutes, pedestrians and bicycles are prohibited on limited-access toll roads such as the proposed OPE. Pedestrian and bicycle facilities are typically categorized by use. Bicycle facilities is a term to describe facilities provided by local authorities to accommodate or encourage the use of bicycles. Bicycle facilities may include bikeways, bicycle lanes, bicycle routes, and paved shoulders. Trail facilities include paved multiple-use trails used for walking, bicycling, or skating. Unpaved multiple-use trails are commonly used for hiking, horseback riding, and off-road bicycling.

Numerous pedestrian and bicycle facilities exist within the Study Area. Concern about accommodating existing multiple-use trails in SOFWEA was highlighted in public meetings (see Section 8, Stakeholder Involvement).

3.6.10 Transportation Plans

The OPE project is documented in or consistent with the local and regional plans detailed in Section 2.1.5 of this report.

3.7 Contamination

A desktop analysis of the Study Area was performed to identify and address any contaminated sites that possess a high degree of potential contamination involvement to the proposed project. A major constraint might be a landfill or Superfund site that would require substantial time and costs to remediate. Sites such as contaminated gas stations or dry cleaners would not be considered a major constraint because these sites have a long history of successful remediation that can be accomplished relatively quickly during construction.

The Florida Department of Environmental Protection's (FDEP's) Map Direct and OCULUS databases were queried for facilities within the Study Area that would be considered a major project constraint. If a facility was a potential major project constraint, supplemental research was performed to determine the current regulatory status. After reviewing the databases, no sites were identified that would be considered a major constraint to the project. Multiple sites were evaluated; however, none elevated to the major project constraint status.

A Level I Contamination Screening Evaluation should be conducted during the PD&E phase of the project. Level II testing may also be necessary for sites assigned a risk rating of "High" or "Medium" in accordance with Chapter 20 of the FDOT (2017b) *PD&E Manual* to determine the presence and extent of contamination.

3.8 Utilities

There are several major utilities within the Study Area including major overhead electric transmission lines, water treatment plants, and electrical sub-stations. Table 3-13 presents major utilities in the Study Area. Attachment C-9 presents the locations of the known existing or proposed utilities.

Table 3-13. Major Utilities in Study Area

Utility	Existing or Proposed	Aerial or Under-ground Utility	General Location
Transmission Lines			
Electric Transmission Lines	Existing	Aerial	North of SR 417; generally, runs parallel to SR 417 until just west of Lake Nona Boulevard, then turns due north
Electric Transmission Lines	Existing	Aerial	North of Cyrils Drive; along the southern boundary of Split Oak Forest
Electric Transmission Lines	Existing	Aerial	Run north-south along Narcoossee Road in Lake Nona area
Utility Substations and Facilities			
GOAA Substation	Existing	N/A	North side of SR 417 just east of Lake Nona Boulevard
Florida Power Corporation Substation	Existing	N/A	Southeast of Wyndham Lakes Boulevard and SR 417
OUC Substation	Proposed	N/A	In the area of Narcoossee Road and Boggy Creek Road
Other			
Lake Nona Water Treatment Plant	Existing	N/A	West of Lake Nona Boulevard
Northeast Water/Wastewater Facility	Proposed	N/A	South of Orange/Osceola County line and east of SOFWEA
Lake Nona Communications Building	Existing	N/A	West of Lake Nona Boulevard

3.9 Railroads

The OUC railroad mainline runs north of and parallel to SR 417 from just east of Narcoossee Road to just west of Lake Nona Boulevard. The rail line then turns northwest and is at-grade with Boggy Creek Road under the Jeff Fuqua Boulevard overpass.

SECTION 4

Traffic Considerations

4.1 Historical and Current Traffic

The OPE will be a new alignment traversing southern Orange County and northern Osceola County. As such, there are no historic or current traffic data available for the corridor itself. However, to characterize the surrounding roadway network, the primary roadways in or crossing the Study Area are shown in Table 4-1 along with historic and current traffic parameters.

Table 4-1. Historic Traffic Data for Study Area Primary Roadways

Roadway Name	Traffic Volume (Vehicles per Day)	Peak Hour Volume (Vehicles per Hour)	Count Station No.	K	T	D
Simpson Road[a]	15,900	N/A	927,049	9.0	4.9	52.8
Boggy Creek Road (Osceola Co.)[b]	13,076	N/A	475	N/A	N/A	N/A
Boggy Creek Road (Orange Co.)[a]	20,500	N/A	757,044	9.0	6.3	52.6
State Road 417[a]	44,500	2,532	750,635	9.0	6.3	52.6
Lake Nona Boulevard[c]	8,084	523	8,167	N/A	N/A	N/A
Laureate Boulevard[c]	6,544	483	8,170	N/A	N/A	N/A
Narcoossee Road[a]	35,500	N/A	750,557	9.0	5.3	52.6
Cyrils Drive[b]	(No data published)			(No data published)		

[a] Florida Department of Transportation (for State Road 417) – "2016 AADT"
[b] Osceola County Traffic Counts Map- "2017 Daily traffic counts"
[c] Orange County Traffic and Transportation Department Website – "2017 AADT"
Note:
N/A = not available
K = ratio of peak hour to annual average daily traffic factor
T = the percentage of truck traffic during the peak hours
D = proportion of traffic based on the average for the design hour of the design year traveling in the peak direction

4.2 Roadway Operational Conditions

Table 4-2 summarizes the current roadway operational conditions for primary roadways in the Study Area. As OPE will be a new alignment, no operational data exist for the corridor itself. The far-right column in the table (Existing V/C Ratio) is the volume-to-capacity ratio. A value less than one indicates that the roadway has sufficient capacity for its traffic volume. A value greater than one indicates recurring congestion during peak demands.

Table 4-2. Existing Operational Conditions for Study Area Primary Roadways

Roadway Name	From	To	No. of Lanes	Type[d]	Existing AADT	Existing V/C[e] Ratio
Simpson Road[a]	Osceola Parkway	Boggy Creek Road	2	Uninterrupted	15,900	0.65

Table 4-2. Existing Operational Conditions for Study Area Primary Roadways

Roadway Name	From	To	No. of Lanes	Type[d]	Existing AADT	Existing V/C[e] Ratio
Boggy Creek Road (Osceola Co.)[b]	Simpson Road	Narcoossee Road	2	Uninterrupted	13,076	0.54
Boggy Creek Road (Orange Co.)[a]	SR 417	Simpson Road	2	Uninterrupted	20,500	0.84
State Road 417[a]	Boggy Creek Road	Narcoossee Road	4	Uninterrupted	45,500	0.63
Lake Nona Boulevard[c]	Boggy Creek Road	SR 417	4	Interrupted	8,084	0.32
Laureate Boulevard[c]	Medical City Drive	Narcoossee Road	2	Interrupted	6,544	0.55
Narcoossee Road[a]	SR 417	Cyrils Drive	6	Interrupted	35,500	0.88
Cyrils Drive[b]	(No data published)			(No data published)		

[a] Florida Department of Transportation (for SR 417) – "2016 AADT"
[b] Osceola County Traffic Counts Map- "2017 Daily traffic counts"
[c] Orange County Traffic and Transportation Department Website – "2017 AADT"
[d] "Type" as defined in the FDOT Generalized Level Of Service Table 2, 2013 Quality / Level of Service Handbook
[e] "Capacity" defined in the FDOT Generalized Level Of Service Table 2, 2013 Quality / Level of Service Handbook; LOS E for freeways (SR 417), LOS D for arterials (all others)
Note: N/A = not available
V/C = volume/count (ratio)

The Traffic and Safety TM in Attachment D-1 includes full details on the operational conditions analysis.

4.3 Safety/Crash Analysis

Crash rates were calculated for primary roadways in the Study Area. Crash rates are expressed in crashes per million vehicle-miles traveled, and can be used to better understand safety concerns of a given roadway segment. Area-wide average crash rates for various road classifications can be used to provide context for the crash rates experienced on a roadway segment. Table 4-3 displays the 5-year crash rate calculated for each segment. Bold values in Table 4-3 show roadway segments with higher crash rates than countywide average for similar facilities. Countywide averages were queried from the FDOT Crash Analysis Reporting System database. Attachment D-2 provides a complete listing of these factors for Orange County and Osceola County.

Table 4-3. Study Area Primary Roadways Crash Analysis

Roadway Name	From	To	5-Year Crashes[a]	Length (Miles)	5-Year Crash Rate	FDOT Roadway Type[b]	Countywide Average Rate[c]
Simpson Road	Osceola Parkway	Boggy Creek Road	118	1.23	**3.3061**	Rural 2-3 Ln 2-Way Undivided	0.73082
Boggy Creek Road (Osceola Co.)	Simpson Road	Narcoossee Road	174	5.89	**1.2379**	Rural 2-3 Ln 2-Way Undivided	0.73082

Table 4-3. Study Area Primary Roadways Crash Analysis

Roadway Name	From	To	5-Year Crashes[a]	Length (Miles)	5-Year Crash Rate	FDOT Roadway Type[b]	Countywide Average Rate[c]
Boggy Creek Road (Orange Co.)	SR 417	Simpson Road	150	1.45	2.7651	Rural 2-3 Ln 2-Way Undivided	N/A
State Road 417	Boggy Creek Road	Narcoossee Road	181	2.55	**0.8548**	Toll Road Rural	0.42605
Lake Nona Boulevard	Boggy Creek Road	SR 417	31	2.60	0.8082	Urban 4-5 Ln 2-Way Divided Raised	2.71499
Laureate Boulevard	Medical City Drive	Narcoossee Road	4	3.05	0.1098	Urban 2-3 Ln 2-Way Undivided	2.75394
Narcoossee Road	SR 417	Cyrils Drive	293	4.83	0.9363	Urban 6+ Ln 2-Way Divided Raised	4.3493
Cyrils Drive					(No data published)		

[a] Source: Florida's Integrated Report Exchange System (firesportal.com)
[b] Source: FDOT CARS database roadway type descriptions as of May 14, 2018
[c] Source: FDOT CARS database as of May 14, 2018
Note:
N/A = not available
bold values show roadway segments with higher crash rates than countywide average for similar facilities

4.4 Travel Demand Forecasting

The traffic forecasts used to analyze the OCX Master Plan Projects for the CFX Concept, Feasibility & Mobility Studies are based on an updated and improved travel demand model created specifically for this effort. The travel demand model was used to estimate the expected traffic based on input data such as socioeconomic data (SE) (that is, land use, population, employment) and transportation network data (for example, number of lanes, facility types, trip rates). The primary forecasting tool used for the last 30 years in Florida has been the Florida Standard Urban Transportation Model Structure (FSUTMS). Within the FSUTMS, toll modeling originated by establishing specific toll amounts for appropriate network links and a coefficient to convert tolls to travel time impedance. FSUTMS is run from the Cube Voyager operating system.

CDM Smith, the General Traffic and Earnings Consultant, developed a travel demand model for a coverage area that includes the CFX system and areas of future expansion and influence. This previous model was based on the 2004 Orlando Urban Area Transportation System model and the 2005 Central Florida Regional Planning Model (CFRPM), version 5.0, and was updated to a base year of 2010. This daily model for the Central Florida region was developed in the Cube Voyager platform and was designated CFX 1.0. Because of expansion of the CFX jurisdictional area and the need to study projects in this expanded area, CDM Smith updated the travel demand model to include a larger study area. This new model, herein referred to as the CFX 3.0 model, is developed specifically for forecasting analysis for the CFX system. The CFX 3.0 model is based on the Central Florida Regional Planning Model (CFRPM) version 6.1, in Cube Voyager, because of the larger study area and updated SE data sets.

4.4.1 CFX 3.0 – Base Year Model (2015)

The CFX 3.0 model was developed using only the daily model from the CFRPM 6.1. The CFRPM 6.1 time of day model was not considered for use for the first version of this model. This first version of the CFX 3.0 model was developed to evaluate the Osceola County Master Plan projects: Osceola Parkway Extension, Northeast Connector Parkway, Southport Connector Expressway, and the Poinciana Parkway I-4 Connector projects for the Concept, Feasibility & Mobility Studies. The CFX 3.0 model was validated for a 2015 base year with a concentration on the sub-area of Osceola County and south Orange County. This model includes all of Orange, Seminole, Osceola, Lake, Sumter, Marion, Volusia, Flagler, Polk, Brevard Counties, as well as connected portions of Indian River County. Figure 4-1 shows the geographic extent of the CFX 3.0 model and some of the more important (higher volume) roadways, including the CFX toll facilities, I-4, I-95, Florida's Turnpike System, U.S. highways, and state routes. The future (or forecast) years for the CFX 3.0 model are 2025, 2035, and 2045. The CFX 3.0 model has a total of 5,406 TAZs including the 56 external zones.

4.4.1.1 Model Characteristics

The base model is the CFRPM model version 6.1, which has a base-year SE data set for 2015. To study the OCX Master Plan projects, several changes were made to the base year model before validation. The 2015 base year SE data for the CFX model was developed by using the 2015 SE data set from the CFRPM model for all locations other than southeast Orange County and Osceola County. For southeast Orange County and Osceola County (study sub-area highlighted in Figure 4-2), FKA developed population, dwelling units/households, school enrollment, and employment control totals for the base year SE data sets. FKA was provided the disaggregated zonal structure (described in Section 4.4.1.2) for the study sub-area and allocated population, school population, and employment using the methodology described in the FKA report (FKA, 2017). The base-year network was reviewed and improved to reflect 2015 existing conditions and include details about the CFX system and other toll roads. In addition, using GIS, the network was compared to 2010 aerial photography and corrections made to various link characteristics, such as the number of lanes, facility type, area type, and speed. Traffic counts in the base year were assembled and reviewed. These included counts from CFX, FDOT, and county and municipal governments.

4.4.1.2 Zonal Structure

The zonal structure from CFRPM 6.1 model was used in its entirety for the CFX 3.0 model. To evaluate the new alignments from the OCX Master Plan, traffic analysis zone disaggregation was needed as the project alignments and supporting roads were added. In Orange County, the southeast portion of the county was modified to incorporate the project alignments and new developments in the Study Area. Orange County TAZs ranging from 883 to 1077 in the CFRPM model were evaluated, 74 zones in all. After disaggregation there were 93 zones, a total of 19 new zones were added in this area of the county. In Osceola County, the entire county was evaluated with zones numbered 1101 to 1350, 250 zones in all. After disaggregation there were 349 zones, with 99 new zones added. Table 4-4 summarizes the zone disaggregation.

Table 4-4. TAZ Disaggregation Summary

	Old TAZ Count	New TAZ Count	New TAZs Added
Orange County	74	93	19
Osceola County	250	349	99
Total	**324**	**442**	**118**

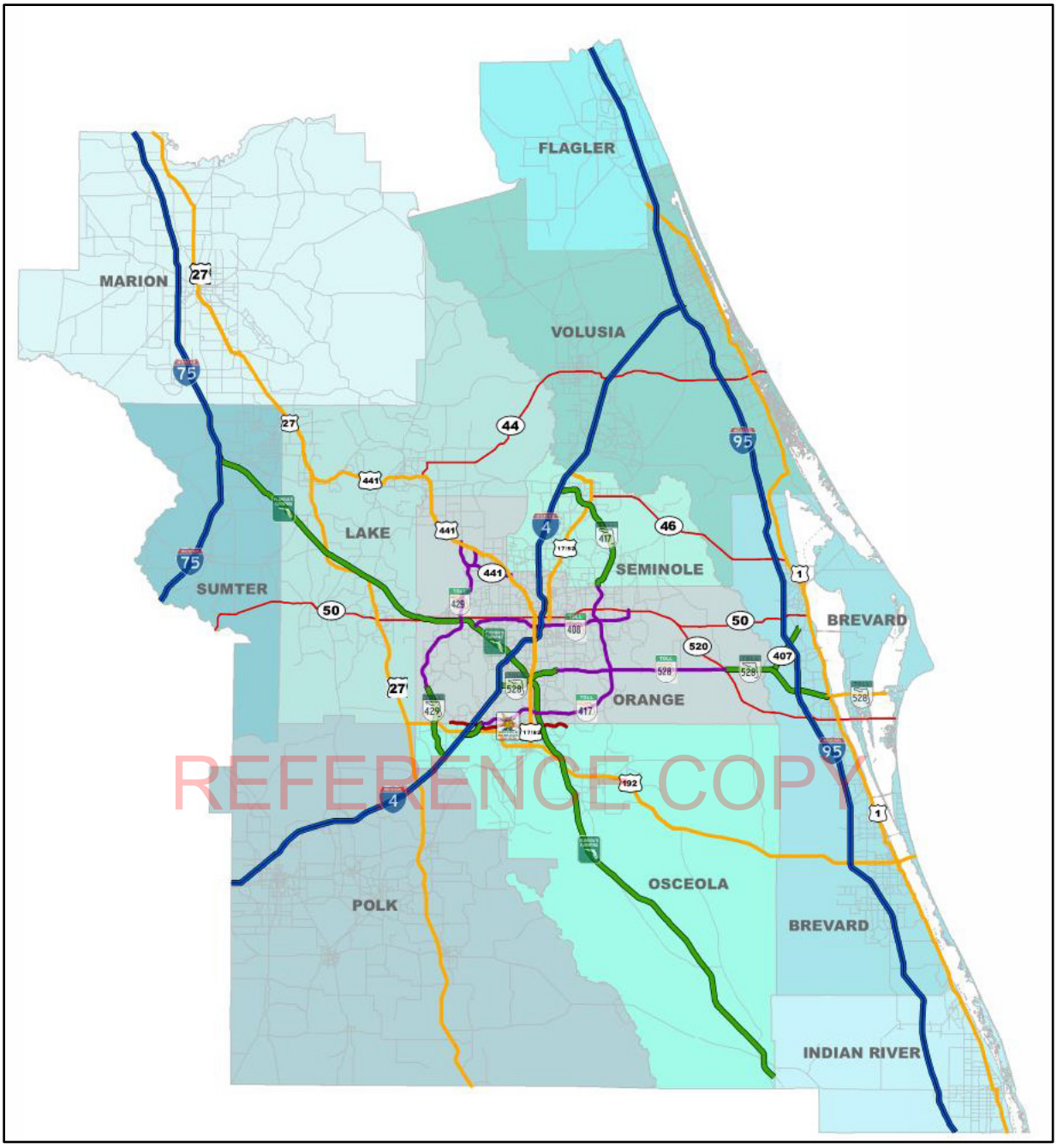

Figure 4-1. CFX 3.0 Model Area

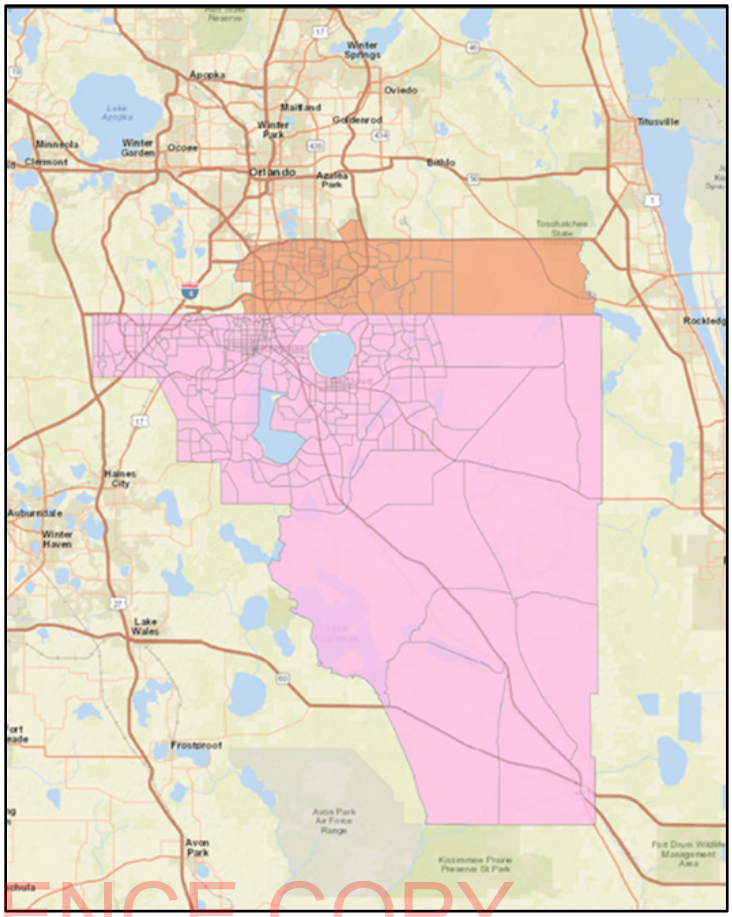

Figure 4-2. Study Sub-Area

4.4.1.3 Socioeconomic Data

FKA developed SE estimates for the following components of the TAZ datasets for the traffic and revenue study:

1. Population and Dwelling Units
   a. Single-family Dwelling Units and Population
   b. Multi-family Dwelling Units and Population
2. Hotel/Motel Units (includes Timeshare) and Hotel/Motel occupants
3. Employment
   a. Industrial
   b. Commercial
   c. Service
4. Student Enrollment

In addition, FKA conducted an analysis of DRIs that affect development patterns and the allocation of population and employment throughout the study sub-area.

The baseline analysis involved a detailed evaluation of each county's property appraiser data by land use type intersected with the TAZs via GIS shape files. FKA used Woods & Poole Economics data, the University of Florida Bureau of Economics and Business Research (BEBR), the Florida Department of Business and Professional Regulation licensure data, ESRI, and DataStory as the sources of its 2015

population control totals and base year hotel/motel population. The FKA base year control total for population in Orange County is 2.9 percent more than BEBR estimates and 1.3 percent higher than Woods & Poole estimates, as shown in Table 4-5. The FKA base year control total for population in Osceola County is 5.1 percent higher than BEBR estimates and 2.0 percent higher than Woods & Poole estimates.

Table 4-5. 2015 Population Control Totals

	Countywide (2015)				Study Area (2015)	
County	W&P	BEBR	FKA	ESRI	DataStory	Final - FKA
Orange	1,272,090	1,252,396	1,288,130	1,258,251		
Osceola	317,680	308,327	323,993	305,855	301,498	323,993
Orange (Study Area)[a]					104,318	106,795

[a] Orange Study Area, not entire County
Sources:
BEBR (2016); DataStory: (ESRI TAZ Data)
FKA (2017); Woods & Poole (2016)
ESRI BAO (2017)

FKA used Woods & Poole Economics data, ESRI, and DataStory as the sources of its 2015 employment control totals. The FKA base year control total for employment in the study portion of Orange County is 7.7 percent of Woods & Poole's total Orange County employment estimate in 2015. FKA base year control total for employment in Osceola County is 2.49 percent more than Woods & Poole estimates as shown in Table 4-6. The FKA base year control total for population in Osceola County is 5.1 percent greater than BEBR estimates and 2.0 percent greater than Woods & Poole estimates.

Table 4-6. 2015 Employment Control Totals

		Employment (2015)				Percentages			
Data Source	County	Industrial	Commercial	Service	Total	Industrial	Commercial	Service	Total
W&P	Orange (Entire Cnty)	142,080	217,700	601,420	961,200	14.8%	22.6%	62.6%	100.0%
	Osceola	14,540	31,420	66,280	112,240	13.0%	28.0%	59.1%	100.0%
ESRI/ DataStory	Orange (Study Area)[a]	25,101	12,443	21,957	59,501	42.2%	20.9%	36.9%	100.0%
	Osceola	11,912	30,853	59,423	102,188	11.7%	30.2%	58.2%	100.0%
FKA	Orange (Study Area)[a]	30,954	15,344	28,109	74,407	41.6%	20.6%	37.8%	100.0%
	Osceola	14,902	32,202	67,930	115,034	13.0%	28.0%	59.1%	100.0%

[a] partial county
Sources:
FKA (2017)
DataStory: (ESRI TAZ Data)
Woods & Poole (2016)

FKA verified existing school enrollments through county school board information and Florida Department of Education Public School data, supplemented by private school data and data for university enrollment within the Study Area. Table 4-7 provides the 2015 school enrollment control totals.

Table 4-7. 2015 School Enrollment Control Totals

Location	2015 Students
Orange - Study Area	26,240
Osceola County	78,547
Total	**104,787**

Source: ESRI (2015) and FKA (2017)

4.4.1.4 Network

The network used for this analysis was developed from the CFRPM 2015 network. First, the network was compared to the most recent transportation capital improvement plans to determine if certain projects were implemented between 2010 and 2015. Using GIS and 2015 aerial imagery, the network facility types, speeds, and capacities were checked, concentrating on expressway and arterial facilities, to ensure that the network was properly coded to match existing conditions. Adjustments were made to the link attributes in the Study Area, including operating speed and capacity. Traffic count data were assembled from CFX, FDOT, and county and municipal governments and reviewed for consistent growth at the stations. Review of count station data focused on arterial and higher facilities.

4.4.1.5 Toll Rates

The toll rates collected on CFX and other toll facilities, including FTE and Osceola County facilities, in 2015 were reviewed for use in the modeling process. At most toll locations, there are two toll rates: one for customers paying through electronic toll collection (ETC) (that is, E-PASS or SunPass), and the other for customers paying with cash. Toll rates used in the model are the weighted average of the ETC and cash toll rates, where the ETC participation rate is the weight. Truck volumes are relatively low on CFX facilities and, therefore, were not included as a model feature.

4.4.1.6 Trip Generation

Several modifications were made to the trip generation model from CFRPM v. 6.1 to ensure a production-attraction balance at the county level. The Volusia Lifestyle Trip Generation Model was incorporated for the remainder of the CFRPM 6.1 model to produce school trips in the remaining 10 counties. In running the CFX 3.0 model, school trips were missing in all counties but Volusia County, accounting for approximately 5 percent of the total trip productions. CDM Smith made corrections in CFX 3.0. It was determined that with the incorporation of the Lifestyle Trip Generation Model, a lifestyle model characteristic was not populated in 200 zones, so no trips were generated from those zones. CDM Smith corrected the missing characteristics in those zones. CDM Smith also reconstructed the Special Generator Model by removing hard-coded trips between major attractions, such as trips between Walt Disney World and the Kennedy Space Center. CDM Smith used Streetlight Data, Inc. origin-destination (OD) surveys to adjust/update the trip productions and attractions in the Special Generator Model for three major attractions (Walt Disney World, Universal, and SeaWorld) in Orlando.

In external trip models, the external-to-external and external-to-internal links were reviewed for count and growth rates. Based on a Streetlight Data, Inc., OD survey of external station locations, including Florida's Turnpike in Osceola County, I-95 in Indian River County, I-4 in Polk County, and I-75 in Marion County, many external to external trips were reset to the travel patterns shown in the OD survey. The adjustments in the trip generation model produced reasonable results that were consistent with current traffic movements, other regional models, and national averages.

4.4.1.7 Trip Distribution

The trip distribution model from CFRPM V 6.1 model is a gravity model in which trips are distributed across TAZs based on the number of productions and attractions and the travel impedance, or generalized cost of travel, between ODs. The distribution step produces trip length frequency distributions (TLFD), which show the probability of trips at different trip lengths. CDM Smith found that the trip lengths were in many cases too long, creating illogical trip patterns between counties. CDM Smith adjusted friction factors in the CFX 3.0 model to make the model TLFDs replicate data from the National Household Transportation Survey. This was completed for each of the 11 counties and 6 trip purposes in the CFX 3.0 model and resulted in a significant improvement to the representation of intercounty movements.

The CFRPM 6.1 model also produced high volumes on I-4 at the Polk County/Osceola County line. CDM Smith reconstructed friction factors for I-4 at the external station because not enough trips from the Lakeland area were being attracted to the external station (heading to Tampa) and instead were being attracted to the Orlando Metro area. CDM Smith used data from Streetlight to reconstruct and calibrate the TLFD of I-4 in Polk County.

Other updates to the trip distribution model include K-factor adjustments for I-4, I-95, and Florida's Turnpike to adjust trip patterns from Polk External Stations to Brevard and Indian River County Zones, Brevard and Indian River County External Stations to Polk County zones, as well as Polk County internal-internal trips.

4.4.1.8 Mode Choice and Trip Assignment

The mode choice model from CFRPM 6.1 (a nested logit model) was reviewed and included in CFX 3.0 without update. This model separates (splits) the total number of trips into low-occupancy vehicles, high-occupancy vehicles, and premium-transit (fixed rail and express bus) classes. The trip assignment model from CFRPM 6.1 implements equilibrium assignment techniques using the Bureau of Public Roads volume-delay function to estimate the effect of volume on link speeds and using CTOLL (the cost of the toll converted into a time impedance) to estimate the effect of toll on travel impedance. The assignment model from CFRPM 6.1 was included in CFX 3.0 without changes.

4.4.1.9 Validation

The purpose of the CFX 3.0 model was to evaluate the viability of the OCX Master Plan projects. The validation of the CFX 3.0 model concentrated on a sub-area including the south Orange County and Osceola County study area. The facilities highlighted in red on Figure 4-3 were the facilities of focus for the validation effort. The main validation test for trip assignment is the ratio of model predicted volumes (base year) to traffic counts, known as volume/count (V/C) ratio.

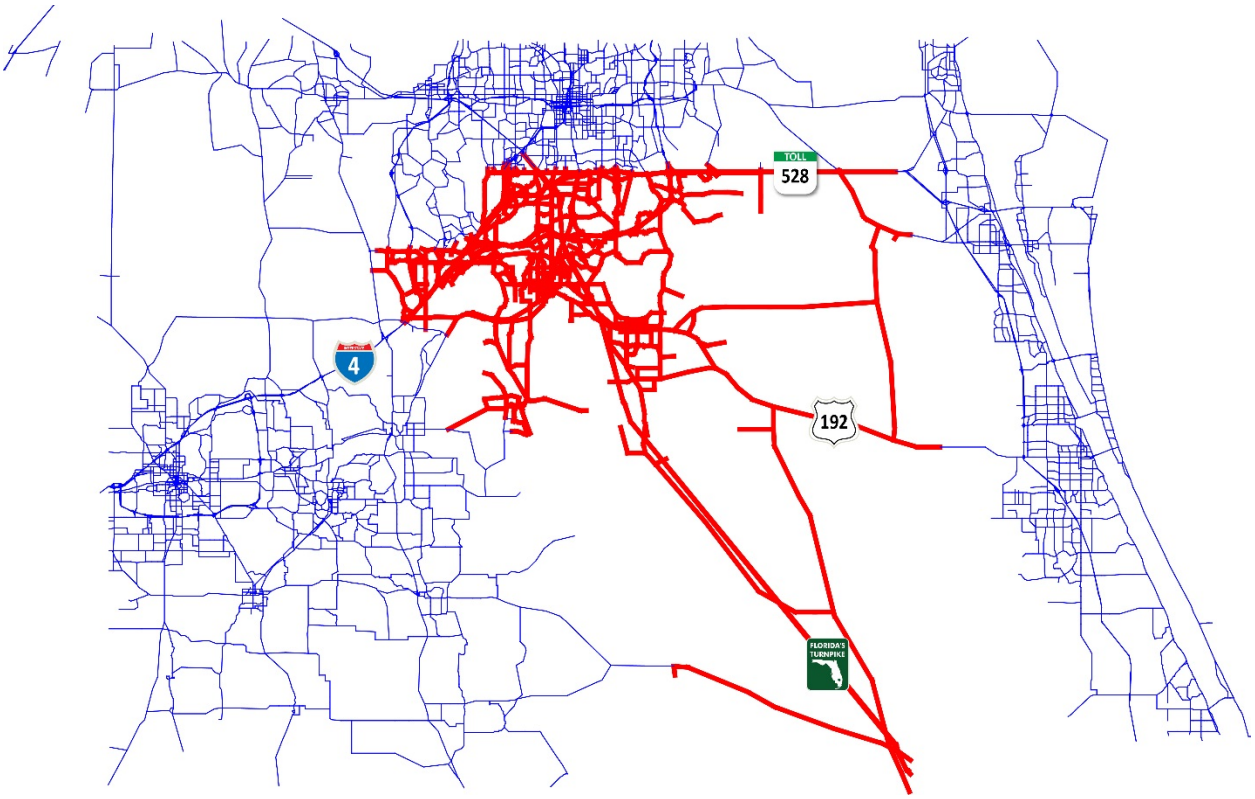

Figure 4-3. CFX 3.0 Sub Area Model

As with the regional planning model, two ways to evaluate the goodness of fit are the ratio of model-predicted V/C ratio and root-mean squared error (RMSE). Table 4-8 summarizes the V/C ratios and RMSE for various categories of links in the 2015 model, including expressway facilities (Facility types 11−17) and toll facilities (Facility types 91−98). In the global model, SR 429 had volumes greater than the counts, with an RSME of 155.09 percent and V/C ratio of 2.21, which is improved to an RSME of 95.12 percent and V/C ratio of 1.95 in the sub-area model. This issue will need to be addressed in further refinements of this model.

Table 4-8. CFX 3.0 Validation: High Capacity Facilities

	Volume/Count (V/C)	% RMSE
Expressway Facilities	1.24	27.42%
Toll Facilities	1.17	27.78%
Expressway Facilities in Sub-area	1.03	11.18%
Toll Facilities in Sub-area	1.12	26.32%

Figure 4-4 shows the model-predicted traffic volumes against traffic counts on CFX facilities in the sub-area. The correlation between the two is close (R2 = 0.8933).

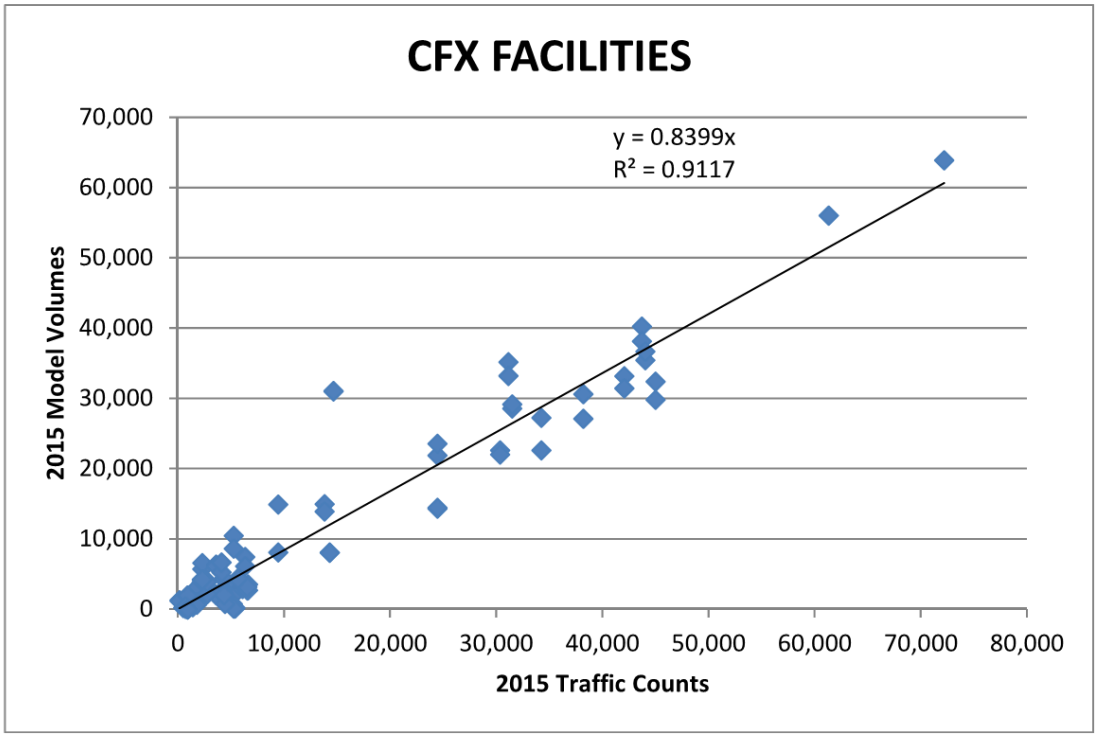

Figure 4-4. Model-predicted Traffic Volumes vs. Traffic Counts

4.4.2 CFX 3.0 Future Year Models

By starting with the CFX 3.0, the future year model retains all the updates and enhancements created for that model and with additional model improvements in the Study Area. The forecast years are set to 2025, 2035, and 2045, which is consistent with the requirements for the OCX Master Plan projects. The information for these years was, in general, taken from the data sets describing FY 2020, FY 2030, and FY 2040 in the CFRPM 6.1.

4.4.2.1 Socioeconomic Data – Base Forecast

The SE data forecasts for 2025, 2035, and 2045 were based on the CFRPM 6.1 SE data forecasts from years 2020, 2030, and 2040. The assumption was that the forecasts were prepared by the local governments and Metropolitan Planning Organization prior to the recent economic recession and using the data sets and extending the horizon 5 years would be a conservative approach for the entire model. As previously referenced, special attention was given to the southeast portion of Orange County and all of Osceola County for the population, employment, and school enrollment data (ZDATA1 and ZDATA2 files). FKA completed an independent SE data forecast for these two counties in the model.

Based on adjusted 2015 socioeconomic data estimated by FKA, the SE data sets were projected for the 2025, 2035, and 2045 forecast years. FKA first evaluated the historic growth rates in population, employment, and school enrollment since 1990. Considering the population growth rates during the last 25 years, FKA also employed two data sources: BEBR and Woods & Poole, both of which provide estimates of population at a county control total level. Table 4-9 lists the ranges of population forecasts.

Table 4-9. Population Forecasts

Source	County	2015	2025	2035	2045
FKA (2017)	Orange (Entire Co.)	1,288,130	1,591,844	1,839,786	2,034,767
	Osceola	323,993	436,348	537,245	634,366
W&P (2016)	Orange	1,272,090	1,488,110	1,724,150	1,963,435
	Osceola	317,680	405,340	514,260	638,550
BEBR (2016)	Orange	1,252,396	1,551,400	1,799,100	2,004,000
	Osceola	308,327	427,900	525,700	605,800

To determine the control total for the portion of Orange County identified in the Study Area, FKA also used ESRI data and DataStory, which has data at a TAZ level. FKA evaluated the data, converted to the zone structure for the CFX 3.0 model, and determined a control total for the portion of Orange County in the Study Area. Table 4-10 lists the population forecasts control totals for the Study Area. The compound average annual growth rates for population by county in the 30-year forecast period are 2.66 percent and 2.26 percent for partial Orange County and Osceola County, respectively.

Table 4-10. Population Control Totals for Study Area

Source	County	2015	2020	2025	2035	2045
FKA (2017)	Orange (Partial Co.)	106,795		151,181	193,563	234,908
	Osceola	323,993		436,348	537,245	634,366
DataStory (ESRI, 2015)	Orange	104,318	123,544			
	Osceola	301,498	352,817			

Employment control total forecasts were estimated in a similar fashion, using Woods & Poole, ESRI, and DataStory sources. Woods & Poole data are the preferred employment data source because it includes full- and part-time workers by place of work as well as sole proprietors, home employment, military, and miscellaneous workers. Table 4-11 lists the employment forecasts control totals for the Study Area.

Table 4-11. Employment Control Totals for Study Area

Source	County	2015	2025	2035	2045
FKA (2017)	Orange (Partial Co.)	74,403	102,576	129,397	154,687
	Osceola	115,035	156,213	192,114	227,612
W&P (2016)	Orange (Entire County)	961,200	1,173,890	1,394,735	1,618,825
	Osceola	112,240	145,110	184,260	229,040

E/P ratio is a good way to ensure consistency of employment growth in the forecast. The Woods & Poole data E/P ratio is slightly higher than the E/P ratio for ESRI and DataStory, which has lower ratios in the Study Area, specifically in Orange County. Table 4-12 lists the E/P ratio forecast estimated by FKA. Osceola County functions as a bedroom community to the Central Florida employment hub, mostly in Orange County, so a lower E/P ratio is consistent with the economy.

Table 4-12. Study Area Employment-to-Population Ratios

County	2015	2025	2035	2045
Orange (Partial Co.)	69.7%	67.9%	66.9%	79.6%
Osceola	35.5%	35.8%	35.8%	35.9%

School enrollment forecasts were completed by geocoding the existing 2015 enrollments for K–12 students for public and private schools in the Study Area, analyzing the county-specific detailed age profile forecasts, estimating future control totals for each county, and allocating forecasted student enrollment based on each TAZs' share of student forecasts based on the 2015 percent allocation. Table 4-13 lists the forecasts for school enrollment control totals.

Table 4-13. School Enrollment Control Total Forecasts

Location	2025 Students	2035 Students	2045 Students
Orange - Study Area	32,123	41,293	46,160
Osceola County	96,539	113,775	134,095
Total	**128,662**	**155,068**	**180,255**

Source: FKA (2017)

With the control total forecasts developed, FKA used a land use allocation model to allocate the population and employment control total forecasts in the Study Area. FKA considered market characteristics including acres of developable vacant land, holding capacity of vacant land, DRI and other approved developments, utility and transportation access proximity, surrounding land use compatibility, and other variables to determine the attractiveness of development. Historic development patterns, using the DataStory TAZ level allocation, were also considered in the future year allocations. For the market characteristics, FKA created an implicit "Index of Attractiveness," described as Super Zones of TAZs based on criteria likely to influence growth in the Study Area. The County control total forecasts were allocated to the Super Zones and checked for population shifts. This check ensures that not too much of the population or employment growth is shifted between the zones in the forecast periods. The Super Zones were then disaggregated to the TAZ level for application in the model. The distribution of population forecast in 2015–2045 is shown on Figure 4-5 for Orange County (portion) and Figure 4-6 for Osceola County.

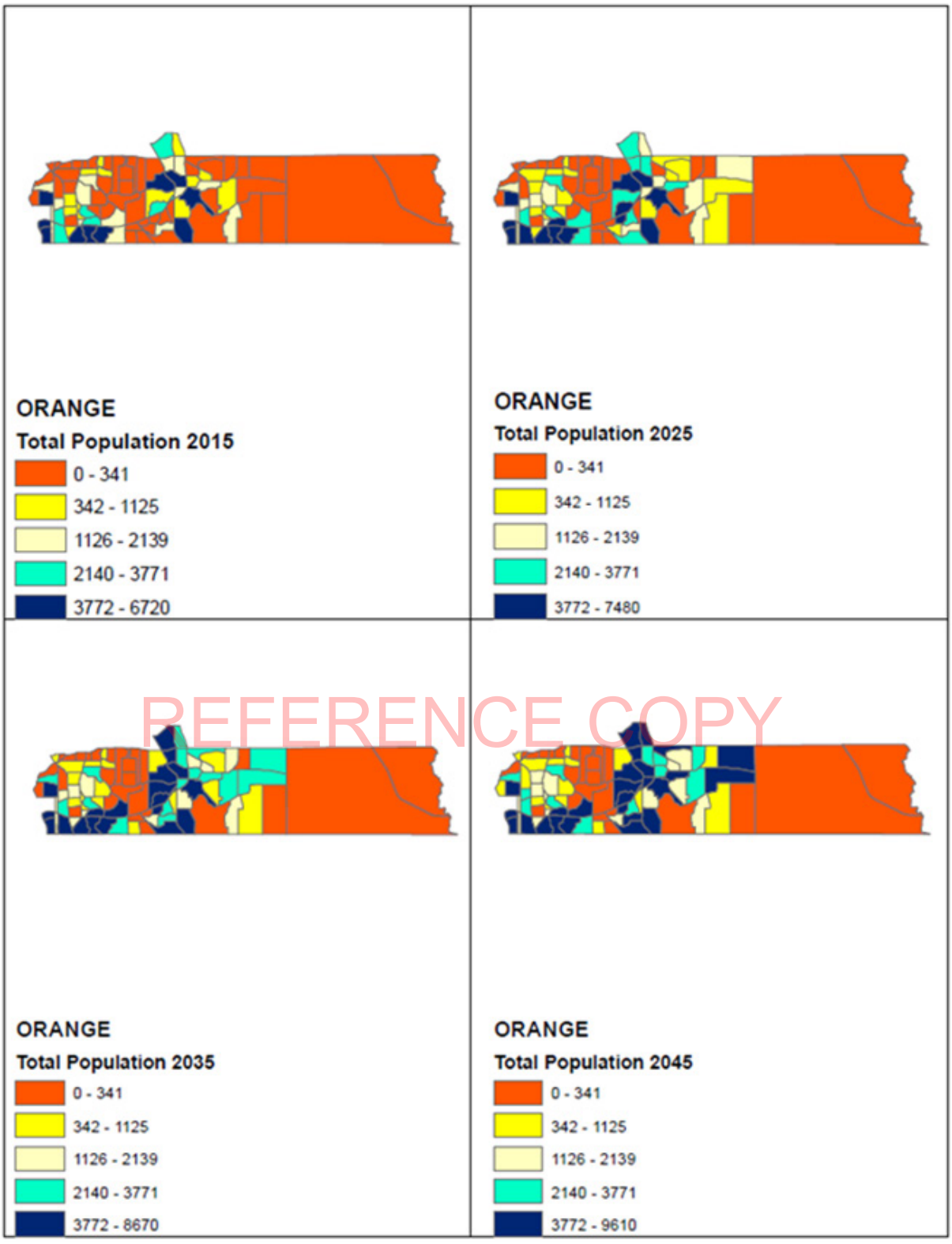

Figure 4-5. Total Population for Orange County (Sub Area): 2015–2045

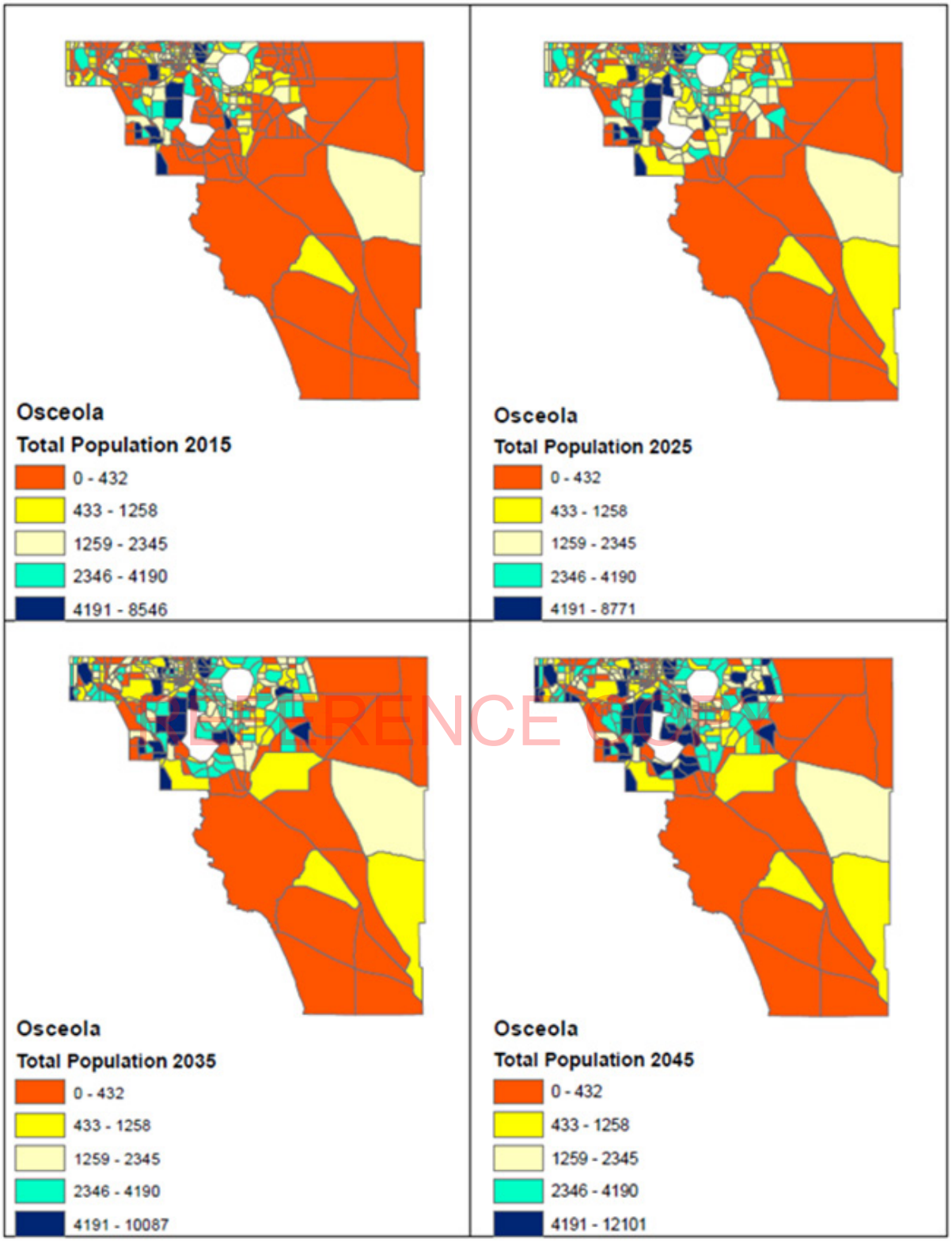

Figure 4-6. Total Population for Osceola County: 2015–2045

4.4.2.2 Socioeconomic Data – Low and High Land Use Forecasts

In addition to this normal growth (base year forecast), FKA developed a low and high forecast of SE data. These variations in land use and development take into consideration the probability of slow growth or housing booms in the 30-year horizon. Using 45 years of Florida population growth, FKA reviewed the history and created a frequency distribution with respect to the annual percentage change in population growth. Based on the frequency distribution and median growth rates, FKA recommended an adjustment to the existing forecasted growth rate of an additional 30 percent on the high side and a reduction in the existing forecasted growth of 20 percent on the low side.

4.4.2.3 Network – Future-year Base Network (2025, 2035, 2045)

The future-year networks in the model contain the transportation improvements identified in the CFX, FDOT, and county work programs, as well as the improvements included in the cost feasible plan from the LRTP for year 2040. In addition to these improvements, additional network links were added, specifically in the high-growth areas and the Study Area. As discussed in Section 4.4.1.2, to ensure proper loading and distribution of trips on the OCX Master Plan study alignments, there was significant TAZ disaggregation in the Study Area, specifically along the four study alignments. This zone disaggregation includes significant future roadway networks to support the study alignments and surrounding future development. For several study alignments, the TAZ structure in the surrounding area consisted of a handful of zones. The number of zones in Osceola County increased by more than 40 percent, or an additional 99 zones, and the portion of Orange County increased by 26 percent, or 19 zones. These zones are supported in part by a network of development roads or roads not considered in the LRTP or county transportation plans. The 2045 network improvements are highlighted in Figure 4-7, with the development roads mainly highlighted in blue. The 2025 and 2035 base networks were created from the 2045 network, and are based on improvements in the 2020 and 2030 networks from the CFRPM 6.1 model. The development roads were included in both the 2025 and 2035 base networks. While the No-Build alternative does not contain the OCX Master Plan projects, it includes the other improvements and development roads.

4.4.2.4 Networks – Future-year Design and Revenue Networks

The traffic forecasts used for design are developed so that the projects are sized to serve customers through the project's useful life (30 years). Conversely, the traffic forecasts used for revenue estimation are created so that the projects produce the forecasted revenue, especially in the early years of operation. Therefore, the traffic forecasts for design purposes differ from (are higher than) the traffic forecasts prepared for revenue-estimation purposes. While the basic assumptions (including overall level and location of future SE activity and toll amounts/values of time) are the same, the network assumptions near the project are different.

As such, a design network and a revenue network were developed for use in the design traffic and revenue traffic forecasts. The design networks were developed to maximize the amount of traffic on the OCX projects, so competitor roads are constrained. The revenue networks were developed to maximize local street utilization (that is, planned improvements, and higher speeds and capacities) and dampen the use of the toll facility.

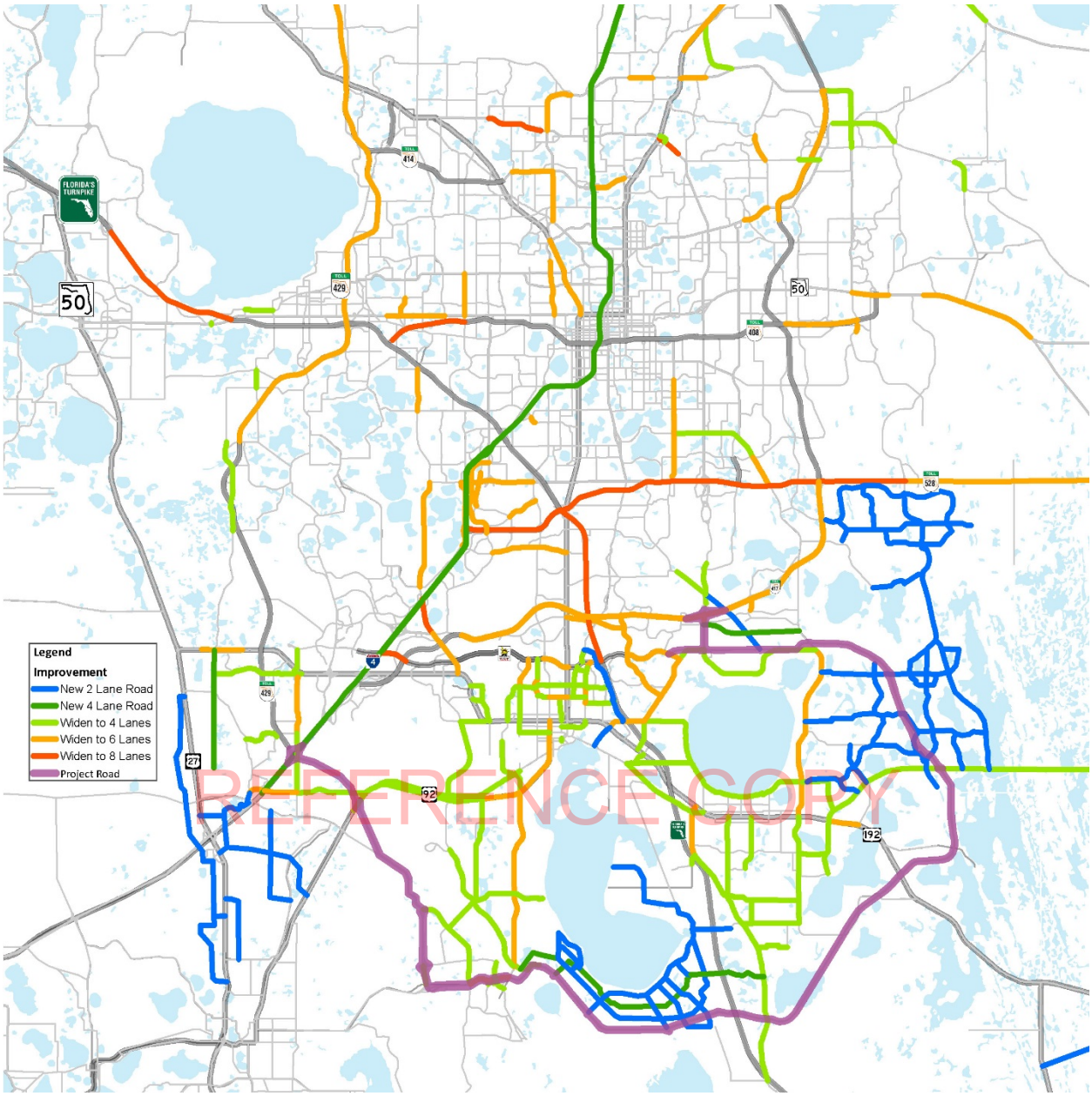

Figure 4-7. 2045 Network Improvements

To maximize traffic on the project facilities in the design network, future improvements were limited to the 2025 LRTP network in Osceola County. More specifically, any improvements identified in Osceola County after 2025 were removed from the 2035 and 2045 networks. In addition, the following 2025 improvements were removed from all design networks:

- Boggy Creek Road from Simpson Road to Narcoossee Road: two to four lanes
- Cyrils Drive from Narcoossee Road to Absher Road: two to four lanes
- Simpson Road from Osceola Parkway to Boggy Creek Road: two to four lanes
- Lakeshore Blvd. from Boggy Creek to Narcoossee Road: two to four lanes
- US 192 from Partin Settlement Road to Brown Chapel Road: four to six lanes
- Narcoossee Road from Boggy Creek Road to US 192: four to six lanes

- Reaves Road from Poinciana Blvd. to Pleasant Hill Road: two to four lanes
- Poinciana Blvd. from Crescent Lakes Way to Pleasant Hill Road: two to four lanes
- Lake Wilson Road from Sinclair Road to Osceola Polk Line Road (CR 532): two to four lanes
- Osceola Polk Line Road (CR 532) from I-4 to Old Lake Wilson Road: four to six lanes

4.4.2.5 Toll Rates

Future-year tolls in the project-specific model reflect current toll amounts and agency policies concerning future toll rate adjustments. The Build alternatives for the OCX Master Plan projects were evaluated with and without tolls. For the analysis, the toll rate was set to $0.18 per mile in 2018 for design traffic, consistent with the toll rate established for the Wekiva Parkway (SR 429). Toll rates were escalated at 1.5 percent per year according to the CFX Customer First Toll Policy.

4.4.2.6 Screen Lines

A final measure of success in validation is the volume of traffic crossing the screen lines within the Study Area. A total of 11 screen lines were established in the model study area, and V/C ratios were evaluated. Table 4-14 summarizes 2015 traffic counts, 2015 model-predicted traffic volumes, and V/C ratios for each screen line. Table 4-14 also lists the 2045 volumes for the screen lines and compound annual average growth rates (CAAGR). Figure 4-8 shows the screen lines.

Table 4-14. Screen-line Counts and Forecasts

	2015			2045	
Screen Line	**Count**	**Volume**	**V/C**	**Volume**	**CAAGR**
1	87,135	98,746	13.33%	163,355	1.7%
2	34,400	37,792	9.86%	90,105	2.9%
3	89,400	84,580	-5.39%	124,280	1.3%
4	88,881	80,947	-8.93%	162,475	2.3%
5	54,096	53,079	-1.88%	86,203	1.6%
6	118,000	136,319	15.52%	310,613	2.8%
7	106,246	93,387	-12.10%	246,506	3.3%
8	140,703	140,995	0.21%	282,295	2.3%
9	147,700	168,999	14.42%	325,155	2.2%
10	249,305	266,849	7.04%	504,555	2.1%
11	62,900	64,656	2.79%	126,928	2.3%
Total	**1,178,766**	**1,226,349**	**4.04%**	**2,422,470**	**2.3%**

There is a good fit between model volumes and actual counts on these screen lines with V/C ratios all between ±15 percent. The table also contains model forecasts for the same locations under the No-Build conditions in the 2045 forecast year. Forecasted traffic growth rates are similar to population and employment growth rates in the Study Area.

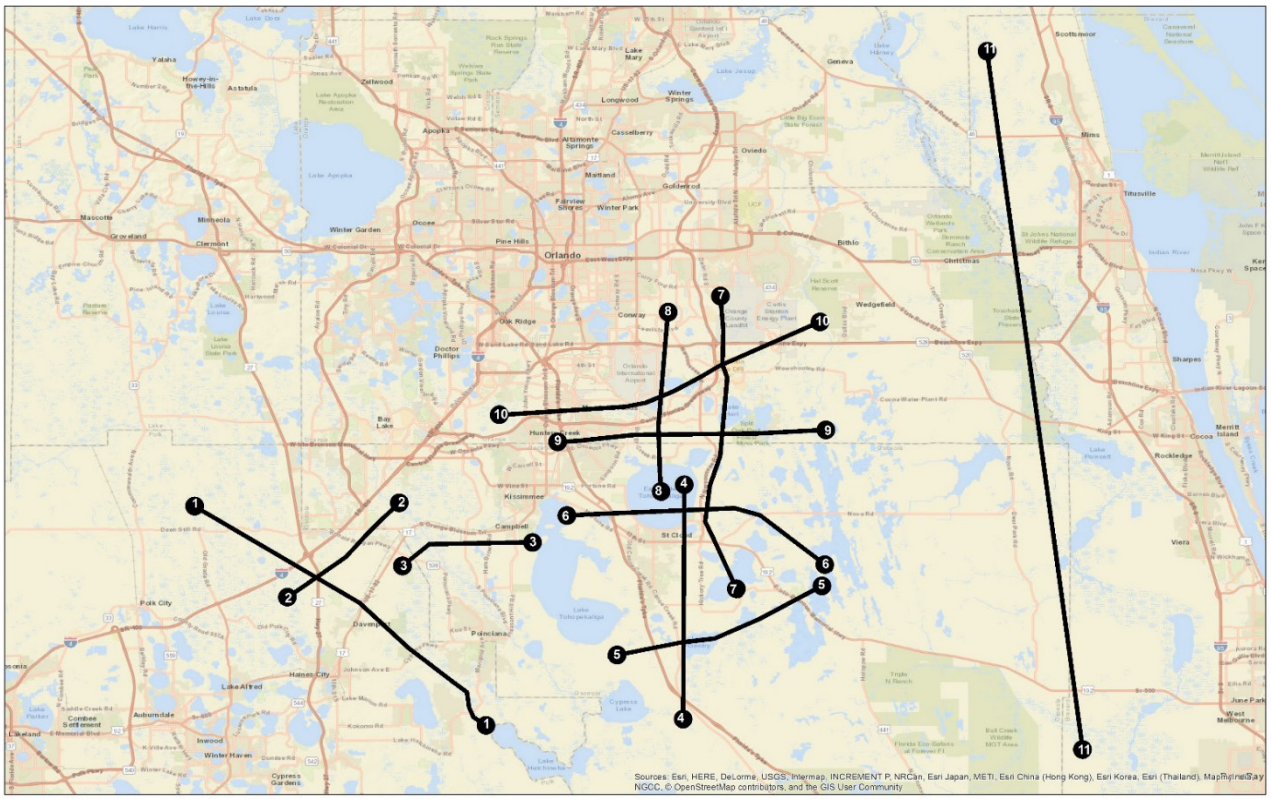

Figure 4-8. Screen lines for OCX Projects

SECTION 5

Design Criteria

5.1 Roadway Design Standards

All alignments considered or developed for this Concept, Feasibility & Mobility Study must adhere to reasonable design standards for the type of alignment envisioned—a limited access expressway facility. In general, each is compatible with an interim four-lane expressway as well as planned widening to include a "transit" corridor in the proposed ROW. The typical sections must consider both the interim and ultimate conditions. Other considerations include the anticipated corridor-wide addition of managed lanes and the need to meet current design criteria including:

- 2017–2018 FDOT Design Standards
- 2017 FDOT Plans Preparation Manual (PPM)
- 2017 FDOT Structures Manual
- 2011 AASHTO A Policy on Design Standards (AASHTO)
- 2016 AASHTO A Policy on Design Standards Interstate System
- 2011 AASHTO Roadside Design Guide
- 2009 Manual on Uniform Traffic Control Devices with 2012 Revisions

Detailed design criteria were provided in the scope of services for this project. In general, they are FDOT criteria for "interstate" roadways. In some cases, CFX-specific criteria were substituted in the scope of services. Table 5-1 lists criteria applicable to this study.

Table 5-1. Roadway Design Criteria

Design Element	Design Standard	Source
Design Year	2045	Scope of Services
Design Vehicle	WB-62FL	AASHTO 2004, Pg. 18 FDOT PPM Vol. 1, p 1-19
Design Speed		FDOT PPM Vol. I, Table 1.9.1, 1.9.2
Rural Freeway	70 mph	
Urban Freeway	60 mph	
Urban Arterial	45 mph	
Rural Arterial	55 mph	
Other		
Frontage Road	45 mph	
Service Road	50 mph	
Access Road	As appropriate	
Ramp		
Directional	50 mph	
Loop	30 mph	
Lane Widths		FDOT PPM Vol 1, Tables 2.1.1, 2.1.2, 2.1.3 and 2.14.1
Freeway	12 feet	

Table 5-1. Roadway Design Criteria

Design Element	Design Standard	Source
Ramp		
1-Lane	15 feet	
2-Lane	24 feet (12 feet per lane)	
Turning Roadway	Case-dependent	
Arterial	12 feet	
Collector/Service Road	12 feet	
Bicycle		
Rural/Urban	5 feet (designated) 4 feet (undesignated)	
Cross Slope (lanes 1-way)		
Roadway		
2-Lane (2)	-0.02 foot/foot (2)	FDOT PPM Vol 1, Figure 2.1.1
3-Lane (3)	-0.02 foot/foot (2), -0.03 foot/foot (1)	
4-Lane (4)	+0.02 foot/foot (I), -0.02 foot/foot (2), -0.03 (2)	
Bridge Section	-0.02 (typical, uniform, no slope break)	PPM Vol. 1, Section 2.1.5
Max. Lane "Roll-Over"	4%	FDOT PPM Vol. 1, Figure 2.1.1
Design Speed ≥35 mph	5% (between through lane and aux. lane)	FDOT PPM Vol. 1, Table 2.1.4
Design Speed <35 mph	6% (between through lane and aux. lane)	
Median Width		
Freeway		
Design Speed ≥60 mph	60 feet	
Design Speed <60 mph	40 feet	
All w/barrier, All speeds	26 feet (with barrier)	FDOT PPM Vol. 1, Table 2.2.1
Arterial and Collector		
Design Speed ≤45 mph	22 feet	
Design Speed >45 mph	40 feet	
Offset Left Turn Lanes		
Median Width ≤30 feet	Parallel offset lane	FDOT PPM Vol. 1, Section 2.13.3 and Figure 2.13.2, AASHTO 9-98
Median Width >30 feet	Taper offset lane	
Horizontal Curve Length	("V" = Design Speed)	
Freeway	30 V (15 V Minimum)	FDOT PPM Vol. 1, Table 2.8.2.a
Others	15 V (400-foot Minimum)	
Max. Curvature (Degree of Curve)	("V" = Design Speed)	
Freeway		
V = 70 mph Rural	3° 30' 00"	FDOT PPM Vol. 1, Tables 2.8.3
V = 60 mph Urban	5° 15' 00"	
Arterial		
V = 55 mph Rural	6° 30' 00"	

Table 5-1. Roadway Design Criteria

Design Element	Design Standard				Source
V = 45 mph Urban	8° 15’ 00”				
Collector					
V = 45 mph Frontage Road	8° 15’ 00”				
V = 50 mph Service Road	8° 15’ 00”				
Ramp					
V = 50 mph Directional	8° 15’ 00”				
V = 30 mph Loop	24° 45’ 00”				
	Total (Feet)		Paved (Feet)		
Shoulder Width (lanes 1-way)	Outside	Left	Outside	Left	
Freeway					
3-Lane or More	12	12	10	10	
2-Lane	12	8	10	4	
Ramp					
1-Lane	6	6	4	2	
2-Lane	10	8	8	4	
Auxiliary Lane	12	N/A	10	N/A	FDOT PPM Vol. 1, Tables 2.3.1 to 2.3.4
Arterial and Collector (Normal volumes)					FDOT Figure 2.3.1
2-Lane divided	10	8	5	0	FDOT Standard Index 510
1-Lane undivided	10	N/A	5	N/A	
Service Road, 2-Lane, 2-Way, Undivided	10	10	5	5	
Shoulder Cross Slope	0.06	0.05	---		
Max. Shoulder “Roll-over”	7.0%	7.0%	---		
Bridge Section (Lanes 1-Way)					
2-Lane	10	6			
3-Lane or more	10	10			
1-Lane Ramp	6	6			FDOT PPM Vol. 1, Figures 2.0.1, 2.0.2 and 2.0.4
2-Lane Ramp	10	6			
Service Road, 2-Lane, 2-Way, Undivided	10	10			
Border Width					FDOT PPM Vol. 1, Tables 2.5.1 and 2.5.2
Freeway	94 feet				
Ramp	94 feet (Limits of Construction plus 10 feet as a minimum)				CFX Policy
Arterial/Collector					
Design Speed >45 mph	40 feet				
Design Speed ≤45 mph	33 feet				

Table 5-1. Roadway Design Criteria

Design Element	Design Standard		Source
Arterial/Collector (Curb and Gutter)			
Design Speed = 45 mph	14 feet (12 feet with bike lane)		
Design Speed ≤40 mph	12 feet (10 feet with bike lane)		
Roadside Slopes			
Front Slope	Fill Height (feet)	Rate	FDOT PPM Vol. 1, Table 4.2.4 CFX Policy Use 1:3 slopes; avoid 1:2 slopes except where as necessary
	0.0–5	1:6	
	5–10	1:6 to CZ then 1:4	
	10–20	1:6 to CZ then 1:3	
	>20	1:2 with guardrail (Use 10-foot bench at half the height of fill)	
	All	1:2 not flatter than 1:6	
Front Slope (curb and gutter)	All	1:2 not flatter than 1:6	
Back Slope	All	1:4 or 1:3 with standard width trapezoidal ditch and 1:6 front slope	
Back Slope (curb and gutter)	All	1:2 not flatter than 1:6	

In addition to the specific numeric design criteria provided in the project scope of services and shown in Table 5-1, the following design constraints were considered in the development of typical section options for the initial construction and ultimate widening:

- Right-of-Way: The proposed typical sections should minimize proposed ROW and minimize the number of property owners affected by ROW acquisition. Primary ROW will be limited access.
- Multimodal corridor: The proposed typical sections should accommodate a multimodal envelope within the proposed ROW or adjacent to the limited-access ROW line. This would be in accordance with the OCX (2013) *Master Plan 2040*, which has been incorporated into the CFX (2016) *Visioning + 2040 Master Plan*.
- Existing Pavement: The proposed typical sections should maximize the use of existing pavement, where possible.

In general, both the initial alignments and the viable alignments adhered to these design criteria. Specifically, all alignments held all horizontal curvature to a 70-mph design speed. These alignments used no more than 7 percent of a maximum allowable 10-percent superelevation, thus leaving flexibility for constraints that might be added during final design.

5.2 Drainage Design Standards

In addition to FDOT design requirements, construction of stormwater ponds for this project will require an Environmental Resource Permit (ERP) from the SFWMD. The criteria to meet water quality and quantity are based on the SFWMD and FDOT stormwater regulation standards. The design criteria are from the *FDOT Drainage Manual* (FDOT, 2018a), *FDOT Drainage Design Guide* (FDOT, 2018b), and the SFWMD *Environmental Resource Permit Information Manual* (SFWMD, 2014). The full details of the stormwater pond and floodplain impact compensation pond calculations are contained in the *Pond Sizing and Siting Technical Memorandum* (TM) in Attachment E. The criteria used are summarized in the following sections.

5.2.1 Pond Design

The ponds were sized to accommodate the proposed roadway and pervious areas within the ROW area. Runoff from offsite areas was not used in treatment or attenuation estimates.

All basins within the project are considered open basins in that they outfall to wetlands, creeks, or lakes. Wet detention systems are analyzed to provide water quality improvements and water quantity attenuation for the project runoff. Wet detention is assumed based on the high water table throughout the project limits. Ponds were sized using stacked attenuation plus treatment volumes, which is reflected in the calculation example in the *FDOT Drainage Design Guide* (FDOT, 2018b).

Design criteria in the following subsections apply.

5.2.1.1 Water Quantity/Attenuation – Open Basins

For open basins, post-development discharge rates must not exceed the pre-development discharge rates per SFWMD requirements. SFWMD uses the local government requirements, if available. In Orange County, the 25-year/24-hour storm event and in Osceola County, the 10-year/72-hour storm event are used for pre-development vs. post-development discharge rate analysis.

In this study, the Orange County 25-year/24-hour storm will provide a reasonable attenuation estimate. The SFWMD rainfall is 8.6 inches based on nearby permits. The pond area is included in the basin area for attenuation. SFWMD does not have a freeboard requirement.

FDOT has a critical duration requirement. FDOT requires a 1-foot freeboard to allow for grading variations during construction. This freeboard was included in the calculations. Typically, the 100-year 24-hour duration is often the critical storm for open basins and was used in this analysis.

5.2.1.2 Water Quality/Treatment – Wet Detention

The treatment volume estimate is based on the wet detention pond requirement plus an additional 50% because the project discharges to an impaired waterbody (Lake Okeechobee). Wet detention requirements are the greater of:

- 1 inch over the Project Area, which does not include the pond water surface area per 4.2.2(c) SFWMD Vol II (SFWMD, 2014)
- 2.5 inches over the Impervious Area, which does not include the pond water surface area.

The project traverses several Water Bodies IDs. A pre- vs. post-pollutant loading analysis will need to be performed in later phases for this project because a Nutrient Reduction Plan has been implemented for Lake Toho and as suggested by the SFWMD. Please refer to the *Lake Toho Nutrient Reduction Plan, Final Report* (CDM, 2011).

5.2.2 Floodplain Compensation

The project limits are within the FEMA FIRM Panel Nos. 12095C0650F, 12095C0675F, 12097C0085G, 12097C0105G, and 12097C0110G. The major floodplain impacts are associated with Boggy Creek, Jim Branch, Lake Myrtle, and Lake Preston. In areas where FEMA mapping or Letter of Map Revision data were unavailable, an overlay of the USGS quadrangle maps was used for determination of elevations for Flood Zone A.

A review of FEMA's FIRM maps for the project indicates that portions of the project lie in the 100-year floodplain, within flood zones AE (elevations range from 63 to 80 NAVD) and A. There is to be no net reduction in flood storage within a 100-year floodplain.

Roadside swales along Boggy Creek Road discharge into unnamed creeks or ditches that drain into Boggy Creek, a FEMA-designated regulatory floodway. Hydraulic modeling and analysis to achieve a FEMA "No-Rise" certification may be necessary during the design phase of the project depending on the preferred alternative design.

Compensation for potential floodplain impacts were sized based on a cup-for-cup basis utilizing the 100-year/24-hour design storm event. Seasonal high groundwater was assumed to be 1 foot below existing ground; therefore, compensation depth is 1 foot. No significant historic basin storage was observed outside of the floodplain areas.

5.2.3 Cross Drains

All cross drains that would be included with this project will be designed to meet FDOT standards and specifically the 2018 *FDOT Drainage Design Guide*, including design frequency flood events.

5.2.4 Canal Crossings

The eastern segment of the project traverses SFWMD Canals C-29A and C-30, which are regulated canals. Stormwater discharge is anticipated to be conveyed into these water bodies. Further coordination with SFWMD will be necessary for desired discharge rates for the canals, and canal ROW requirements. No extensions to existing canals or new canals are proposed. Both canals are fully bridged by all east segments, and impacts to their accompanying ROW were minimized to allow for ongoing maintenance access.

SECTION 6

Mobility Alternatives Evaluation

6.1 No-Build Alternative

The No-Build Alternative, which involves no changes to the transportation facilities in the Study Area beyond currently planned and programmed (tentatively funded) projects, will be analyzed and documented in the next phase of this project. The build alternatives are compared with the No-Build Alternative to demonstrate what selecting a build alternative could accomplish.

6.2 Transportation Systems Management

The next phase of this project will also document Transportation Systems Management and Operations (TSM&O) alternatives, which are low cost transportation improvements designed to maximize the utilization and efficiency of the existing transportation system through improved system management.

6.3 Transit, Intermodal, and Multimodal Alternatives

Transit alternatives operating in the Study Area could enhance the project's ability to meet the mobility needs of people in this growing area. The typical sections provide the possibility of dedicated transit corridors from Laureate Boulevard to the eastern terminus of the project. West of Laureate Boulevard, the typical sections provide the possibility of a transit corridor shared with express lanes. The OPE Project would thereby provide possible transit connections to existing and planned developments and existing and planned transit networks in and near the study corridor.

6.3.1 Assumptions

Transit services within the Study Area would be operated by an agency other than CFX; potentially LYNX, GOAA, Osceola County, or a private entity. This is the approach suggested in the *Central Florida Expressway Multimodal Investment Assessment* report (CUTR, 2017). The report's policy statement recommended "funding or partnering on multimodal initiatives where revenue generated from the investment equals the project cost or where toll user benefits are equal to or exceed the project cost." The report advised that it would not be financially prudent for CFX to take on operating a transit system. CFX adopted the multimodal policy statement in March 2017.

Transit technologies would need to fit within the design parameters of the project as detailed in Section 5.

Based on data in the socioeconomic consultant's report (FKA, 2017), it is assumed that Osceola County and NED will continue to be primarily residential use. If Osceola County continues to serve as a residential community, then residents would need to commute to work in major employment centers in Orange County. Thus, peak travel is expected to be from east to west in the morning and from west to east in the evening.

6.3.2 Phasing

The proposed design would allow for the phasing of transit alternatives. For example, in the initial phase of the project, normal bus service could be offered via the express lanes or regular lanes. Later, a dedicated transit corridor could be developed within the project's ROW for bus rapid transit, light rail, or some other transit technology. Service could be expanded as major developments like NED, Deseret Ranches, the Narcoossee Overlay, OIA, and the Lake Nona DRI grow in population.

6.3.3 Potential Transit Technologies

The OPE Study Area could be served by multiple transit technologies. These could vary from automated people movers up to maglev trains, depending on the recommended alignment geometry. Table 6-1 lists a range of transit technologies and their practical geometric and speed constraints. Given the 70-mph roadway design speed used to lay out the roadway segments and the corresponding design radius of 3,000 feet, the roadway segments could accommodate all the listed technologies, except maglev, high-speed rail, and higher-speed rail.

Table 6-1. Transit Technologies Geometric and Speed Constraints

Technology	Example	Maximum Operating Speed	Minimum Practical Radius (ft)	Absolute Minimum Radius (ft)
Magnetic Levitation	Japan	300 mph	22,000	
	Germany	230 mph	14,000	
High-speed Rail	TGV	200 mph	28,000	
	Japan	225 mph	28,000	
	California	250 mph	28,000	
	China	350kph	23,000	
Higher-speed Rail	Brightline	125 mph	5,800	500
Commuter	SunRail	79 mph	2,000 (3d)	400
Heavy Rail	Atlanta MARTA	70 mph	1,500	
Mono Rail	BYD China		300	
Light Rail				
Dedicated ROW	Foothill Gold Line	65 mph	1,500	500 min
Mixed Street	Atlanta	30 mph	500	85 min
Street Car	Atlanta	25 mph	500	85 min
Automated People Mover	OIA	30 mph	500	
	Honolulu	60 mph	1000	400 min
Bus Rapid Transit		70 mph	22–30	22-30
Local Bus Service	LYNX	70 mph	21.5	21.5

6.3.4 Existing Transit Networks: LYNX, SunRail

LYNX is a bus service operated by the Central Florida Regional Transportation Authority. It serves Orange, Osceola, Seminole, and parts of Lake and Polk Counties. LYNX currently operates 77 local bus routes, 12 NeighborLinks providing feeder access to main routes, two LYMMO downtown circulator routes, three FastLinks (bus routes with reduced stops), express bus service, paratransit, and commuter assistance vanpools. LYNX provides several routes in Osceola County and in the Orange County portion of the Study Area.

SunRail is planned to be a 61.5-mile-long commuter rail line connecting Volusia, Seminole, Orange, and Osceola Counties. Existing SunRail, Phase One, currently connects DeBary in Volusia County to Sand Lake Road in Orange County (MetroPlan Orlando, 2017a).

6.3.5 Future Transit Networks

6.3.5.1 LYNX

LYNX's *2030 Vision Plan* (Tindale-Oliver & Associates, Inc., 2011) and MetroPlan Orlando's 2040 LRTP (MetroPlan Orlando, 2017a) incorporate increased LYNX service in and near the Study Area. Plans include bus rapid transit on US 192 from Lake County to St. Cloud and bus rapid transit on Cyrils Drive. Plans would also enhance connectivity from OIA to Lake Nona/Medical City and the University of Central Florida Campus and Research Park.

6.3.5.2 SunRail

SunRail Phase Two will extend the system south to Poinciana in Osceola County. SunRail is also considering an expansion to connect its mainline to OIA (MetroPlan Orlando, 2017a). An extension to OIA would enhance intermodal transit possibilities for travelers using the OPE.

6.3.5.3 Other

The privately funded Brightline higher-speed rail service plans to connect Miami to OIA. Studies are underway for the possibility of a light rail connection from International Drive to OIA. A private developer is exploring possible maglev service from the Orange County Convention Center area to OIA.

6.3.6 Intermodal or Multimodal Alternatives

Osceola County's Northeast District Plan created a Multimodal Transit District as part of the NED. Development in the area will follow principles of smart growth. The design will place transit stations within the dense central core with multimodal access via pedestrian and bicycle trails. A significant portion of residents will have reasonable pedestrian or bike trail access to the transit station in the central core (Osceola County, 2010).

The OPE will connect this Multimodal Transit District to other multimodal facilities including the ITF at OIA and developing and planned multimodal facilities in Lake Nona/Medical City in Orange County. OIA's ITF is scheduled to open in 2018 and will be a Superstop for LYNX buses, including express buses from Kissimmee and Lake Nona. The ITF will be the Orlando station for the Brightline higher-speed rail service from Miami. Planning is underway for a SunRail station at the ITF and for possible connections to the International Drive area by elevated maglev trains or light rail. By offering better connections to OIA, the OPE Project will give users access to a wide range of multimodal transit options. Once all these facilities are complete, a NED resident could potentially walk or bike to a transit station in the Northeast District's Central Core, ride transit along the OPE to the ITF, and then travel by SunRail to any part of its line, by maglev or light rail to the International Drive area, by Brightline higher-speed rail to Miami, or by air to hundreds of destinations around the world.

The proposed OPE would also provide access from the Study Area to freight facilities at OIA and at the Orlando CSX Intermodal Terminal.

6.4 Tolled Limited-Access Facility

A tolled limited-access expressway is an essential part of any solution to the current and future mobility needs of the Study Area. In the western portion of the Study Area, existing roadways are near capacity and will fail as traffic demands increase in coming years. In the eastern portion of the Study Area, existing and planned roads are inadequate to handle the future traffic generated by planned development in NED and beyond the Study Area into the proposed Deseret Ranches development. Transit solutions would require either the purchase of expensive ROW or would operate on the same failing roadways. TSM&O solutions would work only if there were existing road capacity. In the eastern portion of the Study Area, there are few existing roads in which a TSM&O solution could be implemented.

The tolled limited-access alternatives described in Section 6.6 provide the most viable means to meet future mobility needs in the Study Area. Tolls provide a financing mechanism to fund ROW and construction costs. A limited-access expressway would enable higher-speed travel by avoiding the delays associated with intersections and local access. It would also separate longer-distance travel from local traffic. Each of the alternatives, while focused on a limited access expressway, explicitly accommodates future bus or fixed route transit options within the proposed expressway typical section.

6.5 Corridor Development Process

The reasonable alignments for the OPE Concept, Feasibility & Mobility Study were identified and evaluated in a multistep process to allow opportunities for public and agency input throughout the study. The process for identifying alignments to be evaluated is called *alternatives development*. The process of evaluating a broad range of alignments and selecting a more limited number that should be carried forward for a detailed PD&E study is called *alternatives screening*. As the project continues into the PD&E phase, the range of alignments under consideration should decrease and eventually result in a final recommendation (called a *preferred alternative*).

FDOT uses the Alternative Corridor Evaluation (ACE) process to identify, evaluate, and eliminate alignments on qualifying projects prior to the PD&E phase. The ACE process is the first step of the multistep screening process, which involves developing and evaluating corridors with opportunities for agency and public input. While this Concept, Feasibility & Mobility Study developed and screened alignments similar to an ACE, the feasible alignments from this study will be required to use the ACE process and present the results in an Alternative Corridor Evaluation Report (ACER) during the next phase of the study.

6.5.1 Re-evaluation of Previous Study Corridors

As an initial step of this Concept, Feasibility & Mobility Study, CFX directed that the prior OCX 2017 PD&E be evaluated. This evaluation is fully documented in the PD&E Study Evaluation TM in Attachment F-1. The purpose of this TM was to summarize the findings of the OPE 2017 PD&E study completed in May 2017 by OCX in coordination with FTE. The TM summarized:

- Findings and results of the PD&E study
- PD&E recommendations and commitments
- Significantly changed conditions within the Study Area
- Recommendations to be incorporated into CFX's OPE Concept, Feasibility & Mobility Study

The OCX 2017 PD&E was a follow-on study to the 2012 *Preliminary Feasibility Study* (Osceola County, March 2012). That study developed three corridors named A, B and C, as seen on Figure 6-1. After

extensive analysis, the study concluded Corridor B as the most practical in terms of minimized impacts. Corridor B was then divided into Western, Central, and Eastern segments for further analysis. The Western segment was along the north-south segment of Boggy Creek Road; the Central segment was along the county line from Boggy Creek Road to Narcoossee Road; and the Eastern segment was east of Narcoossee Road. Multiple alternatives were developed and evaluated for each segment, resulting in a Recommended Alternative comprising their W-4A2, C-1, and E-5A2B segments (see Figure 6-2).

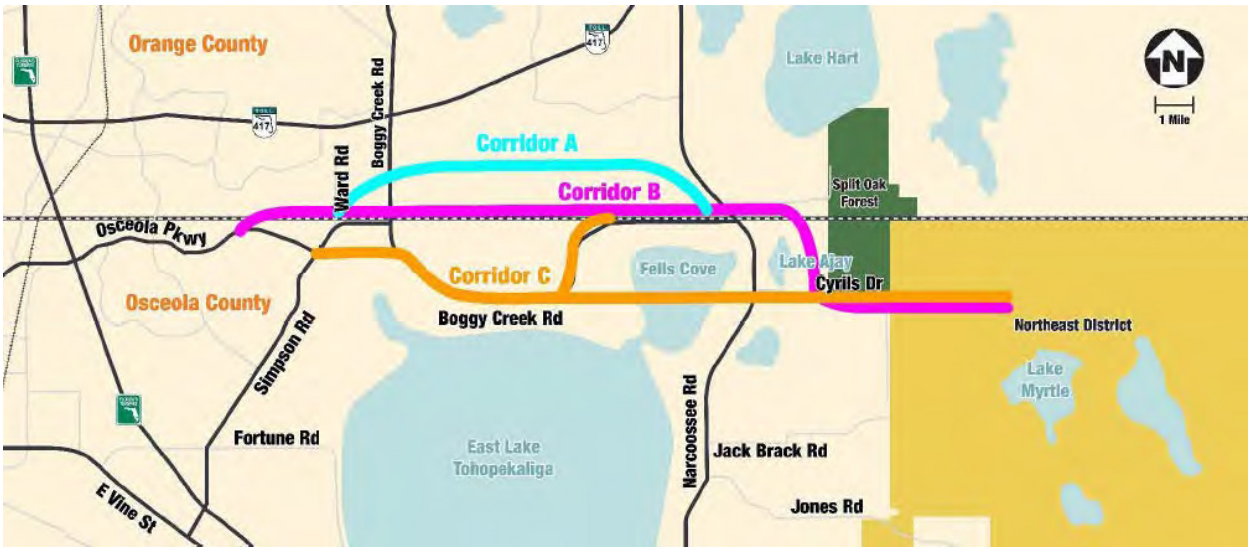

Figure 6-1. OCX 2017 PD&E Initial Corridors

Figure 6-2. OCX 2017 PD&E Recommended Alternative

6.5.2 Development of New Corridors

6.5.2.1 Base Map Development

The Study Area for the OPE project is mixed use and rural. Along Narcoossee Road, and to the west, the Study Area is mixed use, while the eastern portion of the Study Area is primarily rural with low- and medium-density residential land uses. Commercial and technology-based development is concentrated in the Lake Nona area. The 650-acre health and life sciences park known as Lake Nona Medical City is

suited for medical care, research, and education. The Study Area is within the boundaries of the City of Orlando, Orange County, and Osceola County.

The identification of potential alignments was preceded by a comprehensive data collection effort to identify social, cultural, natural, and physical environmental features in the Study Area. Information was obtained from several sources including GIS databases. The environmental features were overlaid on base maps that were created using aerial photography, property boundaries, street names, and other landmarks. These base maps use easily identifiable features to encourage public and agency input into the identification of major project concerns. Project displays were developed to identify potential social, cultural, natural, and physical environmental constraints that should be avoided or minimized to the extent possible. Certain environmental features, such as parks, recreation areas, historic structures, wetlands, and contamination sites, have special federal and/or state protection. Impacts to environmentally sensitive features should be avoided or minimized, if possible. These potential environmental constraints were identified on a constraint map. All the constraint maps were displayed at a series of public meetings held throughout the course of this feasibility study and on the project website to receive input on the identification of project constraints. Section 8 provides more information on public involvement activities.

6.5.2.2 Land Suitability Map

A process called Land Suitability Mapping (LSM) was used to evaluate the Study Area for potential project locations. The LSM process involves using GIS databases to identify, map, and analyze sensitive environmental features. The LSM process was used to identify areas potentially unsuitable for project development. GIS databases are updated regularly by the agencies that compile the data. The information obtained during data collection was used to update the project databases with the most current and accurate information available. Attachment C-2 lists GIS databases used in the assessment of the Study Area.

Environmental features were overlaid on the GIS base map and the environmental constraints map. Certain environmental features—such as parks, recreation areas, historic structures, wetlands, and contamination sites—have special federal and/or state protection. Impacts on environmentally sensitive features must be avoided or minimized if possible. These potential environmental constraints were identified on a constraint map and displayed at the various public meetings and made available on the project website for public input on identifying project constraints. Attachment F-2 presents the environmental constraint map.

The LSM map presented as Attachment F-3 is a composite of all the environmental database features. Each identified feature on the map was set to the same shade of gray, allowing for an equal weight of importance. The intensity of the shades of gray from light to dark represents the number of sensitive environmental features in that area. Areas with multiple features appear dark gray to black. The darker the gray, the more difficult it is to offset effects to those features and the more those areas should be avoided, if possible. The results of the LSM mapping exercise showed most of the Study Area just north of the Orange/Osceola county line is characterized by four or fewer environmental features. Based on the LSM mapping, the eastern portion of the Study Area generally has more sensitive environmental features than other locations.

6.5.2.3 Initial Alignments

The current Concept, Feasibility & Mobility Study started with the OCX 2017 PD&E Recommended Alternative as a “base case” with the directive to improve upon it. Each initial alignment was envisioned to be an improvement in some respect (for example, fewer residential impacts, less wetland impacts, reduced cost, etc.) to the 2017 PD&E Recommended Alternative. A typical section was developed to accommodate an ultimate six-lane expressway and future transit facility in the median. To lessen ROW

impacts, the multimodal corridor and separate transit corridor envisioned in the OCX (2013) Master Plan (400-foot-wide) typical section were omitted west of Narcoossee Road. Figure 6-3 shows the narrowed (338-foot-wide) western typical section.

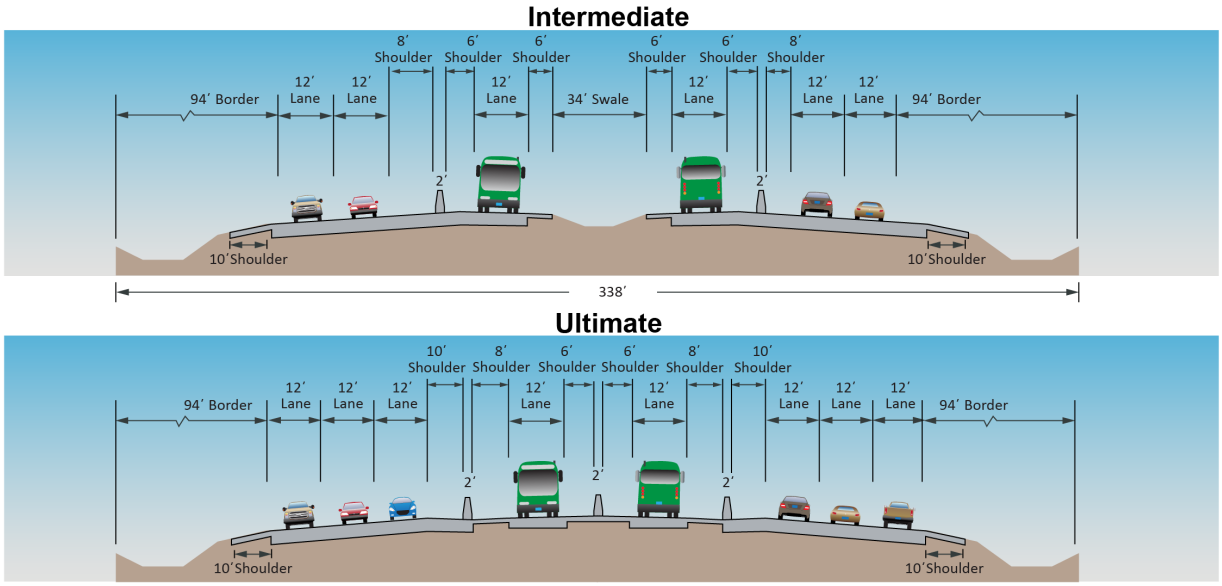

Figure 6-3. Initial Alignments Western Typical Section

Figure 6-4 shows the nine initial alignments developed for this study. These initial alignments were laid out conceptually in accordance with basic design criteria (70-mph design speed, 7 percent or less superelevation, etc.) as set out in the feasibility study's scope of services and each was evaluated for fatal flaws.

Alignment 1

Initial Alignment 1 is based on the 2017 PD&E Recommended Alternative. West of Narcoossee Road, it mimics the PD&E Recommended Alternative. East of Narcoossee Road, it avoids the Orange County portion of SOFWEA by turning southeast sooner than the PD&E Recommended Alternative. It is shown in dark blue on Figure 6-4.

Alignment 2

This alignment starts at the SR 417/Boggy Creek interchange, follows Boggy Creek south, turns east along Whispering Pines Road, and crosses the Poitras Property to Narcoossee Road. East of Narcoossee, it follows the PD&E Recommended Alternative to the C-29A Canal, turns southeast missing the Orange County portion of SOFWEA, interchanges with the Northeast Connector Expressway, and then continues to Sunbridge Parkway. It is shown in dark green on Figure 6-4.

Alignment 3

Alignment 3 follows the PD&E Recommended Alternative from the SR 417/Boggy Creek interchange to the Orange/Osceola County line then moves north through the middle of the Poitras Property to Narcoossee Road. East of Narcoossee Road, it is identical to Alignment 2. It is shown in red on Figure 6-4.

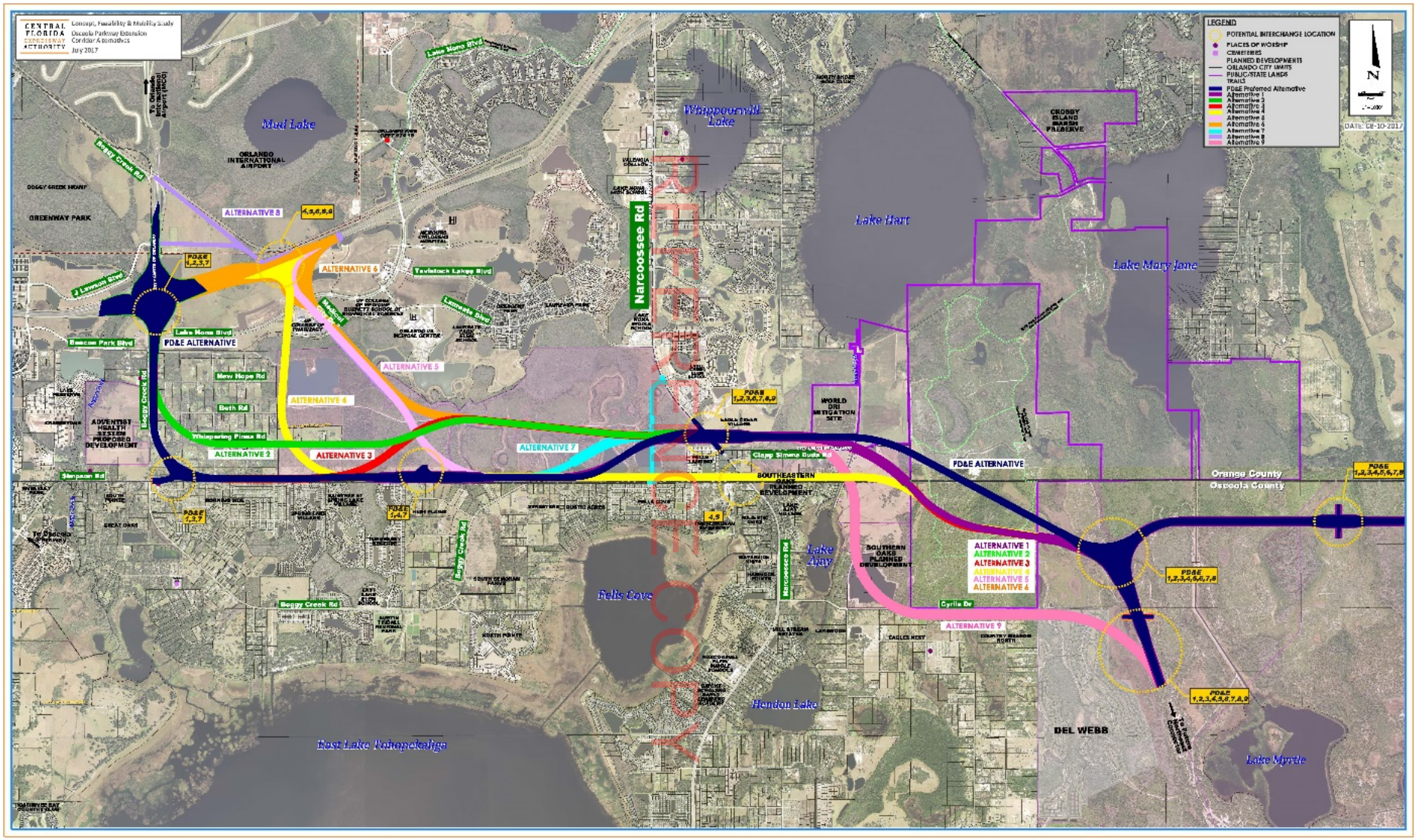

Figure 6-4. PD&E Recommended Alternative and Initial Alignments

Alignment 4

This alignment starts approximately 1 mile east of the SR 417/Boggy Creek interchange, goes south to the Orange/Osceola County line, follows the county line and then Boggy Creek Road to Narcoossee Road. From there, it continues east crossing SOFWEA south of the county line, interchanges with the Northeast Connector Expressway, and continues to Sunbridge Parkway. It is shown in yellow on Figure 6-4.

Alignment 5

Alignment 5 starts at the same place as Alignment 4, approximately 1 mile east of the SR 417/Boggy Creek interchange. It goes southeast along existing Medical City Drive to the Orange/Osceola County line. From there to the eastern terminus, it is identical to Alignment 4. It is shown in light pink on Figure 6-4.

Alignment 6

Alignment 6 starts at the same location as both Alignments 4 and 5. Like Alignment 5, it continues southeast along existing Medical City Drive. At approximately the midpoint of the Poitras Property, it turns east to Narcoossee Road. East of Narcoossee Road, it is identical to Alignments 2 and 3. It is shown in orange on Figure 6-4.

Alignment 7

This is a partial alignment that could be inserted into Alignments 2, 3, and 5 west of Narcoossee Road. It comprises a mainline realignment away from the county line, a local access interchange west of Fells Landing (instead of at Narcoossee Road), and a north-south arterial connection between Narcoossee and Boggy Creek Road. It is shown in light blue on Figure 6-4.

Alignment 8

This is a partial alignment that could be added to Alignments 4, 5, and 6 as an extension north of SR 417. It comprises an arterial connection to an extension of J. Lawson Boulevard and an arterial extension of Boggy Creek Road parallel to and immediately south of the railroad track. It is shown in light purple on Figure 6-4.

Alignment 9

This is a partial alignment that could replace the portions of Alignments 1 through 6 and the PD&E Recommended Alternative east of Narcoossee Road. It is a complete avoidance of SOFWEA with a connection to the Northeast Connector Expressway. It is shown in dark pink on Figure 6-4.

Table 6-2 shows each of the nine initial alignments, major or fatal flaws for each, and which were continued for future consideration.

Table 6-2. Initial Alignments' Fatal Flaws

Initial Alignment	Color in Figure 6-4	Fatal Flaw(s)	Continue for future Consideration? (Y/N)
PD&E	Dark blue	None	Y – Continued as "base case" for future comparisons
1	Dark Purple	None	Y – Relatively large SOFWEA remainder
2	Green	Numerous residential impacts along Boggy Creek Road and Whispering Pines Road	N – High residential impacts

Table 6-2. Initial Alignments' Fatal Flaws

Initial Alignment	Color in Figure 6-4	Fatal Flaw(s)	Continue for future Consideration? (Y/N)
3	Red	Numerous residential impacts along Boggy Creek Road; significant impacts to "developability" of Poitras Property	N – High residential and high value developable property impacts
4	Yellow	Numerous (30+) residential impacts in Fells Landing neighborhood	N – Very high residential impacts at Fells Landing
5	Light pink	Numerous (30+) residential impacts in Fells Landing neighborhood	N – Very high residential impacts at Fells Landing
6	Orange	Significant impacts to wetlands in the Poitras Property	Y – Provides shorter/cheaper route
7	Light blue	Added impacts to wetlands in the Poitras Property	Y – Provides alternate access and possibly lower traffic impacts on Narcoossee Road
8	Light Purple	Additional wetland impacts north of SR 417	Y – provides better connection to OIA
9	Dark pink	Some impacts to residences in Lake Ajay Village and along the east side of Lake Ajay; major impacts along the south side of Cyrils Drive	Y – Continued because it is the complete avoidance alignment

6.6 Alternative Narrative

After development of the initial alignments, further discussions were had with cooperating agencies, stakeholders, and citizens. Through these discussions, some initial alignments were removed from further consideration. Some, such as Alignments 4 and 5, were dismissed because of impacts to existing residences. Others, such as Alignment 9, were retained because, though flawed, they had a desirable benefit. In the case of Alignment 9, it completely avoids SOFWEA – a goal of many citizens in the project area.

As the process moved forward, the alignments were split into west and east segments, with the dividing line being Narcoossee Road. West of Narcoossee Road, the land use is primarily undeveloped commercial property, though there are existing residences along Boggy Creek Road south of SR 417. East of Narcoossee Road, the land use is primarily conservation (Eagles Roost, SOFWEA, Moss Park, etc.), with existing residences around Lake Ajay and along Cyrils Drive. Also, east of Narcoossee Road are many planned residential developments that are either currently under construction or could be in place within the next few years. Given that the west and east segments have different characteristics, splitting the alignment at Narcoossee Road allowed the analysis to focus on different priorities for both sections.

The following sections provide a narrative description of each alternative segment. The concept plans for each alternative segment are provided in Attachment I, Concept Plans.

6.6.1 West Segments

Each west segment begins at the South Access Road (Jeff Fuqua Boulevard) into OIA and continues south and east to Narcoossee Road. The portions north of Laureate Boulevard are assumed to be in a 150-foot-wide right-of-way and south of Laureate they are the full 338-foot-wide expressway ROW. The design speed for the mainline is 70 mph throughout the west segments.

6.6.2 Segment West 1A

This segment provides full connections into the OIA, full access at SR 417, full signalized access at Lake Nona Boulevard, future diamond interchange access to the future east-west arterial within the Poitras Property and local access west of the Fells Landing neighborhood and indirectly to Boggy Creek Road and Narcoossee Road (see Figure 6-5).

6.6.2.1 Segment Location

This segment begins at the intersection of J. Lawson Boulevard and Boggy Creek Road, just north of SR 417. This allows drivers on OPE to access OIA. An easterly four-lane arterial extension of J. Lawson Boulevard turns southeast just west of the existing railroad and creates a new interchange with SR 417, elevated above the existing freeway. This new interchange would likely be a single-point urban interchange (SPUI) but could also be a diamond or diverging diamond interchange depending on projected turning movement counts and final design criteria. The segment continues south as a pair of one-way, at-grade frontage roads. A signalized intersection would be provided at Lane Nona Boulevard. Continuing south, the frontage roads ramp over Laureate Boulevard and expand out to a full expressway typical section. From Laureate Boulevard, the expressway continues south, interchanging with a proposed east-west arterial in the Poitras Property. Beyond this interchange, the segment turns eastward staying just north of the Orange/Osceola County line and continues easterly to Narcoossee Road. Just west of the existing Fells Landing neighborhood, a local access interchange would be provided with arterial connections to new signalized intersections at Narcoossee Road to the north and Boggy Creek Road to the south. The OPE alignment would bridge over Narcoossee Road, with no connections, and link with any one of the east segments.

An optional direct airport connector would begin in the median of Jeff Fuqua Boulevard north of the railroad. These lanes (one northbound and one southbound) would continue southeast on the south side of the railroad, bridge over SR 417 and the local access interchange there, bridge over Lake Nona Boulevard, and then merge into the full expressway typical section over and south of Laureate Boulevard. The direct airport connector would provide a non-stop connection from OIA to the OPE expressway.

6.6.2.2 Proposed Typical Section

West 1A has two distinct typical sections: an arterial and an expressway. The arterial section (see Figure 6-6) provides access to Lake Nona Boulevard, SR 417, and Boggy Creek Road through a four-lane, curb-and-gutter, at-grade roadway with signalized intersections. It has an option to add a non-stop direct airport connector to OIA using a bridge down the median. This option could be added later as traffic demands dictate.

The expressway typical section (see Figure 6-7) allows for a six-lane ultimate build-out plus transit lanes or possibly a rail facility in the median. The transit features could be built later as traffic demands and revenue dictate.

6.6.2.3 Proposed Interchanges

For this segment, interchanges are proposed at SR 417 (SPUI), Lake Nona Boulevard (diamond), future east-west arterial through the Poitras Property (diamond), and west of the Fells Landing neighborhood (diamond). If the optional direct airport connector is built with this segment, there would be an interchange with Jeff Fuqua Boulevard north of the railroad crossing.

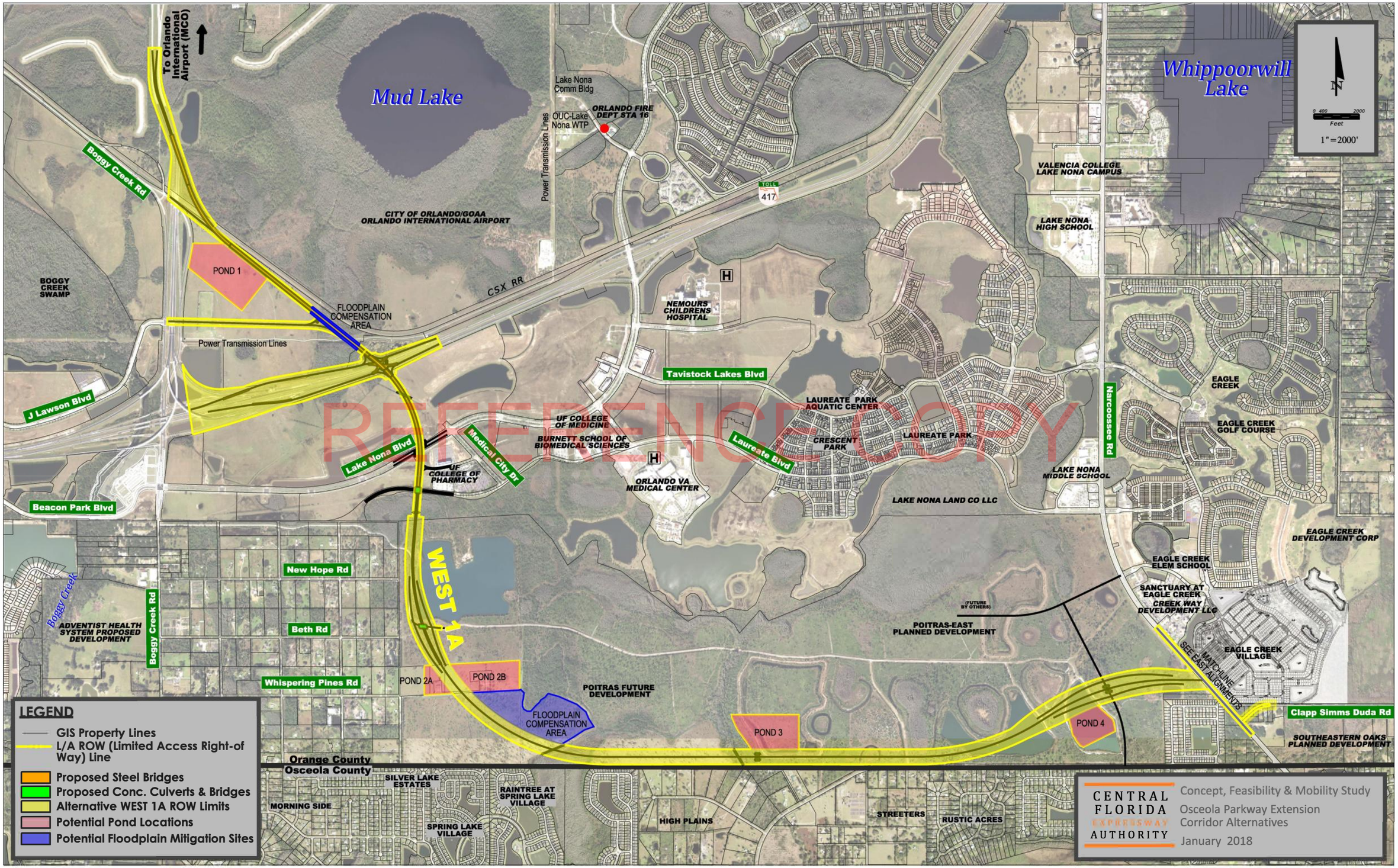

Figure 6-5. Segment West 1A

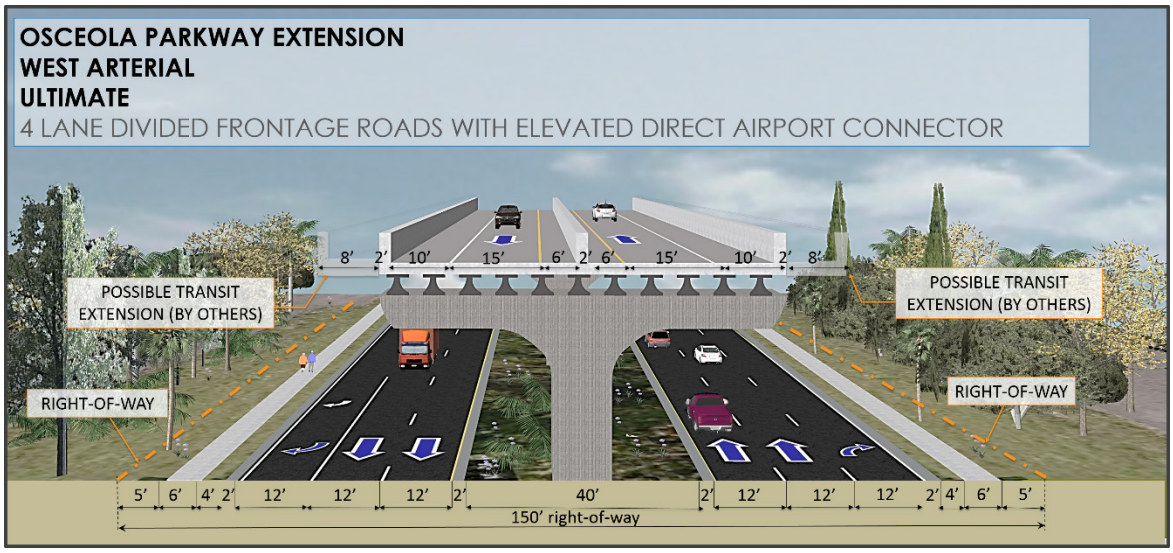

Figure 6-6. Western Arterial Typical Section

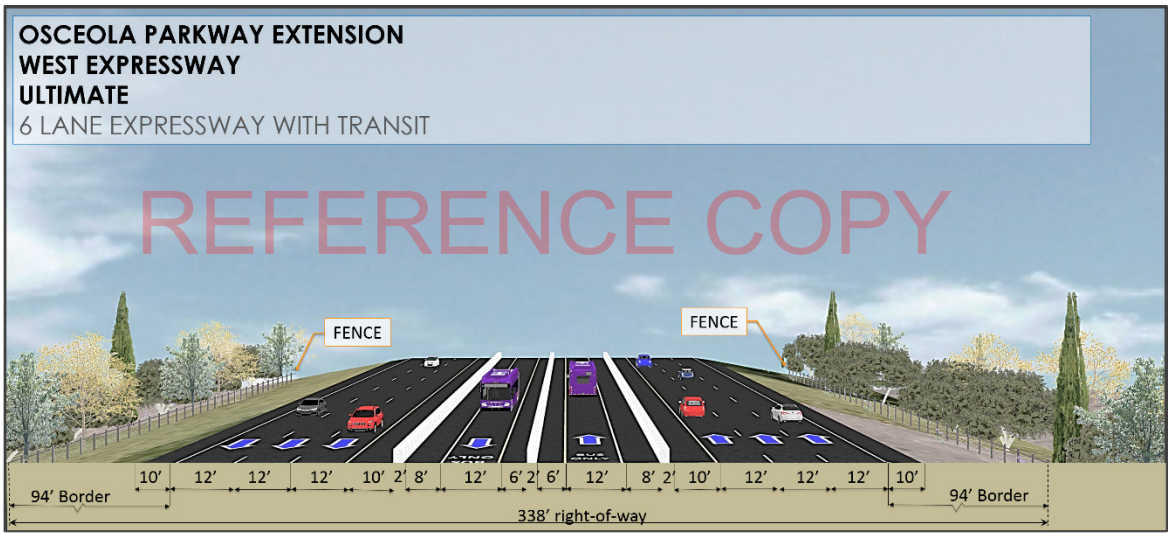

Figure 6-7. Western Expressway Typical Section

6.6.2.4 Proposed Structures

West 1A contains five steel bridges, four concrete bridges, and three box culverts. The steel mainline bridges cross over Jeff Fuqua Boulevard (northbound), over SR 417, and over Lake Nona Boulevard. The two steel ramp bridges cross over existing on and off ramps to connect to the SR 417 mainline. The concrete bridges span Laureate Boulevard, span a future east-west arterial through the Poitras Parkway,[1] and cross over another future access road into Osceola County. There are four box culverts at small creek crossings along the segment.

6.6.2.5 Maintenance of Access

West 1A traverses mostly undeveloped commercial land both north and south of SR 417. North of SR 417, access to adjacent parcels is provided by an extension of J. Lawson Boulevard from east of Boggy

[1] Road name assigned to future roadway through the Poitras Property for modeling purposes

Creek Road to the OPE extension of Boggy Creek Road along the south side of the railroad track. South of SR 417, the ROW is controlled access. Local access is provided at a signalized intersection at Lake Nona Boulevard and possibly right-in-right-out driveways onto the OPE at-grade frontage roads from SR 417 to Laureate Boulevard. South of Laureate Boulevard, OPE becomes a limited-access facility with no direct driveway connections. Access is provided at a future interchange with the proposed east-west arterial through the Poitras Property as well as a local access interchange west of Fells Landing. Lands south and west of OPE at the western edge of the Poitras Property continue to have access along Whispering Pines Road. No existing parcels are cut off (no continuing access) by West 1A.

6.6.2.6 Drainage and Stormwater Considerations

West 1A has five proposed stormwater ponds and one proposed floodplain impact compensation pond. Its primary outfalls are Boggy Creek to the west and Jim Branch to the south. The total required treatment and attenuation volume is 80.59 acre-feet (ac-ft), and there are five stormwater ponds for this segment comprising 94.03 acres. There are approximately 30.50 ac-ft of 100-year floodplain impacts compensated by one pond comprising 34.48 acres. Drainage north of SR 417 will be predominantly in roadside swales. Between SR 417 and Laureate Boulevard, a closed drainage system with curb and gutter will be used. South of Laureate Boulevard in the expressway area, open roadside swales will be used. This segment would modify an existing borrow pit west of Fells Landing for use as a stormwater pond.

6.6.2.7 Proposed Right-of-Way Needs

All west segments feature a 150-foot-wide arterial ROW and a 338-foot-wide expressway ROW. At interchange locations, such as Jeff Fuqua Boulevard, SR 417, Lake Nona Boulevard, the future east-west arterial through the Poitras Property and the local access interchange west of Fells Landing, the prospective ROW has been widened to allow for ramps and overpasses. In addition, as detailed in the Pond Sizing and Siting TM in Attachment E, stormwater ponds and floodplain impact compensation ponds were estimated. Considering the primary roadway ROW, interchange areas, stormwater ponds, and floodplain ponds, the estimated ROW for West 1A is approximately 403 acres. This does not include 35 acres of ROW north of the railroad that would only be needed if the optional direct airport connector is constructed.

6.6.2.8 Projected Design Year Traffic

The projected 2045 AADT is 16,700 vehicles for West 1A. With the optional direct airport connector, the 2045 volume is 22,500 vehicles. See Attachment D for details of these projections.

6.6.2.9 Viability

This segment relocated the local access interchange at Narcoossee Road to a parallel new arterial. The intent was to significantly reduce traffic on Narcoossee Road. Traffic analysis did not show a significant reduction. Thus, the added ROW, added roadway construction for the new arterial, and added traffic on Boggy Creek Road could not be justified.

With no significant traffic benefit, yet added ROW and construction cost, plus added congestion on Boggy Creek Road, West 1A was eliminated from further consideration.

6.6.3 Segment West 1B

This segment provides full connections into OIA, full access at SR 417, full signalized access at Lake Nona Boulevard, future diamond interchange access to the future east-west arterial in the Poitras Property, and local access at Narcoossee Road. It eliminates the additional arterial (included in West 1A) west of Narcoossee Road and added traffic on Boggy Creek Road just west of Narcoossee Road (see Figure 6-8).

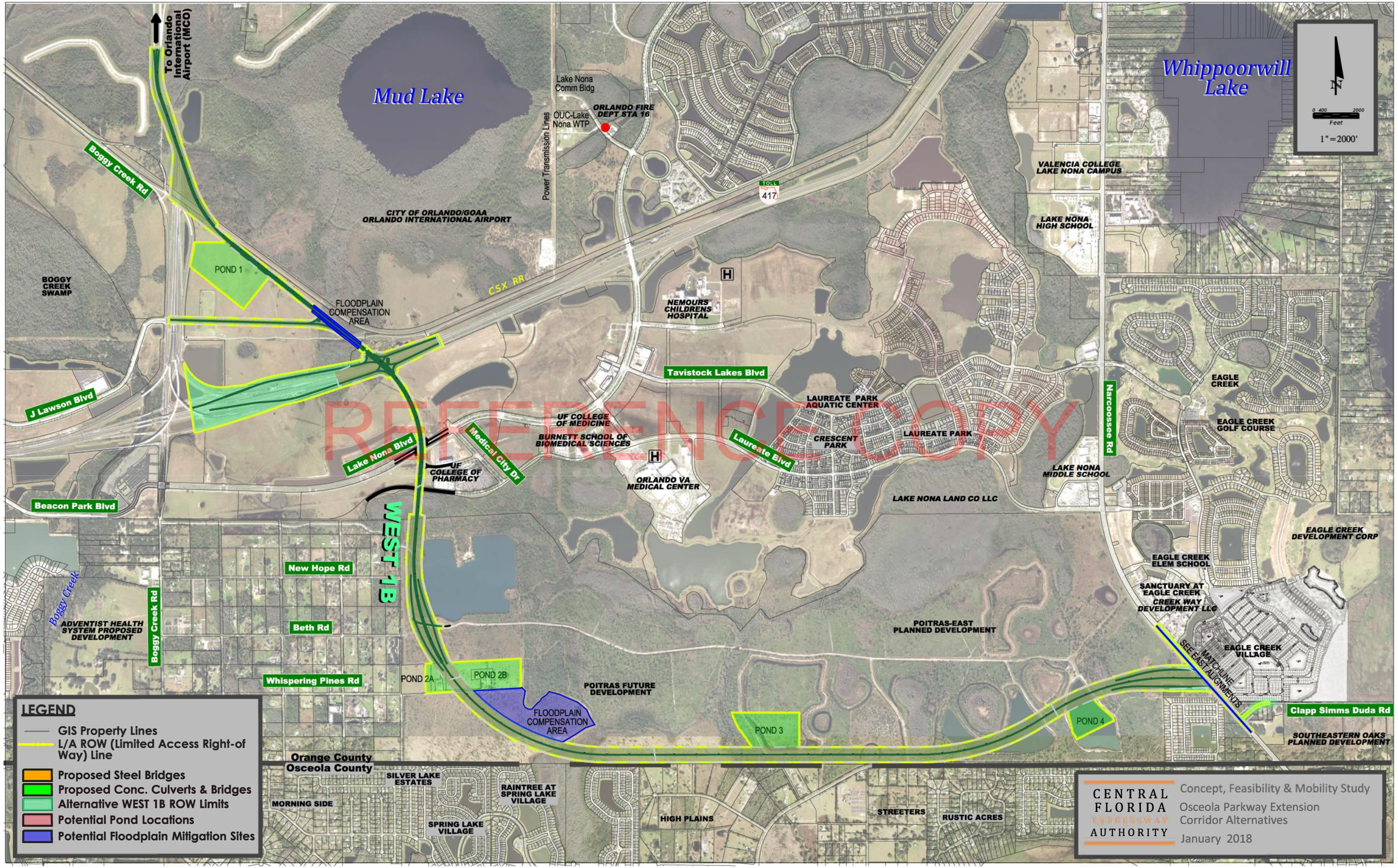

Figure 6-8. Segment West 1B

6.6.3.1 Segment Location

This segment is identical to West 1A with one exception: the interchange location at Narcoossee Road. West 1A has a local access interchange just west of Fells Landing while West 1B has this local access interchange directly at Narcoossee Road. This would eliminate the additional arterial connection west of Fells Landing but would bring additional traffic directly onto Narcoossee Road. West 1B could also include the optional direct airport connector like West 1A.

6.6.3.2 Proposed Typical Section

West 1B has the same two typical sections—an arterial and an expressway—as West 1A (see Figures 6-6 and 6-7, respectively).

6.6.3.3 Proposed Interchanges

For this segment, interchanges are proposed at SR 417 (single-point urban), Lake Nona Boulevard (diamond), future east-west arterial through the Poitras Property (diamond), and at Narcoossee Road (diamond). If the optional direct airport connector is built with this segment, there would be an interchange with Jeff Fuqua Boulevard north of the railroad crossing.

6.6.3.4 Proposed Structures

West 1B contains five steel bridges, three concrete bridges, and four box culverts. The steel mainline bridges cross over Jeff Fuqua Boulevard (northbound), over SR 417, and over Lake Nona Boulevard. The two steel ramp bridges cross over existing on and off ramps to connect to the SR 417 mainline. The concrete bridges span Laureate Boulevard, span a future east-west arterial through the Poitras Parkway, and cross over a future access road into Osceola County. There are four box culverts at small creek crossings along the segment.

6.6.3.5 Maintenance of Access

The West 1B alignment traverses a path nearly identical to West 1A, making the access that must be maintained nearly identical. Where West 1B differs from West 1A is that the local access interchange west of Fells Cove in West 1A is replaced by a local access interchange at Narcoossee Road instead. Adjacent properties would access OPE from Narcoossee Road. For a detailed description of the West 1A access, see Section 6.6.2.5.

6.6.3.6 Drainage and Stormwater Considerations

Drainage and stormwater systems for West 1B are similar to those for West 1A. The only difference is the area just west of Fells Landing where West 1A has a local access interchange and West 1B instead has an interchange at Narcoossee Road. Both modify the existing borrow pit for use as a stormwater pond, but routing varies slightly. The total required treatment and attenuation volume is 78.95 ac-ft comprising 92.21 acres, and there are five stormwater ponds proposed for this segment. There are approximately 30.60 ac-ft of 100-year floodplain impacts compensated by one pond comprising 34.59 acres.

6.6.3.7 Proposed Right-of-Way Needs

The West 1B ROW is similar to the West 1A ROW needs. The only difference is that the local access interchange west of Fells Landing in West 1A is replaced by an interchange at Narcoossee Road in West 1B. Considering the primary roadway ROW, interchange areas, stormwater ponds, and floodplain ponds, the estimated ROW for West 1B is approximately 390 acres. This does not include 35 acres of ROW north of the railroad that would only be needed if the optional direct airport connector is constructed.

6.6.3.8 Projected Design Year Traffic

The projected 2045 AADT is 16,700 vehicles for West 1B. With the optional direct airport connector, the 2045 volume is 22,500 vehicles. Both values are identical to West 1A in that access locations are similar for both segments. See Attachment D for details of these projections.

6.6.3.9 Viability

Similar to West 1A, Segment West 1B meets projected traffic demands with relatively low wetland impacts. Conversely, it does not have West 1A's added arterial construction costs, added arterial ROW costs, and added traffic impacts on Boggy Creek Road.

For these reasons, West 1B was carried forward for further consideration.

6.6.4 Segment West 2

This segment provides full connections into OIA, full access at SR 417, full signalized access at Lake Nona Boulevard, future diamond interchange access to the future east-west arterial in the Poitras Property, and local access at Narcoossee Road. It reduces the overall length of construction slightly relative to West 1A and West 1B and provides the same access as West 1B (see Figure 6-9).

6.6.4.1 Segment Location

North of SR 417, this segment is identical to West 1A and West 1B. South of SR 417, this segment continues southeastward, rather than turning south. Its pair of one-way, at-grade frontage roads intersect with Lake Nona Boulevard at a signalized intersection. Continuing southeast, the frontage roads ramp over Laureate Boulevard and expand out to a full expressway typical section. From Laureate Boulevard, the expressway continues southeast, interchanging with a proposed east-west arterial in the Poitras Property. Beyond this interchange, the segment turns east, running parallel to but well north of the Orange/Osceola County line and continues east to a full interchange at Narcoossee Road.

6.6.4.2 Proposed Typical Section

West 2 has the same two typical sections—an arterial and an expressway—as West 1A (see Figures 6-6 and 6-7, respectively).

6.6.4.3 Proposed Interchanges

For this segment, interchanges are proposed at SR 417 (single-point urban), Lake Nona Boulevard (diamond), future east-west arterial through the Poitras Property (diamond), and at Narcoossee Road (diamond). If the optional direct airport connector is built with this segment, there would be an interchange with Jeff Fuqua Boulevard north of the railroad crossing.

6.6.4.4 Proposed Structures

West 2 contains five steel bridges, two concrete bridges, and one box culvert. The steel mainline bridges cross over Jeff Fuqua Boulevard (northbound), over SR 417, and over Lake Nona Boulevard. The steel ramp bridges cross over existing on/off ramps to connect to the SR 417 mainline. The concrete bridges span Laureate Boulevard and a future east-west arterial through the Poitras Property. The single box culvert is at a small creek crossing along the segment.

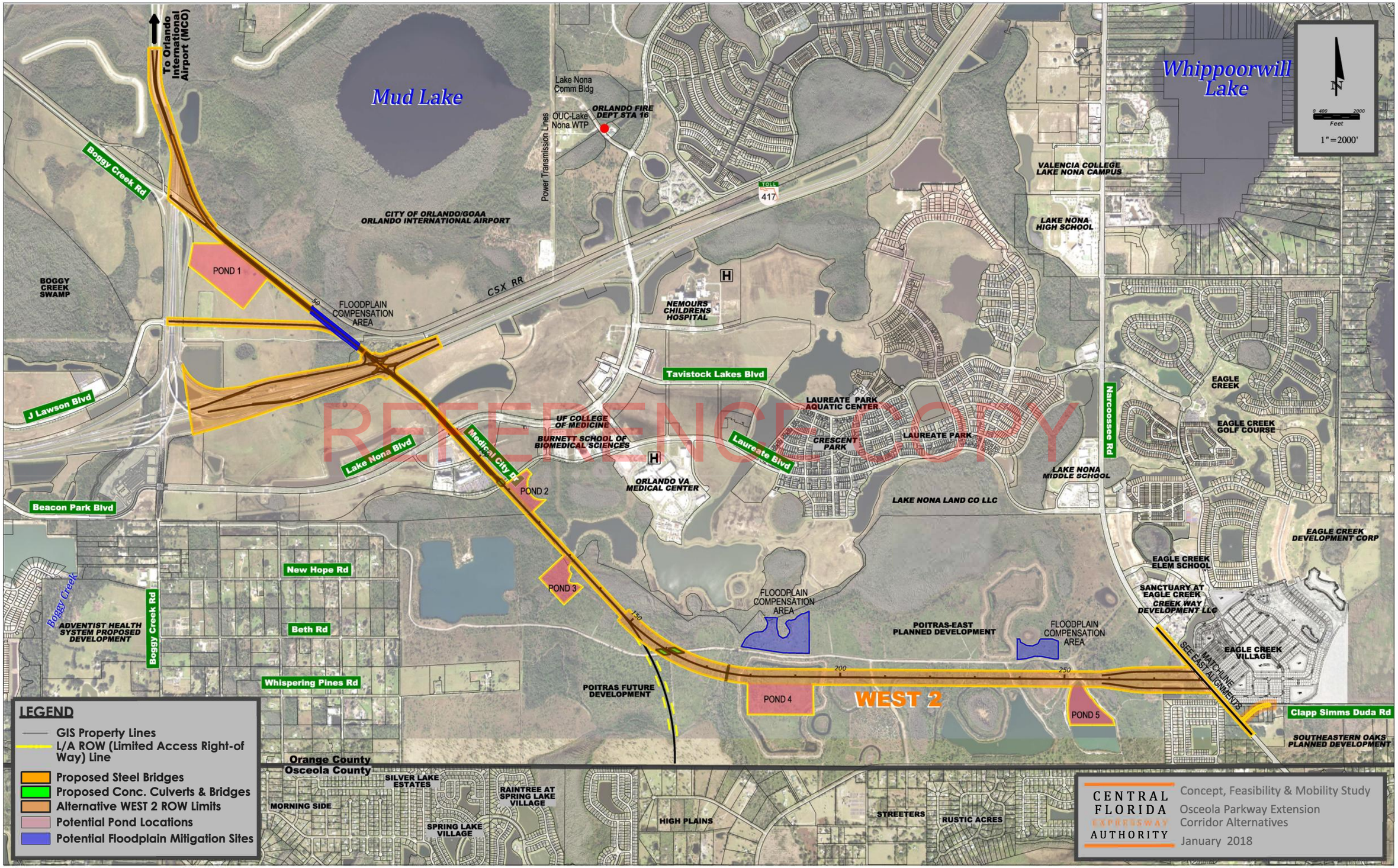

Figure 6-9. Segment West 2

6.6.4.5 Maintenance of Access

North of SR 417, West 2 traverses the same alignment and thus has the same access as West 1A and West 1B. South of SR 417, West 2 follows existing Medical City Drive and then turns east through the middle of the Poitras Property to Narcoossee Road. South of SR 417, the ROW is controlled access. Local access is provided at a signalized intersection at Lake Nona Boulevard and possibly right-in-right-out driveways onto the OPE at-grade frontage roads from SR 417 to Laureate Boulevard. South of Laureate Boulevard, OPE becomes a limited-access facility with no direct driveway connections. Access is provided at a future interchange with the proposed east-west arterial through the Poitras Property as well as a local access interchange at Narcoossee Road. No existing parcels are cut off (no continuing access) by West 2.

For a detailed description of the West 1A (and thus West 2) access north of SR 417, see Section 6.6.2.5.

6.6.4.6 Drainage and Stormwater Considerations

Drainage and stormwater systems north of SR 417 for West 2 are identical to those of West 1A and West 1B. South of SR 417, West 2 down to Laureate Boulevard uses a closed stormwater drainage system with curb and gutter for conveyance. South of Laureate Boulevard, in the expressway area east to Narcoossee Road, open roadside swales are used. The total required treatment and attenuation volume is 69.42 ac-ft comprising 83.07 acres, and there are five stormwater ponds proposed for this segment. There are approximately 22.90 ac-ft of 100-year floodplain impacts compensated by two ponds comprising 26.30 acres. This segment modifies an existing borrow pit west of Fells Landing for use as a stormwater pond.

6.6.4.7 Proposed Right-of-Way Needs

The West 2 ROW is identical to the West 1A and West 1B ROW north of SR 417. South of SR 417, West 2 continues with a 150-foot-wide arterial ROW to Lake Nona Boulevard. There, the ROW widens to the full 338-foot-wide expressway typical section, which continues to the interchange at Narcoossee Road. Considering the primary roadway ROW, interchange areas, stormwater ponds, and floodplain ponds, the estimated ROW for West 2 is approximately 311 acres. This does not include 35 acres of ROW north of the railroad that would only be needed if the optional direct airport connector is constructed.

6.6.4.8 Projected Design Year Traffic

The projected 2045 AADT is 15,300 vehicles for West 2. With the optional direct airport connector, the 2045 volume is 22,500 vehicles. See Attachment D for details of these projections.

6.6.4.9 Viability

West 2 meets projected traffic demands while requiring less ROW, having lower construction costs and fewer floodplain impacts than either West 1A or West 1B. For these reasons, it was carried forward for further consideration.

6.6.5 East Segments

Each East segment begins at Narcoossee Road and continues east through or around SOFWEA into NED and terminates at the planned Sunbridge Parkway. Connections to the proposed Northeast Connector Expressway are allowed for but not included in these potential segments. The typical section is 400 feet wide with through movements using a 70-mph design speed and ramp (non-primary) movements using a 60-mph design speed. With exceptions in East 2 and East 7 along Cyrils Drive, all the east segments are limited-access ROWs allowing for no direct driveway or street connections.

6.6.6 Segment East 1

This segment avoids impacts to residences along the south side of Clapp Simms Duda Road, avoids impacts to SOFWEA in Orange County, minimizes impacts to the Florida scrub-jay territory in SOFWEA, and continues the OCX 2017 PD&E's traffic approach making the primary movement toward the south, rather than the east (see Figure 6-10).

6.6.6.1 Segment Location

This segment begins with a full diamond interchange at Narcoossee Road and continues east north of Clapp Simms Duda Road. At Canal C-29A, the segment turns southeast and crosses into SOFWEA, just below the Orange County line. Within SOFWEA, the segment turns east and extends into NED. At this point, a system-to-system interchange carries the primary (through) movement toward the south becoming the proposed Northeast Connector Expressway. An eastern leg of the interchange allows traffic to continue east to the planned Sunbridge Parkway.

6.6.6.2 Proposed Typical Section

The East 1 typical section is 400 feet wide and is based on the OCX 2040 Master Plan (OCX, 2013) typical section. It comprises two 12-foot-wide lanes in each direction, 94-foot-wide borders on either side, and an 88-foot-wide median. The median accommodates one additional through lane in each direction. In addition, a 50-foot-wide transit corridor and a 26-foot-wide multi-use trail fill out the 400-foot-wide typical section width (see Figure 6-11).

6.6.6.3 Proposed Interchanges

Interchanges for East 1 are proposed at Narcoossee Road (diamond), future Northeast Connector Expressway (system-to-system), and planned Sunbridge Parkway. In the initial construction, the Sunbridge Parkway location is a "T" signalized intersection (OPE ending into Sunbridge Parkway). In the future, Sunbridge Parkway is planned to be relocated eastward and at that time the "T" intersection is replaced by a diamond interchange.

6.6.6.4 Proposed Structures

East 1 contains five steel bridges, five concrete bridges, and three box culverts. The steel mainline bridge is over Canal C-29A and Clapp Simms Duda Road on the eastbound side. The four steel ramp bridges consist of two bridges that span the mainline and two bridges that span other ramps at the Northeast Connector interchange. The concrete bridges cross Narcoossee Road, Clapp Simms Duda Road (eastbound), Cyrils Drive, and Canal C-30. There is also a concrete bridge over the entire SOFWEA. The three box culverts are placed at small creek crossings along the segment.

6.6.6.5 Maintenance of Access

East 1 traverses two primary categories of lands: 1) vacant land with under construction or actively planned or approved residential development, and 2) conservation lands within SOFWEA. For the non-conservation lands, access is provided by planned local roadways in Eagle Creek Village, Springhead Lakes, and Sunbridge (NED) or along existing Clapp Simms Duda Road. Though East 1 splits the planned Springhead Lakes subdivision in half, both halves continue to have local access either to the north on Clapp Simms Duda Road or to the south through Southern Oaks to Cyrils Drive. Within SOFWEA, no vehicular access is provided to or from OPE.

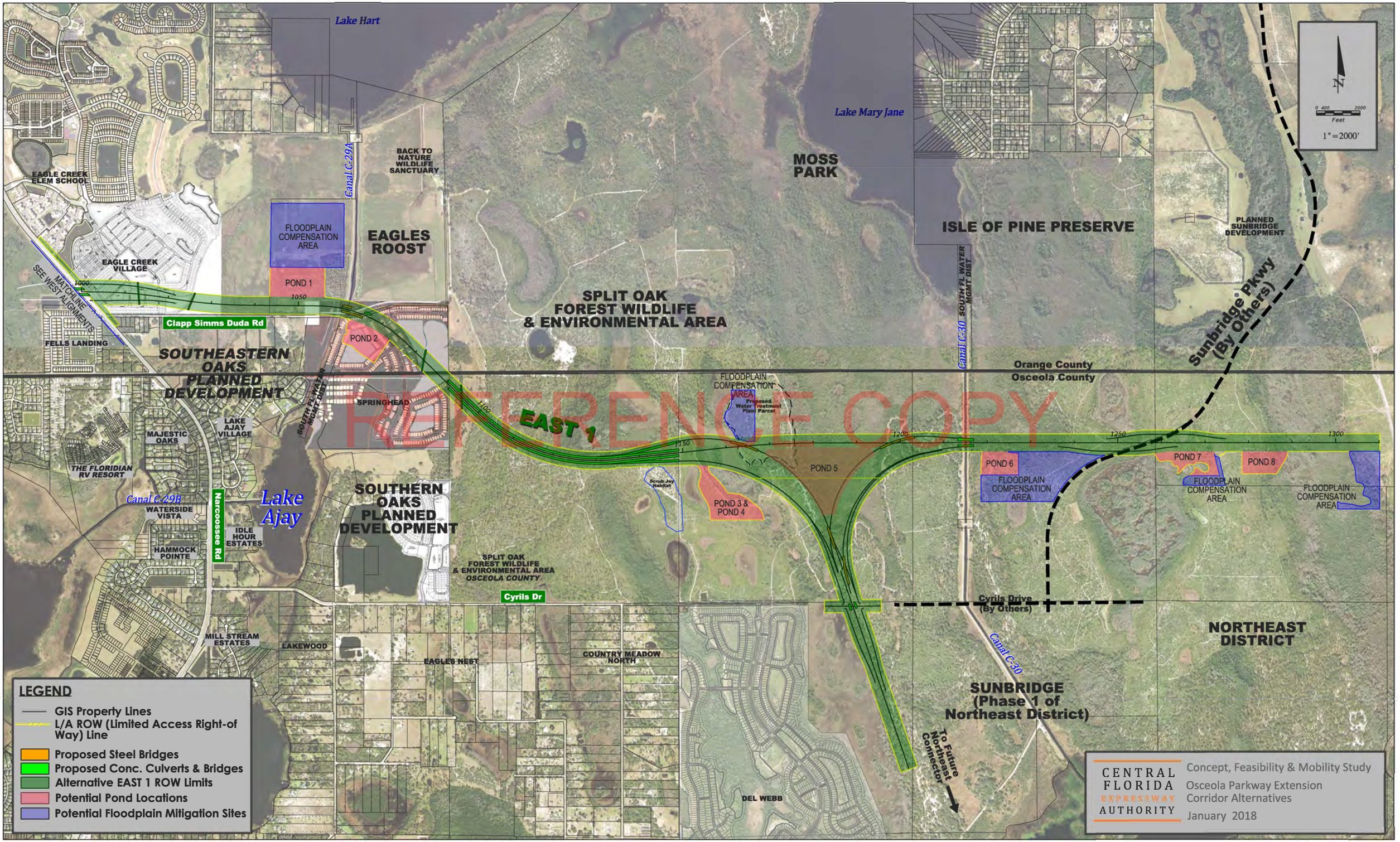

Figure 6-10. Segment East 1

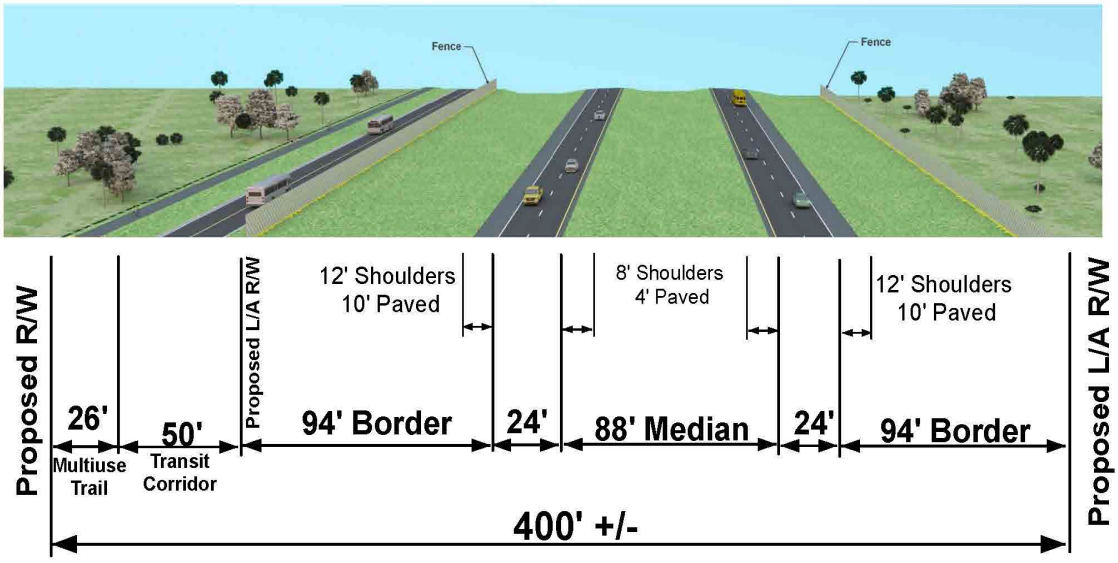

Figure 6-11. East Segment Typical Section

6.6.6.6 Drainage and Stormwater Considerations

East 1 extends from Narcoossee Road to past the planned Sunbridge Parkway. The segment's outfalls include regulated SFWMD Canals C-29A and C-30A. Canal C-29A connects Lake Hart to Lake Ajay while Canal C-30 connects Lake Myrtle to Lake Mary Jane. This segment uses open roadside swales for conveyance to the stormwater ponds. The total required treatment and attenuation volume is 109.65 ac-ft, and there are seven stormwater ponds proposed for this segment comprising 131.23 acres. There are approximately 95.90 ac-ft of 100-year floodplain impacts compensated by five ponds comprising 137.99 acres. This segment uses an infield area at the interchange with the proposed Northeast Connector Expressway for one of the stormwater ponds.

6.6.6.7 Proposed Right-of-Way Needs

All East segments feature a 400-foot-wide mainline ROW. At interchange locations such as Narcoossee Road, the future Northeast Connector Expressway, and the planned Sunbridge Parkway, the prospective ROW has been widened to allow for ramps and overpasses. In addition, as detailed in the Attachment E, stormwater ponds and floodplain impact compensation ponds were estimated. Considering the primary roadway ROW, interchange areas, stormwater ponds, and floodplain ponds, the estimated ROW for East 1 is approximately 589 acres. This does not include an optional 117 acres of ROW toward the south for the future Northeast Connector Expressway system-to-system interchange.

6.6.6.8 Projected Design Year Traffic

The projected 2045 AADT is 43,500 vehicles for East 1. This assumes that West 1B with the direct airport connector is constructed at the same time as East 1. See Attachment D for details of these projections.

6.6.6.9 Viability

This segment was a minor modification to the PD&E Recommended Alternative. As seen on Figure 6-10, East 1 moves the alignment slightly farther south, avoiding any impacts to SOFWEA within Orange County. However, it still leaves a significant remainder of SOFWEA south of the proposed expressway. At the January 31, 2018, Environmental Advisory Group meeting, the forest manager for SOFWEA said that this remainder could not be maintained by prescribed burn—the preferred maintenance technique. This would be because prevailing winds would push smoke from these burns across the expressway. As such,

environmentalists assert that any such remainder has significantly reduced ecological value and should thus be minimized.

Because East 1 has such a large remainder of SOFWEA and that remainder could not be maintained by prescribed burn, East 1 was eliminated from further consideration.

6.6.7 Segment East 2

This segment avoids impacts to residences along the south side of Clapp Simms Duda Road, avoids impacts to SOFWEA in Orange County, provides local access to and from Cyrils Drive, and continues the OCX 2017 PD&E's traffic approach making the primary movement toward the south, rather than the east. Because of its coincidence with the extension of Cyrils Drive, it would impact the northern limits of the Del Webb parcel (see Figure 6-12).

6.6.7.1 Segment Location

This segment begins with a full diamond interchange at Narcoossee Road and continues east north of Clapp Simms Duda Road. At Canal C-29A, the segment turns southeast and crosses into SOFWEA, just below the Orange County line. Within SOFWEA, the segment continues southeast and runs just north of the southern boundary of SOFWEA. Along this boundary, the segment is bracketed by one-way frontage roads providing access to and from Cyrils Drive including its planned extension into NED. Inside NED, the segment has a system-to-system interchange that carries the primary (through) movement south, becoming the proposed Northeast Connector Expressway. An east leg of the interchange allows traffic to continue east to the planned Sunbridge Parkway.

6.6.7.2 Proposed Typical Section

The East 2 typical section is 400 feet wide and uses the same configuration as East 1. Figure 6-11 presents the typical section. The section of East 2 that replaces existing Cyrils Drive features the same mainline roadway as shown on Figure 6-11 but adds one-way frontage roads along either side of the mainline to provide local access and on-off access to OPE.

6.6.7.3 Proposed Interchanges

Interchanges for East 2 are proposed at Narcoossee Road (diamond), future Northeast Connector Expressway (system-to-system), and planned Sunbridge Parkway. Additionally, East 2 would have slip ramp access to one-way frontage roads along Cyrils Drive. In the initial construction, the Sunbridge Parkway location is a "T" signalized intersection (OPE ending into Sunbridge Parkway). In the future, Sunbridge Parkway is planned to be relocated eastward and at that time, the "T" intersection is replaced by a diamond interchange.

6.6.7.4 Proposed Structures

East 2 contains six steel bridges, five concrete bridges, and four box culverts. The steel mainline bridges cross over Canal C-29A, over the northbound to westbound ramp in the Northeast Connector interchange, and over the planned Cyrils Drive Extension. The four steel ramp flyovers span the mainline, Cyrils Drive, and the proposed Cyrils Drive frontage road. The concrete bridges cross Narcoossee Road, Clapp Simms Duda Road, Cyrils Drive, the proposed Cyrils Drive frontage roads, and Canal C-30. There is also a concrete bridge over the entire SOFWEA. The four box culverts are placed at small creek crossings along the segment.

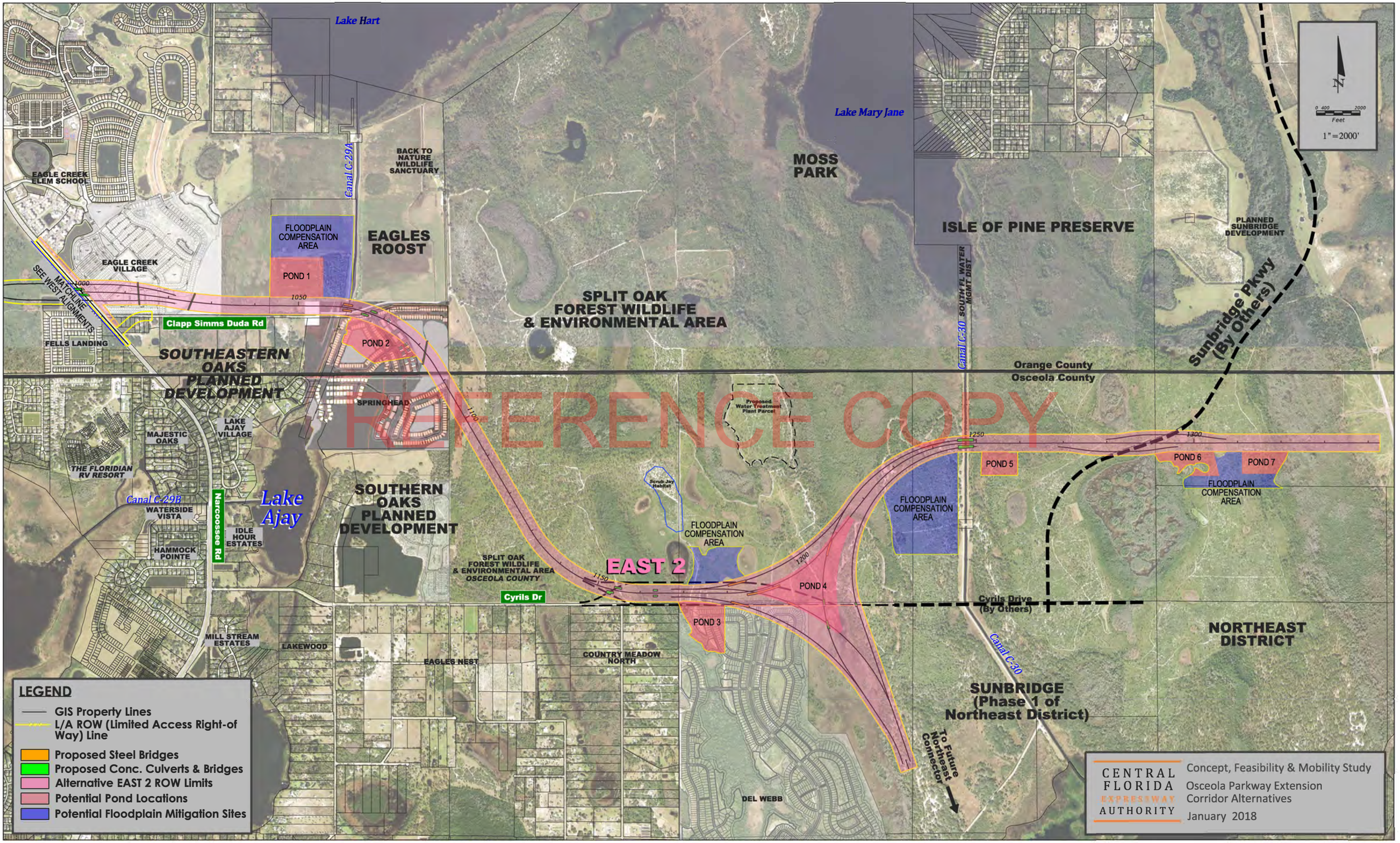

Figure 6-12. Segment East 2

6.6.7.5 Maintenance of Access

As with East 1, East 2 traverses two primary categories of lands: 1) vacant land with under construction or actively planned or approved residential development, and 2) conservation lands in SOFWEA. For the non-conservation lands, access is provided by planned local roadways in Eagle Creek Village, Springhead Lakes, and Sunbridge (NED) or along existing Clapp Simms Duda Road. Though East 2 splits the planned Springhead Lakes subdivision in half, both halves continue to have local access either to the north on Clapp Simms Duda Road or to the south through Southern Oaks to Cyrils Drive. East 2 also changes the access to the Osceola County planned extension of Cyrils Drive by adding frontage roads to maintain local access. This primarily affects the planned Del Webb development immediately south of Cyrils within the Northeast District. If East 2 is built, the northern swath of the Del Webb development would be removed and access would require major reworking. Within SOFWEA, no vehicular access is provided to or from OPE.

6.6.7.6 Drainage and Stormwater Considerations

Stormwater and drainage systems for East 2 are similar to those of East 1. This segment uses open roadside swales for conveyance to the stormwater ponds. The total required treatment and attenuation volume is 127.16 ac-ft, and there are seven stormwater ponds proposed for this segment comprising 148.89 acres. There are approximately 155.90 ac-ft of 100-year floodplain impacts compensated by four ponds comprising 170.51 acres. This segment uses an infield area at the interchange with the proposed Northeast Connector Expressway for one of the stormwater ponds.

6.6.7.7 Proposed Right-of-Way Needs

All East segments feature a 400-foot-wide mainline ROW, interchange areas, stormwater ponds, and floodplain impact compensation ponds, as discussed in Section 6.6.6.7. Considering these various areas, the estimated ROW for East 2 is approximately 665 acres. This does not include an optional 92 acres of ROW toward the south for the future Northeast Connector Expressway system-to-system interchange.

6.6.7.8 Projected Design Year Traffic

The projected 2045 AADT for East 2 was not completed.

6.6.7.9 Viability

As shown in Figure 6-12, this segment crosses into SOFWEA south of the Orange County line. Rather than turning east as does East 1, it continues southeast until it reaches the southern edge of SOFWEA and Cyrils Drive. This reduced the SOFWEA remainder south of the expressway significantly but still leaves a large remainder. However, it also requires major modifications to Osceola County's planned reconstruction of Cyrils Drive into a four-lane divided arterial roadway. It also significantly impacts the planned Del Web community immediately south of Cyrils Drive in NED.

For these reasons, East 2 was eliminated from further consideration.

6.6.8 Segment East 3

This segment avoids impacts to residences along the south side of Clapp Simms Duda Road, avoids impacts to SOFWEA in Orange County, avoid impacts to the Florida scrub-jay territory in SOFWEA, and reverses the OCX 2017 PD&E's traffic approach making the primary movement toward the east, rather than the south. It also provides an interim simple diamond interchange for access to Cyrils Drive and does not preclude a future full system-to-system interchange (see Figure 6-13).

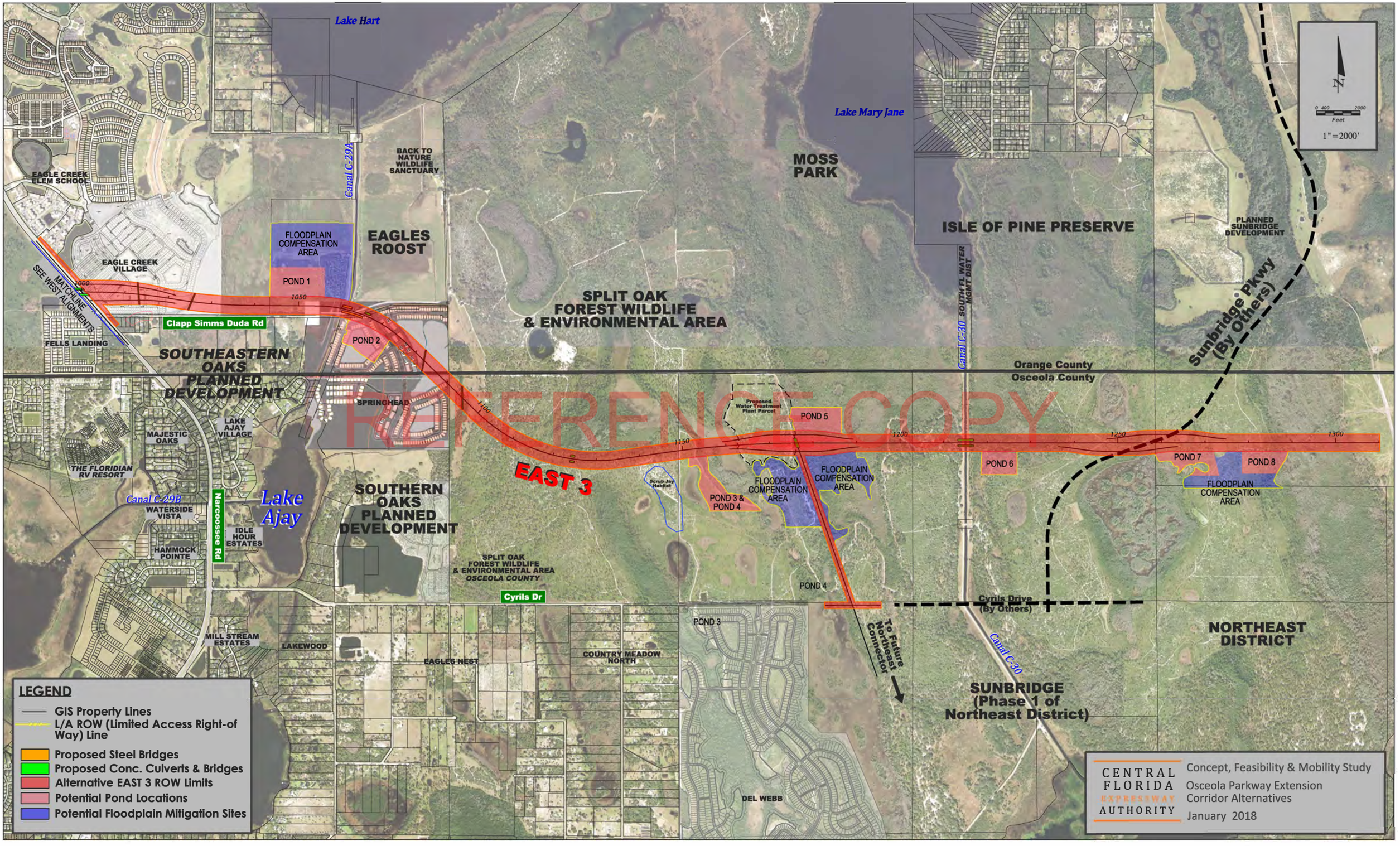

Figure 6-13. Segment East 3

6.6.8.1 Segment Location

This segment begins with a full diamond interchange at Narcoossee Road and continues east north of Clapp Simms Duda Road. At Canal C-29A, the segment turns southeast and crosses into SOFWEA, just below the Orange County line. Within SOFWEA, the segment turns east and extends into NED. Within NED, a simple diamond interchange provides an arterial connection between OPE and Cyrils Drive. At some point in the future, the proposed Northeast Connector could replace this arterial connection and provide a full system-to-system interchange. In both the interim and future conditions, the primary (through) movement is east-west, allowing traffic to continue eastward to the planned Sunbridge Parkway.

6.6.8.2 Proposed Typical Section

The East 3 typical section is 400 feet wide and uses the same configuration as East 1. Figure 6-11 presents the typical section.

6.6.8.3 Proposed Interchanges

Interchanges for East 3 are proposed at Narcoossee Road (diamond), future Northeast Connector Expressway (interim diamond, ultimate system-to-system), and planned Sunbridge Parkway. In the initial construction, the Sunbridge Parkway location is a "T" signalized intersection (OPE ending into Sunbridge Parkway). In the future, Sunbridge Parkway is planned to be relocated eastward and at that time, the "T" intersection is replaced by a diamond interchange.

6.6.8.4 Proposed Structures

East 3 contains one steel bridge, five concrete bridges, and four box culverts. The steel mainline bridge crosses over Canal C-29A. The concrete bridges span Narcoossee road, Clapp Simms Duda Road, the future Northeast Connector, and Canal C-30. There is also a concrete bridge over the entire SOFWEA. The four box culverts are placed at small creek crossings along the segment.

6.6.8.5 Maintenance of Access

East 3 follows a similar path to East 1 and as such has similar maintenance of access issues. The primary difference is that within NED, East 3 has a diamond interchange and north-south arterial connection from OPE to the Cyrils Drive Extension. Unlike East 1, this provides local access from Cyrils Drive on to OPE. Like East 1, additional local access would be provided at Sunbridge Parkway. For a detailed description of East 3 access other than in NED, see Section 6.6.6.5.

6.6.8.6 Drainage and Stormwater Considerations

Stormwater and drainage systems for East 3 are similar to the other previously discussed East segments. This segment uses open roadside swales for conveyance to the stormwater ponds. The total required treatment and attenuation volume is 88.04 ac-ft, and there are seven stormwater ponds proposed for this segment comprising 107.90 acres. There are approximately 119.30 ac-ft of 100-year floodplain impacts compensated by four ponds comprising 132.04 acres.

6.6.8.7 Proposed Right-of-Way Needs

All the East segments feature a 400-foot-wide mainline ROW, interchange areas, stormwater ponds, and floodplain impact compensation ponds, as discussed in Section 6.6.6.7. Considering these various areas, the estimated ROW for East 3 is approximately 551 acres. This does not include the ultimate ROW toward the south for the future Northeast Connector Expressway system-to-system interchange. Instead, the East 3 ROW accommodates only the intermediate arterial connection to the Cyrils Drive Extension.

6.6.8.8 Projected Design Year Traffic

The projected 2045 AADT is 43,500 vehicles for East 3. This assumes that West 1B with the direct airport connector is constructed at the same time as East 3. See Attachment D for details of these projections.

6.6.8.9 Viability

East 3 has a similar path across SOFWEA as does East 1. To reduce its initial cost, it eliminates the proposed system-to-system interchange with the proposed Northeast Connector Expressway and substitutes an intermediate tight diamond interchange and arterial connection to Cyrils Drive.

While the reduced initial construction cost contributes to a more cost-effective project, East 3's SOFWEA remainder is still unacceptable. Thus, for the same reasons as East 1, East 3 was eliminated from further consideration.

6.6.9 Segment East 4A

This segment avoids impacts to residences along the south side of Clapp Simms Duda Road, avoids impacts to SOFWEA in Orange County, reduces impacts to SOFWEA in Osceola County, avoids impacts to the Florida scrub-jay territory in SOFWEA, and reverses the OCX 2017 PD&E's traffic approach making the primary movement toward the east, rather than the south (see Figure 6-14).

6.6.9.1 Segment Location

This segment begins with a full diamond interchange at Narcoossee Road and continues east north of Clapp Simms Duda Road. At Canal C-29A, the segment turns southeast and crosses into SOFWEA, just below the Orange County line on a southeast bearing. Within SOFWEA, the segment turns east and extends into NED. At this point, a system-to-system interchange carries the primary (through) movement east to the planned Sunbridge Parkway. A southern leg of the interchange allows traffic to continue south becoming the proposed Northeast Connector Expressway.

6.6.9.2 Proposed Typical Section

The East 4A typical section is 400 feet wide and uses the same configuration as East 1. Figure 6-11 presents the typical section.

6.6.9.3 Proposed Interchanges

Interchanges for East 4A are proposed at Narcoossee Road (diamond), future Northeast Connector Expressway (system-to-system), and planned Sunbridge Parkway. In the initial construction, the Sunbridge Parkway location is a "T" signalized intersection (OPE ending into Sunbridge Parkway). In the future, Sunbridge Parkway is planned to be relocated eastward and at that time, the "T" intersection is replaced by a diamond interchange.

6.6.9.4 Proposed Structures

East 4A contains three steel bridges, eight concrete bridges, and three box culverts. The steel mainline bridge crosses over Canal C-29A. The two steel ramp flyovers span the westbound to southbound ramp as well as the mainline at the Northeast Connector interchange. The concrete bridges cross Narcoossee Road, Clapp Simms Duda Road, Cyrils Drive Extension, and Canal C-30. There is also a concrete bridge over the entire SOFWEA. The three box culverts will be placed at small creek crossings along the segment.

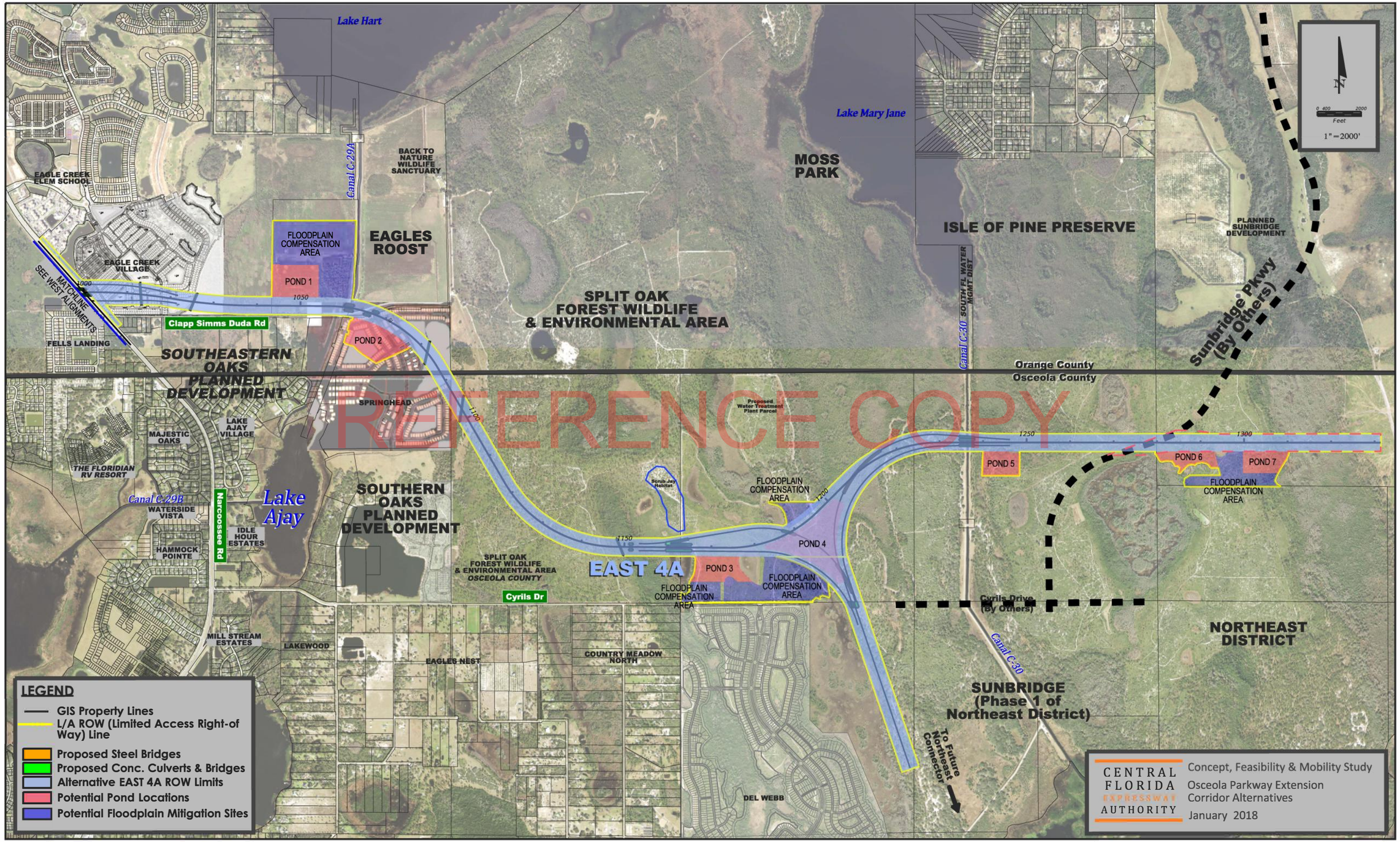

Figure 6-14. Segment East 4A

6.6.9.5 Maintenance of Access

West of SOFWEA, East 4A follows a similar path to East 1 and as such has similar maintenance of access issues in this area. Within SOFWEA, East 4A swings farther south emerging into the Sunbridge development (NED) and a system-to-system interchange. East 4A local access in NED is limited to an intersection and later diamond interchange at Sunbridge Parkway. For a detailed description of East 4A access outside SOFWEA, see the East 1 discussion in Section 6.6.6.5.

6.6.9.6 Drainage and Stormwater Considerations

Stormwater and drainage systems for East 4A are similar to the other previously discussed east segments. This segment uses open roadside swales for conveyance to the stormwater ponds. The total required treatment and attenuation volume is 97.11 ac-ft, and there are seven stormwater ponds proposed for this segment comprising 116.48 acres. There are approximately 127.10 ac-ft of 100-year floodplain impacts compensated by four ponds comprising 130.54 acres. This segment uses an infield area at the interchange with the proposed Northeast Connector Expressway for one of the stormwater ponds.

6.6.9.7 Proposed Right-of-Way Needs

All East segments feature a 400-foot-wide mainline ROW, interchange areas, stormwater ponds, and floodplain impact compensation ponds, as discussed in Section 6.6.6.7. Considering these various areas, the estimated ROW for East 4A is approximately 591 acres. This does not include an optional 56 acres of ROW toward the south for the future Northeast Connector Expressway system-to-system interchange.

6.6.9.8 Projected Design Year Traffic

The projected 2045 AADT is 43,500 vehicles for East 4A. This assumes that West 1B with the direct airport connector is constructed at the same time as East 4A. See Attachment D for details of these projections.

6.6.9.9 Viability

East 4A meets projected traffic demands and, because it is farther south than either East 1 or East 3, it reduces the SOFWEA remainder. For these reasons, it was carried forward for further consideration.

6.6.10 Segment East 4B

This segment avoids impacts to SOFWEA in Orange County, significantly reduces impacts to SOFWEA in Osceola County, provides a small buffer to the Florida scrub-jay territory in SOFWEA, and reverses the OCX 2017 PD&E's traffic approach making the primary movement toward the east, rather than the south. In significantly reducing impacts to SOFWEA in Osceola County, it impacts existing residences along Clapp Simms Duda Road and planned residences in the Carter Lakes and Southern Oaks developments (see Figure 6-15).

6.6.10.1 Segment Location

This segment begins with a full diamond interchange at Narcoossee Road and continues easterly north of Clapp Simms Duda Road. West of Canal C-29A, the segment turns southeasterly, crossing the southern part of the Carter Lakes property, clipping the Southern Oaks property, and crosses into SOFWEA approximately 75 percent of the way south into the Osceola County portion. Within SOFWEA, the segment turns east and extends into NED. At this point, a system-to-system interchange carries the primary (through) movement east to the planned Sunbridge Parkway. A southern leg of the interchange allows traffic to continue south becoming the proposed Northeast Connector Expressway.

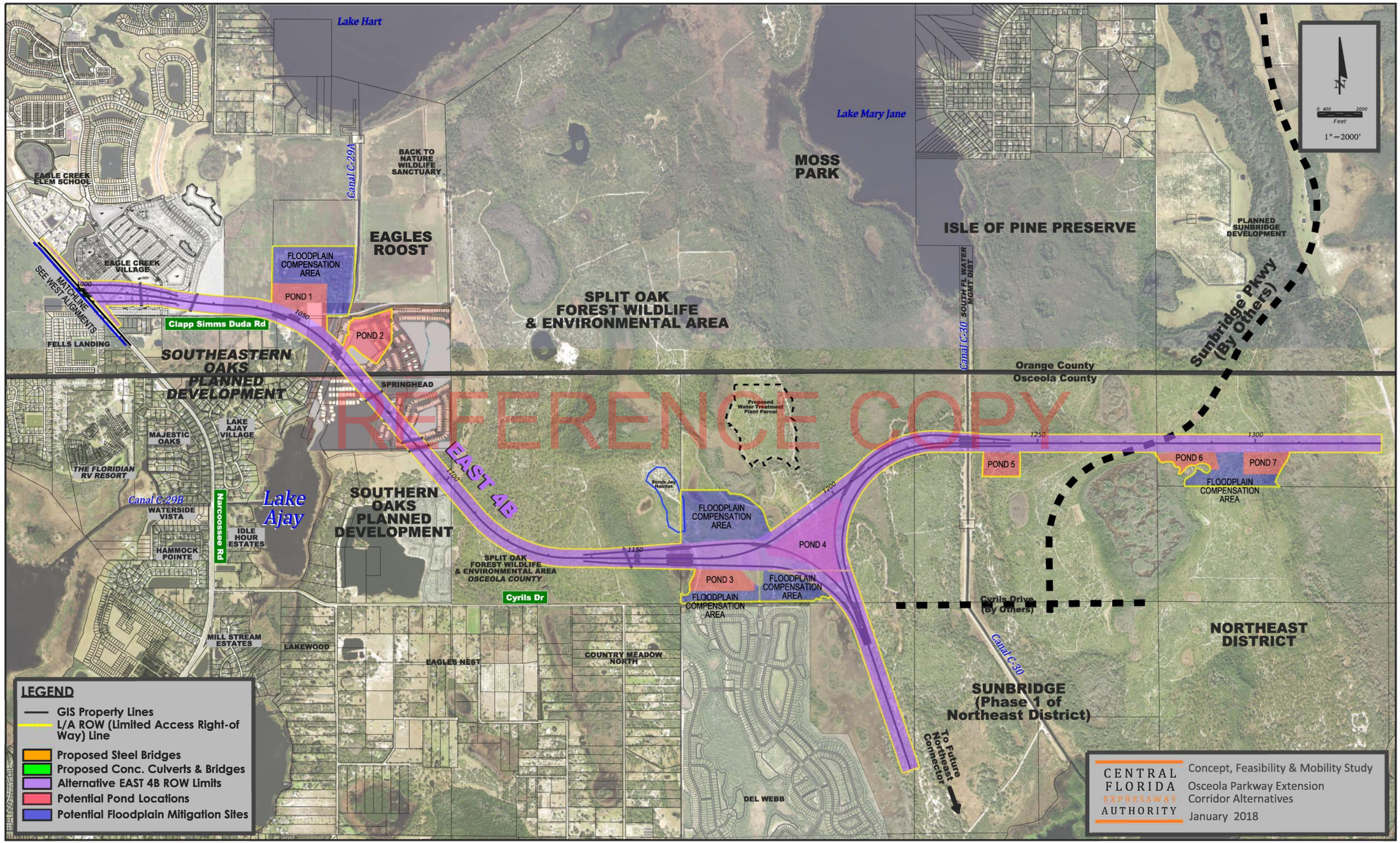

Figure 6-15. Segment East 4B

6.6.10.2 Proposed Typical Section

The East 4B typical section is 400 feet wide and uses the identical configuration as East 1. Figure 6-11 presents the typical section.

6.6.10.3 Proposed Interchanges

Interchanges for East 4B are nearly identical to those proposed for East 4A (see Section 6.6.9.3). The one variation is the system-to-system interchange with the future Northeast Connector Expressway is farther south with East 4B than with East 4A, though the access and design criteria are identical.

6.6.10.4 Proposed Structures

East 4B contains five steel bridges, six concrete bridges, and five box culverts. The steel mainline bridges cross over Clapp Simms Duda Road and Canal C-29A. The steel ramp bridges span the westbound to southbound ramp as well as the mainline at the Northeast Connector interchange. The concrete bridges cross Narcoossee Road, Cyrils Drive Extension, and Canal C-30. There is also a concrete bridge over the entire SOFWEA. The five box culverts are placed at small creek crossings along the segment.

6.6.10.5 Maintenance of Access

West of SOFWEA, East 4B's path is similar to but more southwesterly than East 4A. Parcels not taken by East 4B along Clapp Simms Duda Road continue to have local access along that road. East 4B turns southeastward west of Canal C-29A and cuts in half the planned Springhead Lakes development and clips the far northeast corner of the planned Southern Oaks development. Though East 4B splits the planned Springhead Lakes subdivision in half, both halves continue to have local access either to the north on Clapp Simms Duda Road or to the south through Southern Oaks to Cyrils Drive. Within SOFWEA, East 4B swings further south emerging into the Sunbridge development (NED) and a system-to-system interchange. Within SOFWEA, no vehicular access is provided to or from OPE. East 4B local access in NED is limited to an intersection and later diamond interchange at Sunbridge Parkway.

6.6.10.6 Drainage and Stormwater Considerations

The stormwater and drainage systems of East 4B are similar to the other previously discussed East segments. This segment uses open roadside swales for conveyance to the stormwater ponds. The total required treatment and attenuation volume is 102.96 ac-ft, and there are seven stormwater ponds proposed for this segment comprising 122.81 acres. There are approximately 129.10 ac-ft of 100-year floodplain impacts compensated by four ponds comprising 143.29 acres. This segment uses an infield area at the interchange with the proposed Northeast Connector Expressway for one of the stormwater ponds.

6.6.10.7 Proposed Right-of-Way Needs

All East segments feature a 400-foot-wide mainline ROW, interchange areas, stormwater ponds, and floodplain impact compensation ponds, as discussed in Section 6.6.6.7. Considering these various areas, the estimated ROW for East 4B is approximately 609 acres. This does not include an optional 55 acres of ROW toward the south for the future Northeast Connector Expressway system-to-system interchange.

6.6.10.8 Projected Design Year Traffic

The projected 2045 AADT is 43,500 vehicles for East 4B. This assumes that West 1B with the direct airport connector is constructed at the same time as East 4B. See Attachment D for details of these projections.

6.6.10.9 Viability

East 4B reduces the SOFWEA remainder to less than any of the more northerly segments (that is, East 1, 3, or 4A). However, this southerly shift causes more residential impacts west of SOFWEA (see Figure 6-15).

While reducing the SOFWEA remainder is desirable, the relatively slight decrease could not justify the increase in residential impacts and so East 4B was eliminated.

6.6.11 Segment East 4C

This segment avoids impacts to residences along the south side of Clapp Simms Duda Road, avoids impacts to SOFWEA in Orange County, reduces impacts to SOFWEA in Osceola County, increases the buffer to the Florida scrub-jay territory in SOFWEA, provides a 400-foot-wide buffer from Cyrils Drive and the adjacent 15-foot-wide OUC electric transmission easement, and reverses the OCX 2017 PD&E's traffic approach making the primary movement toward the east, rather than the south. It increases the buffer from the Florida scrub-jay territory relative to East 4A and reduces the residential impacts west of SOFWEA relative to East 4B. The 400-foot-wide buffer from Cyrils Drive and its eastward extension allows this segment to avoid impacts to the Del Webb parcel (see Figure 6-16).

6.6.11.1 Segment Location

This segment is similar to East 4A in that it begins with a full diamond interchange at Narcoossee Road and continues east north of Clapp Simms Duda Road. At Canal C-29A, the segment turns southeast and crosses into SOFWEA, just below the Orange County line on a southeast bearing. It continues southeast within SOFWEA toward its southern boundary, maintaining a 415-foot-wide buffer from that boundary. The segment turns east and extends into NED. At this point, a system-to-system interchange carries the primary (through) movement east to the planned Sunbridge Parkway. A southern leg of the interchange allows traffic to continue south becoming the proposed Northeast Connector Expressway.

6.6.11.2 Proposed Typical Section

The East 4C typical section is 400 feet wide and uses the same configuration as East 1. Figure 6-11 presents the typical section.

6.6.11.3 Proposed Interchanges

Interchanges for East 4C are nearly identical to those proposed for East 4A (see Section 6.6.9.3). The one variation is that the system-to-system interchange with the future Northeast Connector Expressway is farther south with East 4C than with East 4A, though the access and design criteria are identical.

6.6.11.4 Proposed Structures

East 4C contains four steel bridges, seven concrete bridges, and three box culverts. The steel mainline bridge crosses over Canal C-29A. The steel ramp bridges span the northbound to westbound ramp, Cyrils Drive, and the mainline at the Northeast Connector interchange. The concrete bridges cross Narcoossee road, Clapp Simms Duda Road, Cyrils Drive Extension, and Canal C-30. There is also a concrete bridge over the entire SOFWEA. The three box culverts are placed at small creek crossings along the segment.

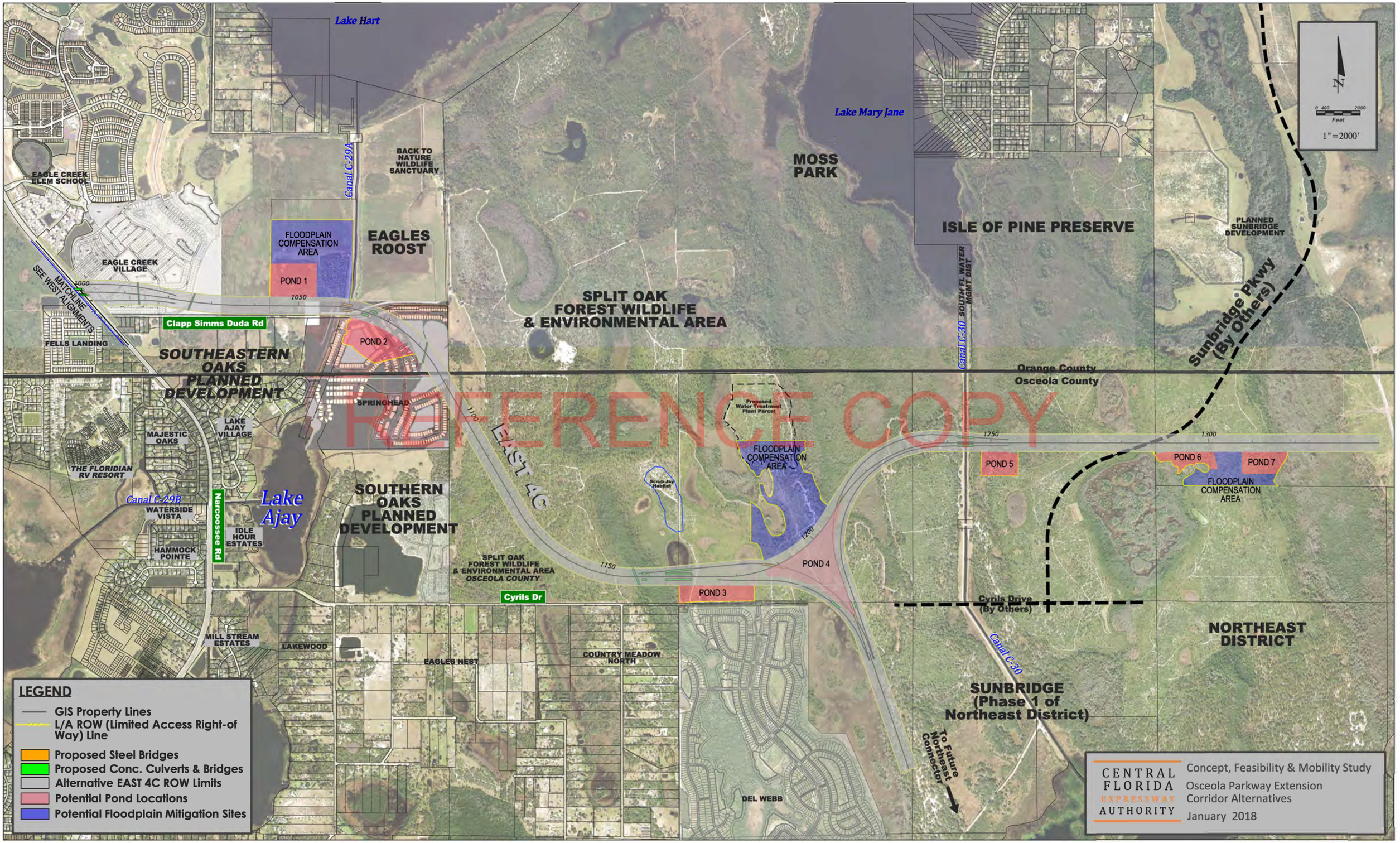

Figure 6-16. Segment East 4C

6.6.11.5 Maintenance of Access

West of SOFWEA, East 4C follows a path in between East 4A and 4B. Parcels not taken by East 4C along Clapp Simms Duda Road continue to have local access along that road. East 4C turns southeastward just east of Canal C-29A and cuts off the northeast corner of the planned Springhead Lakes development. Though East 4C cuts off this corner, both it and the larger remainder south of East 4C continue to have local access either to the north on Clapp Simms Duda Road or to the south through Southern Oaks to Cyrils Drive. Within SOFWEA, East 4C swings south emerging into the Sunbridge development (NED) and a system-to-system interchange. Within SOFWEA, no vehicular access would be provided to or from OPE. East 4C local access in NED is limited to an intersection and later diamond interchange at Sunbridge Parkway.

6.6.11.6 Drainage and Stormwater Considerations

Stormwater and drainage systems of East 4C are similar to the other previously discussed East segments. This segment uses open roadside swales for conveyance to the stormwater ponds. The total required treatment and attenuation volume is 102.23 ac-ft, and there are seven stormwater ponds proposed for this segment comprising 122.00 acres. There are approximately 133.23 ac-ft of 100-year floodplain impacts compensated by three ponds comprising 147.06 acres. This segment uses an infield area at the interchange with the proposed Northeast Connector Expressway for one of the stormwater ponds.

6.6.11.7 Proposed Right-of-Way Needs

All East segments feature a 400-foot-wide mainline ROW, interchange areas, stormwater ponds, and floodplain impact compensation ponds, as discussed in Section 6.6.6.7. Considering these various areas, the estimated ROW for East 4C is approximately 598 acres. This does not include an optional 50 acres of ROW toward the south for the future Northeast Connector Expressway system-to-system interchange.

6.6.11.8 Projected Design Year Traffic

The projected 2045 AADT is 43,500 vehicles for East 4C. This assumes that West 1B with the direct airport connector is constructed at the same time as East 4C. See Attachment D for details of these projections.

6.6.11.9 Viability

East 4C is farther south than East 4A, thus reducing the SOFWEA remainder and providing a greater buffer to the Florida scrub-jay territory while still meeting projected traffic demands. Thus, it was carried forward for further consideration.

6.6.12 Segment East 5

This segment avoids impacts to SOFWEA in Orange County, avoids impacts to the Lake Ajay Village neighborhood, minimizes impacts to SOFWEA in Osceola County, maximizes the buffer to the Florida scrub-jay territory in SOFWEA, and reverses the OCX 2017 PD&E's traffic approach making the primary movement toward the east, rather than the south. In significantly minimizing impacts to SOFWEA, it impacts existing residences along Clapp Simms Duda Road and planned residences in the Carter Lakes and Southern Oaks developments, although it does not impact the Del Webb parcel (see Figure 6-17).

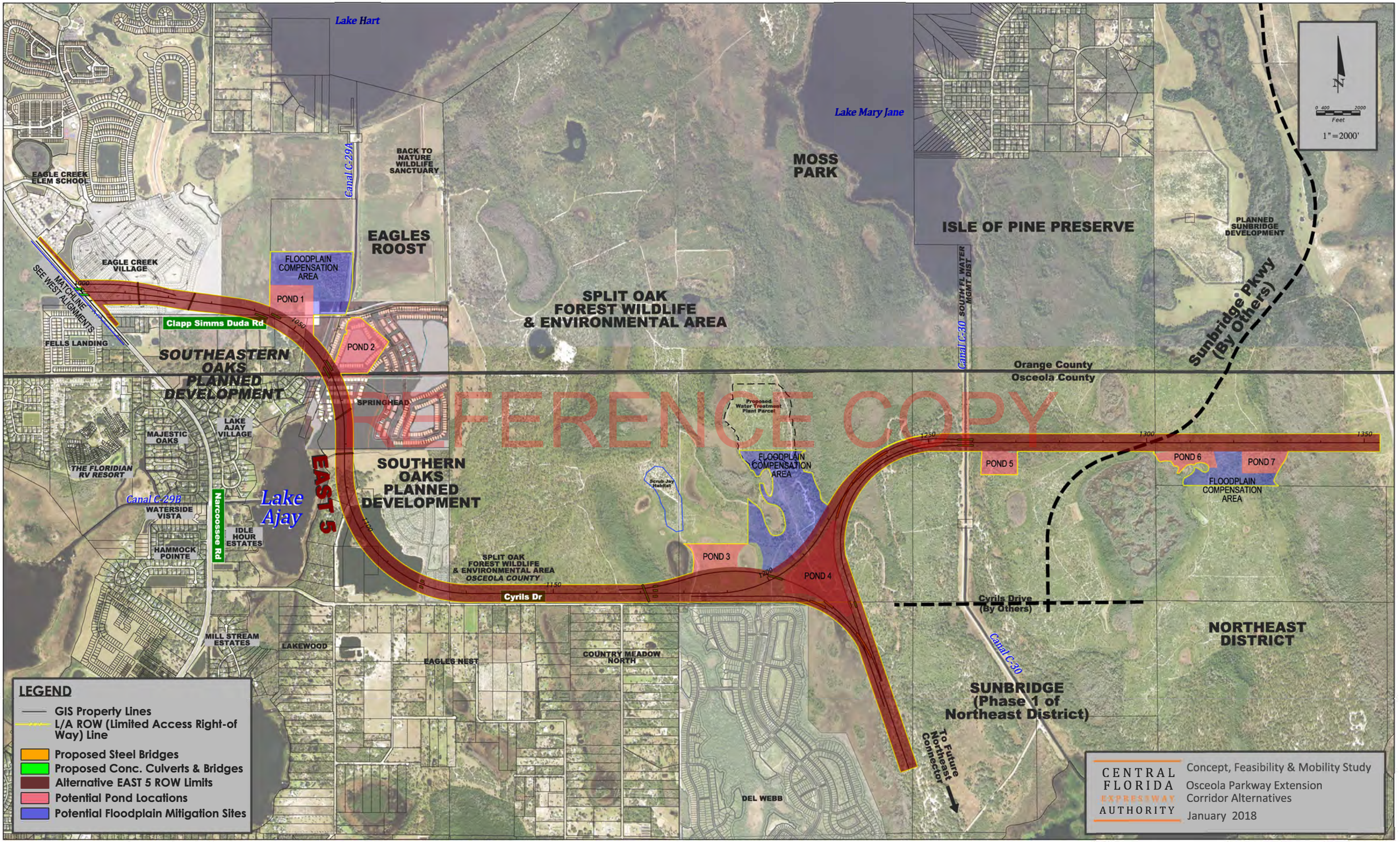

Figure 6-17. Segment East 5

6.6.12.1 Segment Location

This segment begins with a full diamond interchange at Narcoossee Road and continues east north of Clapp Simms Duda Road. West of Canal C-29A, the segment turns southward, skirting the existing Lake Ajay Village neighborhood, crossing the western part of the Carter Lakes property, clipping the Southern Oaks property, crossing the adjacent borrow pit, and then turning east into SOFWEA. Within SOFWEA, the segment hugs the southern boundary and 15-foot-wide OUC electric transmission easement and continues east into NED. At this point, a system-to-system interchange carries the primary (through) movement east to the planned Sunbridge Parkway. A southern leg of the interchange allows traffic to continue south becoming the proposed Northeast Connector Expressway.

6.6.12.2 Proposed Typical Section

The East 5 typical section is 400 feet wide and uses the same configuration as East 1. Figure 6-11 presents the typical section.

6.6.12.3 Proposed Interchanges

Interchanges for East 5 are nearly identical to those proposed for East 4A (see Section 6.6.9.3). The one variation is that the system-to-system interchange with the future Northeast Connector Expressway is farther south with East 5 than it would be with East 4A, though the access and design criteria would be identical.

6.6.12.4 Proposed Structures

East 5 contains four steel bridges, nine concrete bridges, and four box culverts. The steel ramp bridges span the OPE mainline, Cyrils Drive Extension, and the Northeast Connector mainline at the Northeast Connector interchange. The concrete bridges cross Narcoossee road, Clapp Simms Duda Road, Canal C-29A, a wildlife crossing area, Cyrils Drive Extension, Canal C-30, and over the mainline in the Northeast Connector interchange. The four box culverts are placed at small creek crossings along the segment.

6.6.12.5 Maintenance of Access

East 5 proceeds east from Narcoossee Road along the north side of Clapp Simms Duda Road. It turns south well west of Canal C-29A, impacting existing homes along the south side of Clapp Simms Duda Road and cutting through the western portions of the planned Springhead Lakes and Southern Oaks developments. Some small number of parcels between OPE and Canal C-29A could be cut off from local access unless a reworked plan provides access to the south through Southern Oaks to Cyrils Drive. Most of Springhead Lakes continues to have access, as currently planned, on to Clapp Simms Duda Road. East 5 cuts across the far southern limits of the planned Southern Oaks development. The current East 5 concept calls for bridging the Southern Oaks primary roadway, thus maintaining local access to Cyrils Drive as currently planned.

Within SOFWEA, East 5 hugs the southern boundary emerging into the Sunbridge development (NED) and a system-to-system interchange. Within SOFWEA, no vehicular access is provided to or from OPE. East 5 local access within NED is limited to an intersection and later diamond interchange at Sunbridge Parkway.

6.6.12.6 Drainage and Stormwater Considerations

Stormwater and drainage systems for East 5 are similar to the other previously discussed East segments. This segment uses open roadside swales for conveyance to the stormwater ponds. The total required treatment and attenuation volume is 100.26 ac-ft. and there are seven stormwater ponds proposed for this segment comprising 119.86 acres. There are approximately 124.20 ac-ft of 100-year floodplain impacts compensated by three ponds comprising 138.29 acres. This segment uses an infield area at the interchange with the proposed Northeast Connector Expressway for one of the stormwater ponds.

6.6.12.7 Proposed Right-of-Way Needs

All East segments feature a 400-foot-wide mainline ROW, interchange areas, stormwater ponds, and floodplain impact compensation ponds, as discussed in Section 6.6.6.7. Considering these various areas, the estimated ROW for East 5 is approximately 620 acres. This does not include an optional 45 acres of ROW toward the south for the future Northeast Connector Expressway system-to-system interchange.

6.6.12.8 Projected Design Year Traffic

The projected 2045 AADT is 43,500 vehicles for East 5. This assumes that West 1B with the direct airport connector is constructed at the same time as East 5. See Attachment D for details of these projections.

6.6.12.9 Viability

East 5 meets projected traffic demands, eliminates the SOFWEA remainder, and minimizes impacts to SOFWEA. Thus, it was carried forward for further consideration.

6.6.13 Segment East 6

This segment completely avoids impacts to SOFWEA in both Orange and Osceola Counties, and reverses the PD&E's traffic approach, making the primary movement toward the east rather than the south. In completely avoiding impacts to SOFWEA, it impacts existing residences along Clapp Simms Duda Road and in the existing Lake Ajay Village neighborhood, and impacts planned residences in the Carter Lakes, Southern Oaks, and Del Webb developments. It also impacts existing residences south of Cyrils Drive and on Absher Road (see Figure 6-18).

6.6.13.1 Segment Location

This segment begins with a full diamond interchange at Narcoossee Road and continues east for a short distance north of Clapp Simms Duda Road. Well west of Canal C-29A, the segment turns southward, impacting the existing Lake Ajay Village neighborhood, crossing the western part of the Carter Lakes property, clipping the Southern Oaks property, and crossing the adjacent borrow pit. Turning east, the segment overpasses Cyrils Drive and continues east into the Northeast District. At this point, a system-to-system interchange carries the primary (through) movement east to the planned Sunbridge Parkway. A southern leg of the interchange allows traffic to continue south becoming the proposed Northeast Connector Expressway.

6.6.13.2 Proposed Typical Section

The East 6 typical section is 400 feet wide and uses the same configuration as East 1. Figure 6-11 presents the typical section.

6.6.13.3 Proposed Interchanges

Interchanges for East 6 are nearly identical to those proposed for East 4A (see Section 6.6.9.3). The one variation is the system-to-system interchange with the future Northeast Connector Expressway is farther south with East 6 than it is with East 4A, though the access and design criteria are identical. Because East 6 is south of Cyrils Drive, the system-to-system interchange at the Northeast Connector has more complicated geometry and more structures.

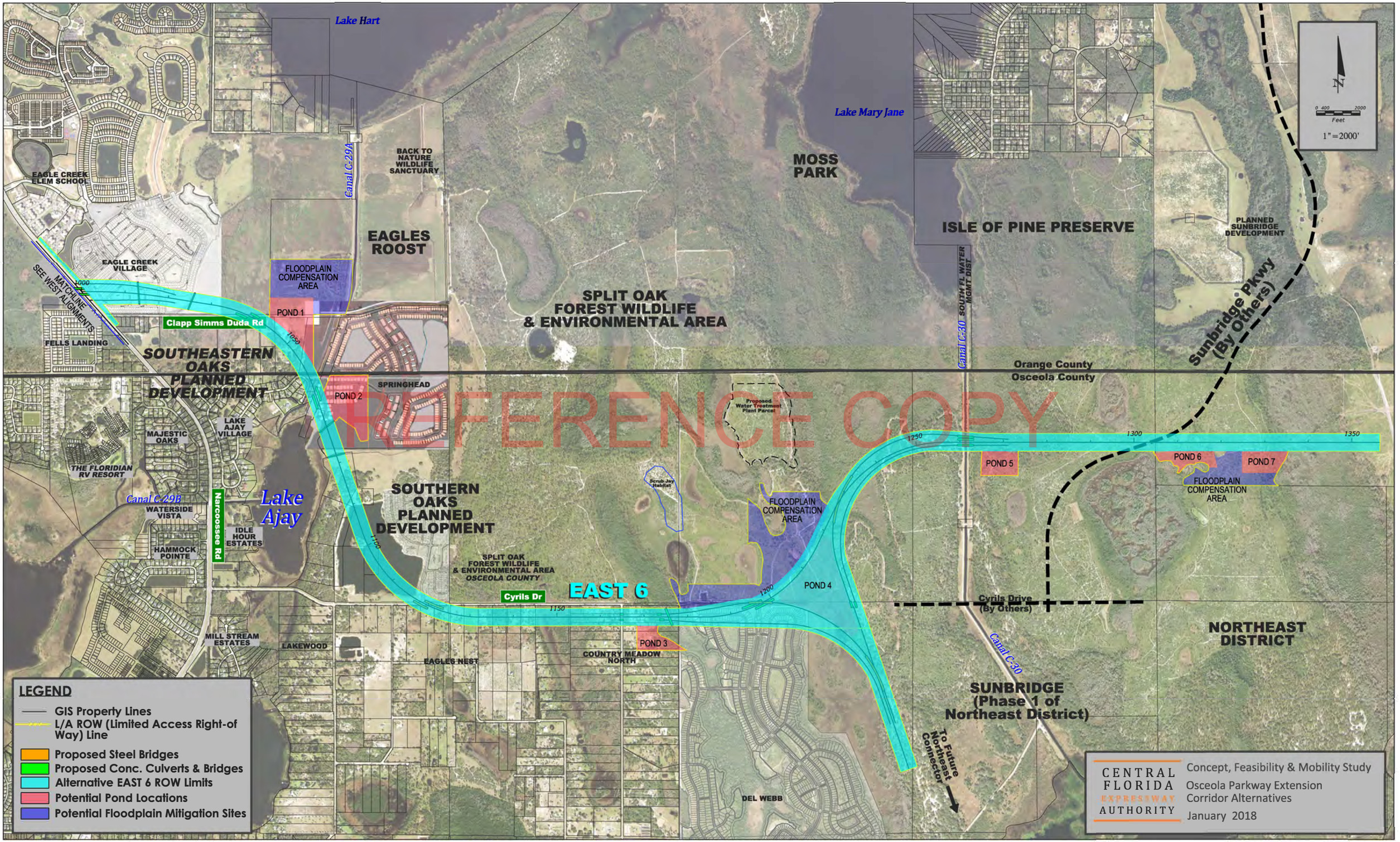

Figure 6-18. Segment East 6

6.6.13.4 Proposed Structures

East 6 contains four steel bridges, eight concrete bridges, and five box culverts. The steel mainline bridge crosses over Cyrils Drive west of SOFWEA. The steel ramp bridges span the Northeast Connector mainline, Cyrils Drive Extension, and the OPE mainline at the Northeast Connector interchange. The concrete bridges cross Narcoossee Road, Clapp Simms Duda Road, Canal C-29A, Absher Road off Cyrils Drive, a wildlife crossing area, Cyrils Drive Extension, and Canal C-30. The five box culverts are placed at small creek crossings along the segment.

6.6.13.5 Maintenance of Access

East 6 proceeds east from Narcoossee Road along the north side of Clapp Simms Duda Road. It turns south well west of the Canal C-29A, even farther west than East 5, impacting existing homes along the south side of Clapp Simms Duda Road and multiple homes in Lake Ajay Village. It continues southward, cutting through the far western portion of the planned Springhead Lakes and the far southern edge of the planned Southern Oaks developments. The undisturbed portions of Springhead Lakes continue to have access, as currently planned, on to Clapp Simms Duda Road. The current East 6 concept calls for bridging Cyrils Drive and the Southern Oaks primary roadway, thus maintaining local access to Cyrils Drive as currently planned. East 6 completely avoids SOFWEA, so there are no access effects within the property. East 6 parallels Cyrils Drive immediately south of that ROW and would take many parcels there. Access from Absher Road onto Cyrils Drive is maintained by OPE bridging over Absher Road. East 6 local access in NED is limited to an intersection and later diamond interchange at Sunbridge Parkway. East 6 also causes major impacts to the northern swath of the planned Del Webb development, thus requiring a major redesign of its planned frontage and access along the Cyrils Drive Extension. The current East 6 concept does not address this access issue.

6.6.13.6 Drainage and Stormwater Considerations

Stormwater and drainage systems for East 6 are similar to the other previously discussed East segments. This segment uses roadside swales for conveyance to the stormwater ponds. The total required treatment and attenuation volume is 106.43 ac-ft, and there are seven stormwater ponds proposed for this segment comprising 126.29 acres. There are approximately 130.10 ac-ft of 100-year floodplain impacts compensated by three ponds comprising 142.60 acres This segment uses an infield area at the interchange with the proposed Northeast Connector Expressway for one of the stormwater ponds.

6.6.13.7 Proposed Right-of-Way Needs

All East segments feature a 400-foot-wide mainline ROW, interchange areas, stormwater ponds, and floodplain impact compensation ponds, as discussed in Section 6.6.6.7. Considering these various areas, the estimated ROW for East 6 is approximately 547 acres. This does not include an optional 41 acres of ROW toward the south for the future Northeast Connector Expressway system-to-system interchange.

6.6.13.8 Projected Design Year Traffic

The projected 2045 AADT is 43,500 vehicles for East 6. This assumes that West 1B with the direct airport connector is constructed at the same time as East 6. See Attachment D for details of these projections.

6.6.13.9 Viability

East 6 is the complete avoidance segment with respect to SOFWEA. Because a complete avoidance alignment should always be considered (unless a fatal flaw is discovered), it was carried forward for further consideration.

6.6.14 Segment East 7

This segment avoids impacts to residences along the south side of Clapp Simms Duda Road, avoids impacts to SOFWEA in Orange County, significantly reduces impacts to SOFWEA in Osceola County, maximizes the buffer to the Florida scrub-jay territory in SOFWEA, provides local access to and from Cyrils Drive, and reverses the OCX 2017 PD&E's traffic approach, making the primary movement toward the east rather than the south. It increases the buffer from the Florida scrub-jay territory relative to East 4A and reduces the residential impacts west of SOFWEA relative to East 4B (see Figure 6-19).

6.6.14.1 Segment Location

This segment is a composite of East 4C and East 2. It begins with a full diamond interchange at Narcoossee Road and continues east north of Clapp Simms Duda Road. At Canal C-29A, the segment turns southeast and crosses into SOFWEA, just below the Orange County line on a southeast bearing. It continues southeast in SOFWEA, reaching its southern boundary near Absher Road. The segment turns east and extends into NED. Along this southern boundary of SOFWEA, the segment is bracketed by one-way frontage roads providing access to and from Cyrils Drive, including its planned extension into the Northeast District, in the same manner as East 2. Like East 2, it directly impacts the northern portion of the Del Webb parcel. Within NED, a system-to-system interchange carries the primary (through) movement east to the planned Sunbridge Parkway. A southern leg of the interchange allows traffic to continue south becoming the proposed Northeast Connector Expressway.

6.6.14.2 Proposed Typical Section

The East 7 typical section is 400 feet wide and uses the same configuration as East 1. Figure 6-11 presents the typical section. The section of East 7 that replaces existing Cyrils Drive features the same mainline roadway as shown on Figure 6-11 but adds one-way frontage roads along either side of the mainline to provide local access and on-off access to OPE.

6.6.14.3 Proposed Interchanges

Interchanges for East 7 are nearly identical to those proposed for East 2 (see Section 6.6.7.3). The one variation is the system-to-system interchange with the future Northeast Connector Expressway. For East 7, the through movement is east-west with the Northeast Connector Expressway being the secondary or ramp movement. For East 2, the through movement and ramp movement are reversed.

6.6.14.4 Proposed Structures

East 7 contains six steel bridges, six concrete bridges, and three box culverts. The steel mainline bridge crosses over Canal C-29A. The steel ramp bridges span the OPE mainline in the Northeast Connector interchange (two places), Cyrils Drive Extension, and the Northeast Connector mainline. The concrete bridges cross Narcoossee Road, Clapp Simms Duda Road, Cyrils Drive Extension, and Canal C-30. There is also a concrete bridge over the entire SOFWEA. The three box culverts are placed at small creek crossings along the segment.

6.6.14.5 Maintenance of Access

East 7 follows a path nearly identical to East 2 and as such has identical access concerns. See Section 6.6.7.5 for a detailed discussion.

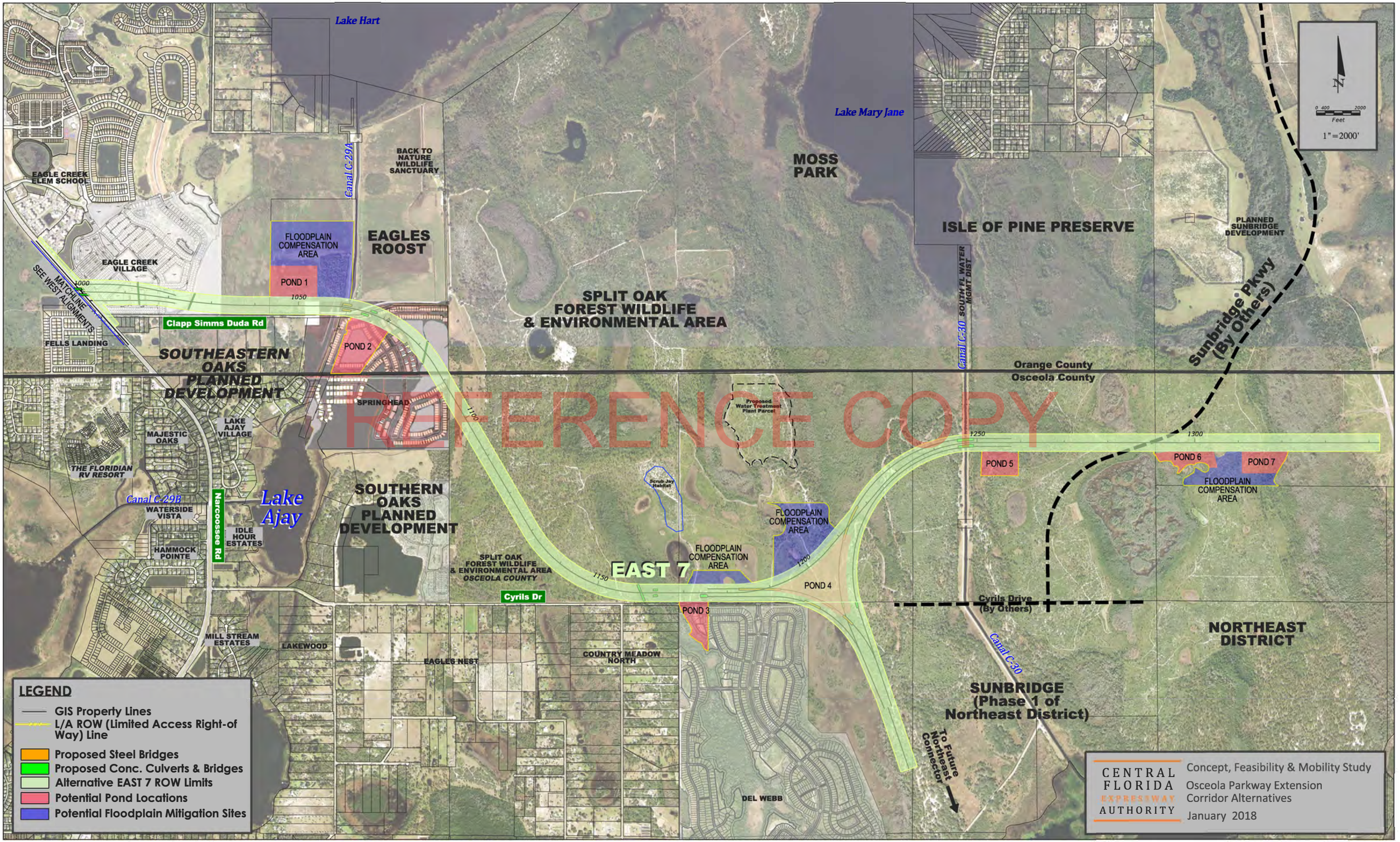

Figure 6-19. Segment East 7

6.6.14.6 Drainage and Stormwater Considerations

Stormwater and drainage systems for East 7 are similar to the other previously discussed East segments. This segment uses open roadside swales for conveyance to the stormwater ponds. The total required treatment and attenuation volume is 94.75 ac-ft, and there are seven stormwater ponds proposed for this segment comprising 113.84 acres. There are approximately 113.40 ac-ft of 100-year floodplain impacts compensated by four ponds comprising 125.53 acres. This segment uses an infield area at the interchange with the proposed Northeast Connector Expressway for one of the stormwater ponds.

6.6.14.7 Proposed Right-of-Way Needs

All east segments feature a 400-foot-wide mainline ROW, interchange areas, stormwater ponds, and floodplain impact compensation ponds, as discussed in Section 6.6.6.7. Considering these various areas, the estimated ROW for East 7 is approximately 564 acres. This does not include an optional 49 acres of ROW toward the south for the future Northeast Connector Expressway system-to-system interchange.

6.6.14.8 Projected Design Year Traffic

Design year traffic was not completed for this segment.

6.6.14.9 Viability

East 7 is nearly identical to East 2 in terms of footprint outside NED (that is, within and west of SOFWEA). The difference between the two is all within the system-to-system interchange within the Northeast District (see Figure 6-19).

Because of their similarities, East 7 was eliminated from further consideration for the same reasons as East 2: too great of a SOFWEA remainder and too great of impacts to Osceola County's planned improvements to Cyrils Drive.

6.7 Design Traffic

6.7.1 2045 Design Traffic

The traffic forecasts used for design purposes are developed so that the project would be adequately sized to serve customers through its useful life (30 years). Conversely, traffic forecasts used for revenue estimation were developed so that the project would be able to produce the forecasted revenue, especially in the opening years. Therefore, traffic forecasts prepared for design purposes are different from, and greater than, traffic forecasts prepared for revenue estimation. While assumptions involving overall level and location of future socioeconomic activity and toll amounts/values of time are the same, assumptions about the network near the OPE Project differ.

CDM Smith, CFX's general traffic and earnings consultant, developed a project-specific travel demand model to prepare traffic forecasts for both the design process and for traffic and revenue estimates. The validation and calibration of the travel demand model, CFX 3.0, is described in detail earlier in this section. The following section describes the model assumptions used in developing the traffic forecasts for design purposes.

6.7.2 2045 Design Traffic Network

The CFX 3.0 model has a 2045 Base Network that includes the transportation improvements included in the MetroPlan Orlando 2040 LRTP and CFX's 2040 Master Plan. In the 2040 LRTP, the OCX Master Plan projects Osceola Parkway Extension, Northeast Connector Expressway, Southport Connector Expressway, and Poinciana Parkway I-4 Connector are included as four-lane tolled expressways. To ensure that traffic forecasts provide the level of traffic for the 30-year project life, the 2045 Design

Traffic Network was scaled back to reflect the 2025 LRTP improvements to the local street network. In addition, for the design traffic network other arterials and major collector improvements in the Study Area that act as competitors to the new toll project, including improvements to Boggy Creek Road (Simpson Road to Narcoossee Road), Simpson Road (Osceola Parkway to Boggy Creek Road), and Cyrils Road (East of Narcoossee Road), were removed from the network.

6.7.3 Socioeconomic Assumptions

In the CFX 3.0 model, the socioeconomic (SE) data sets from CFRPM 6.1 were used, except for Osceola County and portions of Southeast Orange County. For these select areas, CDM Smith employed FKA, an independent economist, to provide forecasts of population, employment, school enrollment, and hotel/motel (ZDATA 1 and 2 datasets). FKA updated the 2015 Base Year SE data sets and developed SE forecasts for 2025, 2035, and 2045. These forecasts are known as the Medium SE Data Forecasts. FKA also provided high- and low-side forecasts for use in traffic estimates for revenue. For the design traffic forecasts, the Medium SE Data Forecasts were used.

6.7.4 Toll Rates

The OPE Project has been coded in the design network with a toll rate of $0.18 per mile in FY 2018 dollars, which is consistent with average toll on all new CFX facilities. The toll rates were set by multiplying the rate per mile with the project segment lengths in miles, measured to centerline of the interchange cross street. The toll rates were then inflated to 2045 using the new toll policy of a compounded annual growth rate of 1.5 percent, in accordance with the CFX Customer First toll rate policy, adopted by the CFX Board in January 2017.

6.7.5 2045 Project Alignments AADT Volumes

For study purposes, the OPE Project was studied as a stand-alone project. As such, for the No-Build alternative, the remaining three OCX projects were not assumed to be constructed or part of the background network. Using the calibrated model, traffic forecasts were developed for the year 2045 to coincide with the design year of the project. The full model was run using the Design Network, Medium SE data set for the Build, No Toll option to attract the most amount of traffic to the Study Area. Using the trip table from this full model run, assignment-only runs were completed for each of the Build options or project tolled alignments. The FDOT Model Output Conversion Factor (MOCF) of 0.98 was applied to the model segment volumes to estimate 2045 AADT. The MOCF for Orange and Osceola Counties was obtained from the Florida Traffic Information website.[2] As the purpose of the study was to develop conceptual design traffic forecasts for the OPE Project, only the segment volumes are provided. Figures 6-20 and 6-21 provide the 2045 AADT.

[2] http://flto.dot.state.fl.us/website/FloridaTrafficOnline/viewer.html

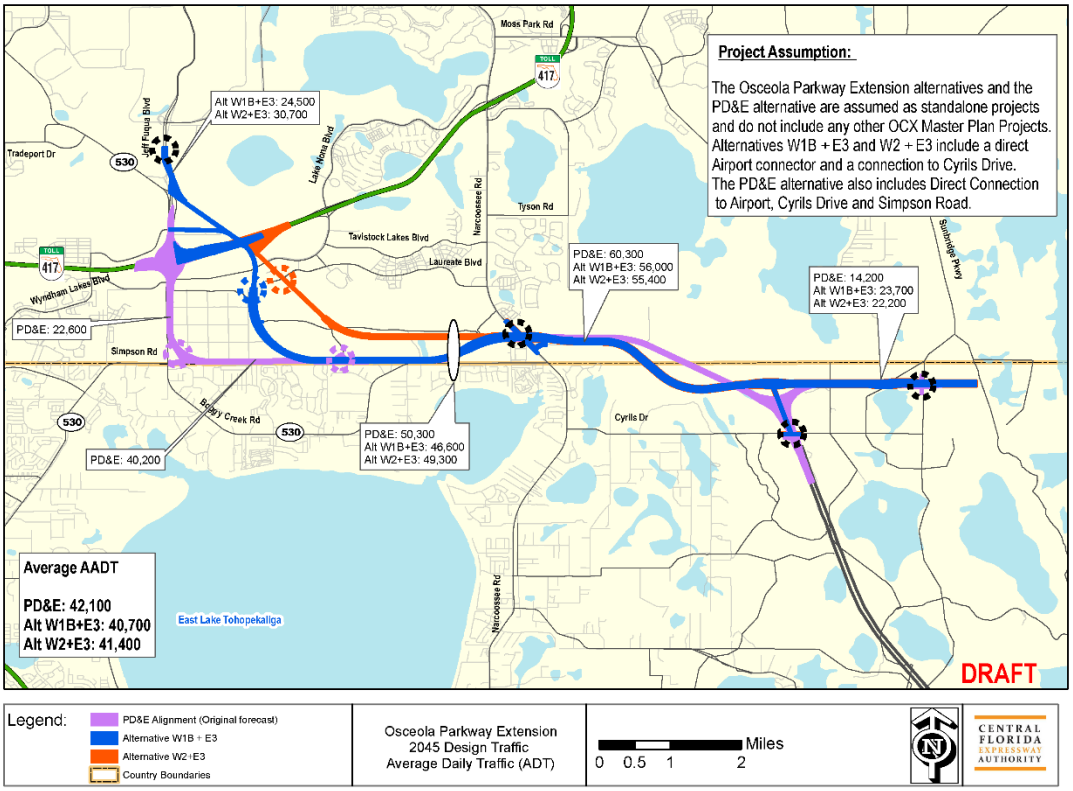

Figure 6-20. 2045 Design Traffic – PD&E, W1B+E3, and W2+E3

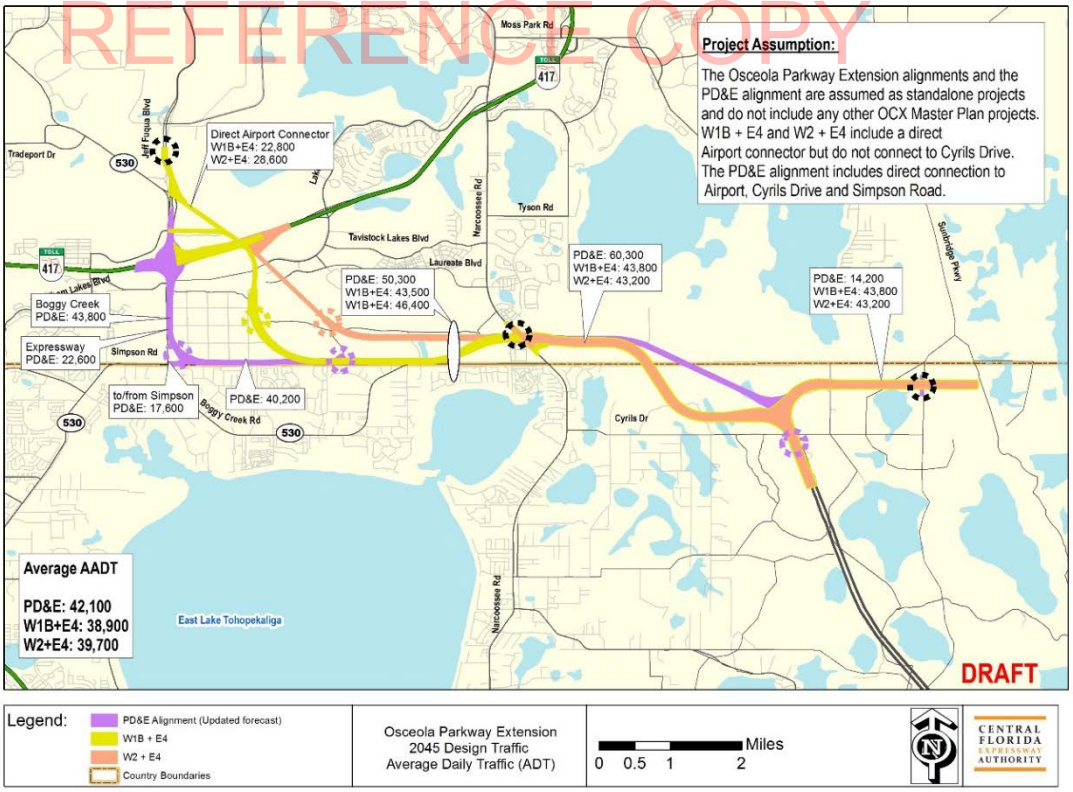

Figure 6-21. 2045 Design Traffic – PD&E, W1B+E4, and W2+E4

6.7.6 Weighted Average AADT

For the project evaluation matrix, a weighted average AADT was provided to compare the alignments. The weighted average provided an even comparison based on the amount of traffic generated by the project weighted by the length of the project. The 2045 Design traffic AADT per segment was multiplied by the length of each segment and the sum was divided by the total length of the alignment. The weighted average 2045 Design AADT for each alignment is provided in Tables 6-3 and 6-4.

Table 6-3. OPE Weighted Average Daily Traffic – With Direct Airport Connector

	Alignment						
	PD&E	**W1A + E3 West of Narcoossee**	**W1B + E3**	**W1B + E4**	**W2 + E3**	**W2 + E4**	**W1B Phased**
2045 ADTs	42,100	39,700	40,700	38,900	41,400	39,700	22,500

Table 6-4. OPE Weighted Average Daily Traffic – Without Direct Airport Connector

	Alignment			
	W1B + E4	**W1B Phased**	**W2 + E4**	**W2 Phased**
2045 ADTs	33,700	16,700	27,700	16,400

6.8 Summary Matrix – Mobility Alternatives Evaluation

Table 6-5 summarizes the remaining practicable alignments and various engineering criteria discussed throughout this section. All alignments carried forward were configured so that any west segment could be paired with any east segment to form a complete alignment. In subsequent sections of this report, these engineering values will be supplemented with natural, social, and cultural impact values to provide a more complete comparison of the remaining practicable alignments.

Table 6-5. Engineering Criteria Comparison Matrix

Alternative or Segment	Length (Miles)	ROW Width (ft)	Number of Structures	Number of Interchanges	2045 AADT[a]	Construction Costs ($ Millions)	ROW Costs ($ Millions)	Mitigation Costs (Millions)	Total Cost ($ Millions)
No-Build	0.0	N/A	0	0	N/A	$ 0	$ 0	$ 0	$ 0
PD&E Recommended Alternative	12.1	260/400	37	5	42,100	$ 709.3	$ 355.0	$ 32.9	$ 1,097.2
West 1B	7.53	150/338	8	4	22,500	$ 402.6	$ 166.7	$ 15.5	$ 584.8
West 2	7.40	150/338	7	4	23,800	$ 394.3	$ 227.4	$ 18.7	$ 640.4
East 4A	5.30	400	19	2	43,800	$ 673.2	$410.1	$ 61.7	$ 1,145.0
East 4C	5.40	400	20	2	43,800	$ 685.4	407.7	$ 61.8	$ 1,154.9
East 5	5.70	400	20	2	43,800	$ 592.6	$ 501.0	$ 56.2	$ 1,149.8
East 6	5.70	400	22	2	43,800	$ 622.8	$ 512.1	$ 54.4	$ 1,189.3

[a] AADT values for all east segments assume that they are constructed with West 1B including the direct airport connector

SECTION 7

Anticipated Effects

7.1 Natural Environment

Natural environment data was derived from the data collection efforts detailed in Section 3. Impacts for each alignment were then estimated through GIS analysis. Because of the land use differences west of Narcoossee Road versus east of Narcoossee Road, the project was divided into western segments and eastern segments. There are two practicable western segments, West 1B and West 2, and four practicable eastern segments, East 4A, East 4C, East 5, and East 6. Alignments were then formed by combining each of the eastern segments with West 1B and then with West 2 for a total of eight practicable alignments (West 1B/East 4A, West 1B/East 4C, West 1B/East 5, West 1B/East 6, West 2/East 4A, West 2/East 4C, West 2/East 5, and West 2/East 6). Estimated impacts to natural resources for each alignment were then compared to each other.

A GIS layer was created for each practicable segment (West 1B, West 2, East 4A, East 4B, East 5, and East 6). Using the geoprocessing tool, an intersect analysis (or overlay) of each segment with each natural resource was performed to determine the impacts per segment. The segments were combined to yield estimated impacts for each of the eight practicable alignments. Section 7.9 summarizes the natural environment impacts associated with each alignment. Attachment G-1 is a GIS map of the footprints of the practicable segments (including stormwater and floodplain ponds). Results of the natural resources analyses and impacts are summarized below.

7.1.1 Water Resources

The water resources evaluated for the proposed OPE include surface waters, floodplains, and groundwater. For the purposes of feasibility, preliminary ponds were sized and located for each of the proposed alignment drainage basins (see Attachment E). Avoidance of floodplains, existing wetlands, and conservation lands was done to the greatest extent possible. Pond locations and sizes are likely to change as the project moves forward into the next phases.

7.1.1.1 Surface Waters

Anticipated impacts to surface waters on the west side of the Study Area (west of Narcoossee Road) include Jim Branch and Boggy Creek, which outfall to East Lake Toho, and the SFWMD Canals C-29A and C-30 east of Narcoossee Road, which outfall to Lake Ajay and Lake Myrtle, which in turn flow into East Lake Toho and Alligator Lake, respectively. Additional treatment may be required because the Kissimmee River Watershed is a part of the greater Lake Okeechobee Basin, which is classified as an impaired waterbody and subject to additional treatment requirements (SFWMD, 2014). Additional nutrient loading analyses may be required as East Lake Toho, while not an impaired water body, is under a nutrient reduction plan.

Within the Study Area, SFWMD Canals C-29 and C-30 are likely to be impacted. These canals are regulated by both SFWMD and USACE. Criteria related to direct withdrawals of surface water from these canals and indirect withdrawals of surface water from contributing waterbodies are regulated under SFWMD “no harm” threshold. Any dewatering during the project schedule will require adherence to this criterion. Coordination with both SFWMD and USACE will be necessary during the next project phase.

7.1.1.2 Floodplains

Flood hazard areas were identified using FEMA Floodplain Maps and presented in Attachment C-1. Flood hazard areas mapped include the 100-year floodplain and floodways. Flood hazard impact acreage has

been estimated by alignment for comparison of direct impacts to floodplains and floodways, the cost of floodplain compensation, and cost of roadway construction resulting from fill or bridging. Section 7.9 includes impact acreages by practicable alignment.

In the Study Area, Boggy Creek is a FEMA-designated regulatory floodway. Should the project impact Boggy Creek, hydraulic modeling and analysis may be required prior to permitting to determine the project meets a No-rise Certification. This No-rise Certification must be supported by technical data and signed by a registered professional engineer.

7.1.1.3 Groundwater

No effects are anticipated to groundwater. If dewatering is necessary during construction, the water table would be temporarily affected. A detailed geotechnical investigation will be required to determine the seasonal high water table. During the next phase of the study, an evaluation of potential impacts to groundwater resources within the Study Area will be performed. As part of the evaluation, a Water Quality Impact Evaluation will be completed for the existing basins within the Study Area in accordance with FDOT's PD&E Manual, Part 2, Chapter 11.

7.1.2 Wetlands and Hydric Soils

Wetlands, both forested and non-forested, were determined through GIS desktop analysis as detailed in Section 3 to estimate acres of impact from each alignment. Wetland impact acreage has been estimated to compare each alignment's direct impacts to wetland habitat, impacts to wetland-dependent species, amount of mitigation required, and cost of roadway construction resulting from fill or bridging. Potential wetland impacts for each alignment are presented in Section 7.9. Wetland impacts are anticipated to be higher in the western portion of the Study Area. The eastern segments (East 4A, 4C, 5, and 6) are similar in potential wetland impact acreage. East 5 is associated with the lowest wetland impact acreage, while East 4C is the highest.

7.1.3 Farmlands

Most farmlands are in the Osceola County portion of the Study Area and are rated as unique farmlands. Unique farmland is land other than prime farmland that is used to produce specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables (NRCS, 2018c). Significant impacts to unique farmlands are anticipated. Should OPE continue to a PD&E study, the anticipated environmental document is a State Environmental Impact Report (SEIR). Part 1, Chapter 10 of the PD&E Manual states that farmlands are not analyzed for SEIR projects because analysis of these resources is only required for federal projects. However, OPE will likely have a federal action because of impacts associated with wetlands and federally listed species. The federal lead agency (likely to be USACE) is required to analyze alternatives of a proposed project pursuant to two main requirements: the 404(b)(1) Guidelines and National Environmental Policy Act (NEPA). Therefore, USACE may require coordination with NRCS and completion of the Farmland Conversion Impact Rating Form (Form NRCS-CPA-106).

7.1.4 Threatened and Endangered Species

Potential habitat areas for federal and state listed wildlife species, as well as species observations in the project vicinity, were identified based on publicly available GIS databases, field studies conducted as part of the OCX 2017 PD&E Study, and preparation of a custom IPAC Report for the Study Area. The two western segments, West 1B and West 2, are similar in terms of potential impacts to threatened and endangered species. For most of the species for which GIS analysis was conducted, West 2 is expected to result in somewhat fewer acres of potential habitat impact than West 1B. Several threatened and endangered species are known or are likely to occur near the two segments, including gopher tortoise

(*G. polyphemus*), Florida scrub-jay (*Aphelocoma coerulescens*), and the red-cockaded woodpecker (*Leuconotopicus borealis*).

The four eastern segments differ notably in potential impacts to threatened and endangered species, with segments East 4A and East 4C having significantly greater impacts than segments East 5 and East 6. This is largely because segments East 4A and East 4C extend through SOFWEA. It provides important ecological community and wildlife corridor links to other nearby conservation lands, and contains high quality habitat for diverse wildlife species, including listed species such as gopher tortoise, and Sherman's fox squirrel (*S. niger shermani*), a state Species of Special Concern. Segments East 5 and East 6 minimally impact or completely bypass SOFWEA to the south. In this preliminary analysis, East 6 appears to result in somewhat fewer impacts to potential habitat than East 5; however, these results will be refined as part of future studies.

7.1.5 Priority Habitat

Six types of priority habitats were established by the FWC from 45 habitat categories as part of a conservation effort to improve ecological sustainability statewide. Three of these six types of priority habitats were identified in the Study Area: softwater streams, sandhills, and xeric scrub. Softwater streams and sandhills will be impacted by segments West 1B and West 2. Segment West 1B will also impact a small area of xeric scrub habitat. The acreage of sandhill habitat impacts for the two western segments is comparable, while the linear footage of softwater streams potentially impacted by West 1B is approximately 50 percent less than segment West 2.

Each of the four eastern segments will impact sandhill communities and small areas of xeric scrub. The acreage of priority habitats affected by the four eastern segments is similar, with East 4A impacting the lowest, and East 6 impacting the highest acreage of priority habitats.

7.1.6 Essential Fish Habitat

Based on a review of the National Oceanic and Atmospheric Administration's National Marine Fisheries database, there is no essential fish habitat within the Study Area and, therefore, none of the potential alignments will impact essential fish habitat.

7.1.7 Conservation Areas

Conservation areas and easements within the Study Area were identified based on a review of existing permits and electronic databases. Several conservation areas and permitted conservation easements were identified within the project area, including Eagle Creek, World Gateway DRI, Eagles Roost, GOAA, Greeneway, Poitras, and SOFWEA. Potential direct and indirect (based on a 1,000-foot-wide buffer) impacts to these easements were estimated for each segment. These conservation areas include lands used for mitigation. Section 7.9 presents the impacts to conservation/public lands.

All segments are expected to result in impacts to conservation areas. The two western segments are relatively similar in impacts to conservation areas. Of the eastern segments, East 4A and, to a lesser extent, East 4C will result in relatively high impacts to conservation lands because they traverse SOFWEA. However, the buffer width (currently 1,000-foot-wide) to allow for secondary impacts, will likely be reduced during PD&E and therefore impacts associated with these segments will likely be lower. Segments East 5 and East 6 will result in lower impacts to conservation lands, with East 6 having the lowest impacts to conservation areas.

The Osceola County portion of SOFWEA was purchased using a grant from FCT. During the 2017 PD&E Study, a meeting was held with FCT on January 28, 2016, to discuss potential impacts to SOFWEA. The meeting notes presented in Attachment G-2 have the following key points:

- FCT provided a copy of FAC Chapter 62-818 that describes the options for addressing the impacts to lands purchased with Florida Forever Funds.
- FCT indicated they would work with OCX in moving forward with the project and determining the mitigation required and process for addressing the Grant Award Agreement. An interlocal agreement may be needed between the FCT and the Counties.

7.1.8 Mitigation Banks

There are no mitigation banks in the western portion of the study area. There is only one mitigation bank in the eastern portion of the study area (Orange County portion of SOFWEA), and no impacts to that bank are anticipated.

7.1.9 Prescribed Burn Areas

The use of prescribed burns in land management represents a potential smoke hazard to drivers near a burn. As part of the SOFWEA *Management Plan* (FWC, 2016), FWC employs a prescribed burning program to increase both species and habitat diversity. It is designed to have both frequently burned and infrequently burned aspects. In areas where prescribed burning is limited by the buildup of mid-story brush and a lack of fuel-rich groundcover, mechanical control is used to sustain prescribed fire. The *Management Plan* states that FWC plans to conduct prescribed burning on 400 acres per year within the area's fire-adapted communities. The fire-adapted communities within SOFWEA include 1,683 acres, or 95 percent of the total conservation area.

The land management plans for Eagles Roost and Isle of Pine Preserves, state that prescribed burn is used for overall forest management of the properties. Both plans state that prescribed burns promote biodiversity and lower and maintain fuel loads, thus mitigating the behavior and effects of wildfires that start in or outside of the properties. Additionally, the plans state that when necessary, other methods such as mowing, roller chopping, and herbicide, will be utilized in place of or in conjunction with prescribed burning.

While there is no land management plan for Moss Park, Orange County recently (February 2018) awarded a contract for burning and mechanical services at Moss Park. Orange County remarks that the prescribed burning is to promote habitat for wildlife, open space for recreation, and reduction in the danger of wildfires in areas like Moss Park, where houses are close to the boundaries of park.

There are no managed lands in the western portion of the study area, therefore the two western segments will not impact conservation lands with prescribed burns. East 4A and East 4C are likely to have the greatest impacts to conservation lands, and thus associated prescribed burn areas.

7.2 Human Environment

7.2.1 Community and Neighborhood Features

The sociocultural environment evaluation involved a comparative assessment of criteria related to the social (human) and cultural environment including estimated ROW impacts (number of residential and non-residential parcels, number of parcel owners, and potential relocations), impacts to community facilities and neighborhoods, impacts to parks and recreation areas and conservation lands, involvement with potential archaeological and historical resources, agricultural land involvement, and socioeconomic impacts to special populations. Section 7.9 presents a matrix of the anticipated sociocultural impacts.

The western segments have similar impacts to both planned and unplanned residential parcels and non-residential parcels. West 1B is anticipated to have more aesthetic effect impacts to the residential community to the east of the alignment because of its proximity. Both western segments, West 1B and

West 2, are anticipated to have aesthetic effect impacts to the residential communities along the Orange/Osceola line, particularly the Fells Cove neighborhood because of the rural nature of the community and proximity to the proposed segments.

All eastern segments have high impacts to planned residential parcels, with the highest (26 parcels) being East 6. Impacts to existing residential communities are lowest with East 4A, East 4C, and East 5. The Lake Ajay community and the residences along Cyrils Drive will experience most relocations and aesthetic effect impacts. Should the project continue into further study, a Sociocultural Effects Evaluation is recommended.

7.2.2 Cultural Resources

Environmental resources, such as publicly-owned parks and recreational facilities, conservation lands, and Section 106 resources, may be determined to be eligible Section 4(f) resources. Section 106 resources are significant historic and archaeological properties that are included in, or eligible for, the NRHP. These NRHP-eligible, or potentially NRHP-eligible, properties include historic districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, or culture.

Publicly owned park and recreation lands and wildlife and waterfowl refuges may also be determined eligible Section 4(f) resources if they are publicly owned, formally designated, and considered significant resources. Multiple hiking trails occur throughout SOFWEA. Eastern segments East 4A, East 4C, and East 5 have potential to impact the trails. Because no federal dollars are anticipated to be used for the OPE, Section 4(f) is not applicable. However, the proposed OPE is anticipated to be state-funded with a SEIR as the anticipated environmental document. The FDOT *PD&E Manual* Part 1, Chapter 10 (FDOT, 2017b) states:

> *Under the state funded project delivery process, Section 4(f) does not apply since there is no United States Department of Transportation (USDOT) action; however, coordination with the public entity of jurisdiction of the public recreation area should still occur [Part 2, Chapter 7, Section 4(f) Resources]. For example, coordination with the FDEP is necessary on projects affecting state owned parks or other program areas such as the Florida Forever land acquisition program*.

The OPE will likely have a federal action because of impacts associated with wetlands and federally listed species. The federal lead agency (likely to be USACE), is required to analyze alternatives of a proposed project pursuant to two main requirements: the 404(b)(1) Guidelines and NEPA. Therefore, a Section 4(f) evaluation may be necessary for the project to receive a federal permit (USACE, 2014). Coordination with USACE will be required to determine Section 4(f) requirements.

7.2.2.1 Historical

Potential Section 106 resources affected by the OPE include eight historic structures and three historic linear resources that have not been evaluated by the SHPO regarding eligibility for listing on the NRHP. Therefore, these resources would need to be evaluated if located with the APE of the preferred alternative or ponds.

7.2.2.2 Archaeological

Potential Section 106 resources affected by the OPE include 10 archaeological resources that have not been evaluated by the SHPO regarding eligibility for listing on the NRHP. Therefore, these resources would need to be evaluated if located with the APE of the preferred alternative or ponds. During the 2017 PD&E Study, only an archaeological pedestrian survey was undertaken in SOFWEA as part of the CRAS. The SHPO concurred with the 2017 PD&E Study CRAS report but noted that, should the OPE

project intersect the preserve, archaeological testing would be necessary in SOFWEA. A special use permit would be required to conduct archaeological testing in SOFWEA boundaries.

Once the preferred alternative has been developed and preferred pond locations have been selected, a cultural resource assessment, including archaeological and architectural history surveys, should be conducted. The APE for the roadway and ponds should be subjected to subsurface testing at intervals according to the probability of identifying archaeological material. Unrecorded historic resources should be recorded and assessed. The identified historic structures and archaeological sites, if any, should be assessed for their potential eligibility for listing in the NRHP. The results of this evaluation should then be reviewed by the Florida SHPO for concurrence and possible comment.

7.2.3 Emergency Services

There are no emergency services, such as police and fire rescue stations in the Study Area. Just north of the Study Area is the City of Orlando Fire Station Number 16.

7.3 Noise

No noise impacts were assessed for this study. However, noise abatement must be considered for residential areas near the proposed OPE, SOFWEA, and other noise-sensitive sites. Therefore, a preliminary review of potential noise impacts associated with a project should be conducted in the next phase of the study. This review should determine if noise-sensitive receptors are or may be located within the Study Area and if there is a possibility that noise-sensitive receptors will be impacted because predicted traffic noise levels with the Build alternative approach or exceed the Noise Abatement Criteria.

7.4 Air Quality

The project area is designated “attainment” with respect to the National Ambient Air Quality Standards (NAAQS). State Implementation Plans (SIPs) are not prepared for areas designated attainment. Therefore, there is no reason to demonstrate compliance with the SIP. To meet NEPA requirements, a carbon monoxide analysis should be performed during subsequent project phases on the project alignments. All alignments are expected to pass the screening test.

7.5 Contamination

The FDEP’s Map Direct and OCULUS databases were queried for facilities within the Study Area that would be considered a major project constraint. If a facility was a potential major project constraint, supplemental research was performed to determine the current regulatory status. After reviewing the databases, no sites were identified that would be considered a major constraint to the project.

A complete Level I Contamination Screening Evaluation Report is conducted once the preferred alternative is selected. Level II testing may also be necessary for sites assigned a risk rating of High or Medium in accordance with Chapter 20 of the FDOT *PD&E Manual* (FDOT, 2017b) to determine the presence and extent of contamination.

7.6 Utilities

There are several major utilities in the Study Area including major overhead electric transmission lines, water treatment plants, and electrical sub-stations (as described in Section 3). Alignments will be developed to avoid and minimize impacts to existing and proposed utilities including:

- The proposed NED Water/Wastewater Treatment Plant just south of the Orange/Osceola County line
- Existing OUC electric transmission lines along the east side of Narcoossee Road
- Proposed OUC electric substation near Narcoossee Road at Clapp Simms Duda Road

7.7 Railroads

An at-grade OUC railroad mainline exists in the Study Area near Jeff Fuqua Boulevard; coordination with OUC will be required should an alignment north of SR 417, which is the southern portion of OIA, be desired.

7.8 Anticipated Permits Required

The following permits are anticipated to be required for OPE:

- SFWMD - Environmental Resource Permit
- SFWMD - Water Use Permit (Construction Dewatering)
- SFWMD - ROW Occupancy Permit
- USACE – Federal Dredge and Fill Permit
- FDEP – National Pollution Discharge Elimination System (NPDES) General
- FWC – State Protected Species Permits (for example, Gopher Tortoise Permit for burrows, sandhill crane or osprey nests located prior/during construction)
- USCG –Bridge Permit; some waterways in the Study Area are potentially navigable by small watercraft, such as canoes, kayaks, etc., and a USCG Advance Approval authorization in accordance with 33 CFR § 115.70 may be required
- FWS - Federally Protected Species Permits (for example Florida scrub-jay, eastern indigo snake, or eagles)

7.9 Summary Matrix – Anticipated Effects

Table 7-1 presents a matrix of potential impacts to resources associated with the practicable alignments.

Table 7-1. Anticipated Effects Summary Matrix

Osceola Parkway Extension

Alternatives Evaluation Matrix

January / February 2018

Last Updated: 3/7/2018

Evaluation Criteria	Unit of Measure	PD&E Recommended Alternative	West 1B (w/ Direct Airport Connector) + East 4A w/o Northeast Con	West 2 (w/ Direct Airport Connector) + East 4A w/o Northeast Con	West 1B (w/ Direct Airport Connector) + East 4C w/o Northeast Con	West 2 (w/ Direct Airport Connector) + East 4C w/o Northeast Con	West 1B (w/ Direct Airport Connector) + East 5 w/o Northeast Con	West 2 (w/ Direct Airport Connector) + East 5 w/o Northeast Con	West 1B (w/ Direct Airport Connector) + East 6 w/o Northeast Con	West 2 (w/ Direct Airport Connector) + East 6 w/o Northeast Con
Design										
Alternative Length (Approximate)	Miles	12.1	12.8	12.6	12.9	12.8	13.2	13.0	13.3	13.1
Proposed Right-of-Way Width (Width Varies; Minimum / Maximum)	Feet	260 / 400	150 / 338 / 400	150 / 338 / 400	150 / 338 / 400	150 / 338 / 400	150 / 338 / 400	150 / 338 / 400	150 / 338 / 400	150 / 338 / 400
Physical										
Major Utility Conflicts - Existing	No. of Conflicts	2	4	4	4	4	4	4	4	4
Major Utility Conflicts - Planned	No. of Conflicts	0	0	0	1	1	1	1	0	0
Contamination Sites & Facilities	No. of Conflicts	2	2	2	2	2	1	1	1	1
Railroad Involvement	No. of Conflicts	0	1	1	1	1	1	1	1	1
Cultural Environment Effects										
Public Lands	Acres	56	162	162	166	166	112	112	56	56
Section 4(f) Coordination Required (Public Recreation Lands, Wildlife Refuges, etc.)	Y/N	Y	Y	Y	Y	Y	Y	Y	N	N
Potential Historic Resources	No. of Conflicts	2	2	1	2	1	1	0	1	0
Potential Historic Linear Resources (Canals)	No. of Resources	2	5	4	5	4	5	4	5	4
Potential Archaeological Resources	No. of Resources	1	1	1	1	1	1	1	2	2
Natural Environment										
Water Features										
Ponds / Lakes	Acres	0	0	0	0	0	0	0	1	1
Canals/Regulated Floodways	No. of Conflicts	2	5	2	5	2	5	2	5	2
Flood Hazard Areas - 100 Year Floodplain	Acres	194	169	157	186	173	177	165	181	169
Wetlands (Non-Forested and Forested)	Acres	110	366	398	367	399	338	370	341	373
Potential Habitat - Federal Listed Species	Acres	-	464	441	474	451	485	462	470	447
Potential Habitat - State Listed Species	Acres	-	489	469	501	481	496	476	487	467
Potential Bald Eagle Nest	Y/N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Potential Species Impacts (Composite Rating)	Rating	-	7.4	7.6	7.4	7.6	7.3	7.5	7.1	7.3
Conservation Easements										
Eagle Creek, World Gateway DRI, Eagles Roost, Split Oak	Acres	1114	992	990	956	954	731	729	606	604
Split Oak - Total Impact (ROW + Remainder)	Acres	675	275	275	229	229	49	49	0	0
Social										
Right-of-Way Area (including proposed ponds)	Acres	546	1094	1015	1112	1033	1133	1054	1061	982
Potential Residential Impacts (Includes Partial Impacts)	Total Parcels	291	372	370	374	372	370	368	451	449
Existing	*Parcels*	33	6	4	6	4	7	5	31	29
Planned	*Parcels*	258	366	366	368	368	363	363	420	420
Potential Non-Residential Impacts (Includes Partial Impacts)	Total Parcels	16	28	24	26	22	28	24	27	23
Existing	*Parcels*	16	21	17	21	17	21	17	18	14
Planned	*Parcels*	0	7	7	5	5	7	7	9	9
Community Facilities	No. of Conflicts	2	2	2	2	2	2	2	2	2
Parks and Recreational Facilities (Public and Private)	No. of Conflicts	0	0	0	0	0	0	0	0	0
Trails	No. of Conflicts	5	6	6	6	6	4	4	5	5
Existing	*No. of Conflicts*	1	1	1	1	1	0	0	0	0
Planned	*No. of Conflicts*	4	5	5	5	5	4	4	5	5
Community Cohesion Effects	Ranking	Moderate	Low	Low	Low	Low	Low	Low	Low	Low
Socioeconomic Impacts to Special Populations	Ranking	-	High	High	High	High	High	High	High	High
Proposed Development (PD)/Development of Regional Impact (DRI)	Acres	416	757	496	763	502	836	575	826	565

SECTION 8

Stakeholder Involvement

8.1 Introduction

Stakeholder involvement is integral during the initial stages of a project to provide awareness of community values and concerns and to gain insight on existing constraints and issues that may affect development and evaluation of alignments. At the onset of this study, an Environmental Advisory Group (EAG) and a Project Advisory Group (PAG) were formed to provide an opportunity for project stakeholders to participate in the project development process by providing input and identifying project concerns. Public involvement was also conducted through a series of public meetings, coordination meetings with local government officials (both elected and appointed), and other informational stakeholder meetings. The following sections summarize stakeholder involvement including agency coordination and opportunities for public input related to the OPE study.

8.2 Stakeholder Coordination and Meetings

8.2.1 Environmental Advisory Group

A single EAG was created for all four studies. The purpose of the EAG was to provide project stakeholders an opportunity for input on local needs, concerns, and environmental impacts in the Study Area.

EAG meeting invitations were sent to representatives from environmental agencies and organizations, other government agencies, large landholders, community groups, and other key stakeholders. Attachment H-1 lists the EAG members.

EAG meetings were held on July 11, 2017, and January 31, 2018. These meetings were attended by more than 50 EAG members.

8.2.1.1 July 11, 2017, EAG Meeting

The EAG for all four studies met on July 11, 2017, for a kickoff meeting at the Osceola Heritage Park, Exhibition Hall in Kissimmee, FL. Invitation letters were emailed to 94 members of the EAG on June 22, 2017. An ad was placed in the *Florida Administrative Register* on June 26, 2017, Vol.43/123. Reminder invitations were emailed to EAG members on July 10, 2017. There were 25 attendees and 21 staff members in attendance.

Each of the four project teams made presentations on their project. The study team for the OPE described the goals of the Concept, Feasibility & Mobility Study, project background including the previous PD&E study, study limits, the purpose and need of the project, and study area constraints. Six initial alignments were presented. Attachment H-2 shows the initial alignments. Alignments 1–3 connected to SR 417 at the existing Boggy Creek Road interchange. Alignments 4–6 connected to SR 417 at a new interchange approximately 1 mile east of the Boggy Creek Road interchange. All alignments followed the same path through SOFWEA. It was noted that different alignments were being developed to minimize impacts to SOFWEA. The attendees were invited to provide comment on the purpose and need and the potential alignments.

Meeting attendees urged the study team to find ways to avoid SOFWEA. Members noted that a highway bisecting SOFWEA could limit the use of controlled burns, a key tool in managing the area's ecosystem and preventing wildfires. Because smoke from controlled burns would create safety issues for OPE, one member said the proposed corridor through SOFWEA would make it "very, very difficult for those

managing SOFWEA to use the most important tool they have, which is fire". Others highlighted the number of controlled burns conducted each year in Osceola County to prevent wildfires. One member expressed concern that "mitigating previously mitigated areas" was becoming more common as SOFWEA contains mitigation banks for past development projects. Other environmental issues raised included the need for a comprehensive look at ecosystems and hydrology of the area, potential effects on gopher tortoise habitat, and the possibility for portions of the roadway to be elevated in SOFWEA to enable land managers, wildlife, and park visitors to move within the preserve without having to cross a highway. Additionally, an elevated section would allow the Florida National Scenic Trail to cross under OPE. Attachment H-3 provides a full EAG meeting summary. Discussions with EAG members continued throughout the study.

8.2.1.2 January 31, 2018, Meeting

The second EAG met on January 31, 2018, at the Osceola Heritage Park Exhibition Hall in Kissimmee, FL. Notifications were emailed to 107 members of the EAG on January 13, 2018. There were 30 attendees and 24 staff members.

Introductions were followed by discussion of the studies' background, purpose, goals, and schedule, as well as the EAG roles. Each of the four study corridor consultants gave presentations including details on the latest revised alternatives. The study teams also presented evaluation matrices comparing the physical, cultural, natural environment, and social impacts of their respective alternatives.

It was noted during the meeting that on March 8 the CFX Board would review the study findings and determine which projects, if any, moved forward to a PD&E study. It was emphasized that the Board would not be selecting a particular alternative for any corridor. That process would be part of any subsequent PD&E study.

Discussion topics included identifying and protecting habitat corridors, methods for establishing right-of-way and other costs, traffic estimates, established conservation easements, and mitigation for wetlands, listed species, and state land. There was extensive discussion about potential impacts to SOFWEA from the latest revised alternatives. There was also mention of the SOFWEA working group discussions underway.

Several attendees expressed their desire for a regional mitigation concept. Meeting attendees also provided specific input on various alternatives.

It was noted that exhibits and information provided to the EAG would be displayed at the upcoming public meetings on February 13, 15, and 21. Attachment H-3 provides a full EAG meeting summary.

8.2.2 Project Advisory Group

A PAG was created for each of the four study corridors. The PAGs were created to allow a broad range of stakeholders and relevant agencies to provide input on the economic, community impact, and environmental aspects of the projects. The OPE PAG invitees consisted of 40 representatives of key stakeholders including state and federal agencies, local government agencies including representatives from Orange County, Osceola County, City of Orlando, City of Kissimmee, City of St. Cloud, and other agencies. Attachment H-4 lists the PAG members.

8.2.2.1 July 20, 2017, Meeting

The OPE PAG was held on July 20, 2017, from 9 a.m. to 11 a.m. at the Osceola Heritage Park Exhibition Hall in Kissimmee, FL. Invitation letters were emailed to 44 members of the PAG on June 23, 2017. Reminder invitations were emailed to PAG members on July 8, 2017. Six PAG members attended including representatives of Osceola County, Orange County, Tavistock Development Corporation, Deseret Ranches, and Suburban Land Reserve.

The study team described the goals of the Concept, Feasibility & Mobility Study, project background including the previous PD&E study, study limits, the purpose and need of the project, and study area constraints. Six potential alignments (see Attachment H-2) were presented. Alignments 1–3 connected to SR 417 at the existing Boggy Creek Road interchange. Alignments 4–6 connected to SR 417 at a new interchange approximately 1 mile east of the Boggy Creek Road interchange. All alignments followed the same path through SOFWEA. It was noted that different alignments were being developed to minimize impacts to SOFWEA. The attendees were invited to provide comment on the purpose and need and the potential alignments. Along with potential alignments, the primary environmental constraints for OPE as shown in Attachment H-5 were presented to the EAG.

There was considerable discussion about options to minimize or avoid impacts to SOFWEA. One member explained that agencies that need to be contacted regarding SOFWEA include Orange County, Osceola County, FWC, and FCT. PAG members asked if environmental groups had been contacted. The study team answered that an EAG meeting had been conducted the prior week. The study team noted that they had developed an alignment to avoid crossing through the Orange County portion of SOFWEA. An Orange County official replied that even if the alignment avoided the Orange County portion, crossing any part of SOFWEA caused impacts to the management of all SOFWEA, notably by limiting the possibility of controlled burns, a key management tool.

PAG members stressed the need for the project to connect to OIA. One member urged a system-to-system interchange at the Northeast Connector and a separate interchange at Cyrils Drive Extension. Members asked about traffic studies and were told they were underway. Members urged that the proposed alignments provide for connection to corridors to be developed based on recommendations from ECFCTF. One member stressed that it was important to maintain availability of ROW in the entire Study Area, provide for ties to the future corridors developed by ECFCTF including a new north-south alignment east of the Study Area, and allow for an ultimate connection between Central Florida and central Brevard County.

Study team members said that based on the PAG discussion, they would review the proposals presented. They would consider new alignments near SOFWEA; connections to SR 417, Boggy Creek Road, Narcoossee Road and Medical City Drive; a systems interchange to the Northeast Connector; and the Cyrils Drive Extension proposed by Osceola County.

8.2.2.2 February 8, 2018, Meeting

The second OPE PAG meeting was held on February 8, 2018, at the Osceola County Extension Services in Kissimmee, FL. Invitation letters were mailed to 44 members of the PAG on January 16, 2018. There were eight attendees and five staff members in attendance.

The presentation included the study overview and background, schedule, and latest public involvement opportunities, as well as the study purpose and goals. The presentation provided an update of study corridor alternatives. An evaluation matrix also was provided comparing the physical, cultural, natural environment, and social impacts of the alternatives.

Discussion topics included noting the Governor's ECFCTF recommended the project go to SR 520 and Nova Road, potential impacts to Cyrils Drive, concerns about the proximity of alternatives to Lake Ajay Village, potential impacts to the Florida scrub-jay territory in SOFWEA, and options to use elevated roads when going through environmentally sensitive areas.

Meeting summaries and presentations from the PAG meetings were emailed to the group members. The presentations were also posted on the study's public involvement webpages.

8.2.3 Local Governmental Entities

The study team coordinated with local government officials throughout the study process. A kickoff letter to inform local officials about the project was sent on May 23, 2017 (mailing list is provided as Attachment H-6). Various local officials attended the public meetings, the PAG meetings, and the EAG meetings. An Officials' Briefing was held on September 19, 2017, at the Association of Poinciana Villages Community Center in Poinciana, FL. Elected and appointed officials were provided notice of all public meetings, with several of them attending various meetings. Municipal and agency staff also participated in the EAG and PAG meetings.

Representatives from Osceola County attended nearly all the bi-weekly progress meetings for each of the study corridors.

Formal presentations were made to local official boards to gain input and to provide study updates as follows:

Polk County Board of County Commissioners	August 8, 2017
Osceola County Expressway Authority	October 10, 2017
Central Florida Expressway Authority	October 12, 2017
Osceola County Expressway Authority	February 13, 2018
Osceola County Board of County Commissioners	February 19, 2018
Central Florida Expressway Authority	March 8, 2018

It should be noted that two members of the Orange County Board of County Commissioners, including the County Mayor, sit on the CFX Board. Also, the current CFX Board chair serves concurrently as an Osceola County commissioner.

At the March 8, 2018, meeting, the CFX Board reviewed the findings of the four concept studies and heard comments from more than 40 members of the public. The CFX Board approved advancing the OPE study to the PD&E Study phase for further analysis.

In addition to this final CFX Board meeting, numerous meetings between the study team and agency staffs were held. These meetings are further described in the following paragraphs.

8.2.3.1 Orange County Planning

May 16, 2017: Orange County planning staff provided their opinions on the previous PD&E Recommended Alternative and other potential alternatives.

October 4, 2017: Study team presented multiple alignments and received input from county staff.

8.2.3.2 Osceola County Planning

May 31, 2017: Study team members met with Osceola County planning staff to gain understanding of planned development in and near the Study Area. Topics included the Southern Oaks Planned Development, the Sunbridge/NED plans, plans for Boggy Creek Road in Orange County, and the Cyrils Drive Extension.

October 4, 2017: County staff members discussed potential corridors for the Northeast Connector to inform consideration of the future connection between the OPE and the Northeast Connector. County staff provided updates on the status of the Southern Oaks Planned Development. Study team members explained that Cyrils Drive could become frontage roads alongside the project if an alternative (either East 2 or East 7) running along Cyrils Drive was selected. County staff expressed concerns about bike and pedestrian connectivity and safety across OPE, noting that an extension of the Florida National Scenic

(multi-use) Trail is planned for the area around Cyrils Drive. Also discussed were mitigation for impacts on SOFWEA, the effect of various alignments on plans for Sunbridge Town Center, and possible alignments for the western segment of the OPE.

8.2.3.3 Greater Orlando Aviation Authority

October 26, 2017: GOAA officials provided updates on plans for the Poitras Property. They noted that they were close to finalizing the sale of the portion of the Poitras Property east of Jim Branch to Tavistock. They also stated that Tavistock has an option to purchase the remainder of the Poitras Property west of Jim Branch. GOAA expressed interest in additional westerly access from the Poitras Property to Boggy Creek Road. Changes to the Poitras Property require a Federal Aviation Administration release.

GOAA officials noted regulatory requirements for portions of the Study Area: Jim Branch is subject to USACE and SFWMD permitting. Also, there is an existing conservation easement on GOAA's Mud Lake parcel north of SR 417 and the OUC railroad.

8.2.4 Other Stakeholder Meetings

Additional stakeholder meetings were convened with large landholders, community associations, environmental advocates, developers, business and civic groups, and other stakeholders. Corridor-wide and individual study team outreach resulted in nearly 60 key stakeholder meetings being conducted throughout the four concept studies. For the OPE segment, these meetings included the following. Attachment H-3 provides summaries of each meeting.

April 28, 2017 – Tavistock Development Company: Study team members met with Richard Levey, a consultant for the Tavistock Development Company, the developer of Sunbridge on the eastern end of the Study Area and of Lake Nona in the western portion of the Study Area. Mr. Levey explained the plans for Sunbridge in NED: the overall acreage is 19,000 acres, and the first phase is a slightly less than 3,000 acres with approximately 4,700 dwelling units. Other topics discussed included a proposed Cyrils Drive interchange, issues on the east side of Narcoossee Road, and opportunities to work together on potential mitigation.

August 28, 2017 – Major Land Owners and Osceola County: Study team members met with Josh DeVries of Osceola County Transportation and Transit and with representatives of major landowners Tavistock Development Company, Southern Land Reserve, and Deseret Ranches. The study team described alternative alignments, the previous PD&E Recommended Alternative, and two alternatives each for east and west of Narcoossee Road. The discussion focused on potential interchanges with SR 417, alignments within the Poitras Property, possible interchanges with Narcoossee Road, minimization of impacts to SOFWEA, integration with Osceola County's planned widening and extension of Cyrils Drive, connections with the Northeast Connector, alignment and interchange locations within the Northeast District to limit impacts to the proposed water treatment plant and adjacent developments, and design options to ensure a cost-feasible project. As a result, CFX agreed to make alignment refinements as detailed in the meeting minutes in Attachment H-3.

October 12, 2017 – Major Land Owners: CFX hosted a meeting with study team members and representatives of major landowners Tavistock and Deseret Ranches. The group discussed input from the Public Kick-off Meeting on October 5. The primary public concern was to avoid or at least minimize impact to SOFWEA. Other concerns discussed included avoiding impacts on the recently sold Del Webb parcel south of Cyrils Drive and the proposed water treatment plant north of Cyrils Drive, as well as connecting to the planned Northeast District commercial center.

During the meeting, a new East 4 Alternative (later renamed to East 4A) was developed to avoid impacts to Florida scrub-jay territory identified by Inwood Consulting in 2014, to the Del Webb parcel, and to

NED's commercial center, while maintaining a 70-mph mainline design speed and a 60-mph design speed on all ramps. This alternative would not provide access to Cyrils Drive.

Tavistock representatives expressed preference for the West 1B Alternative with an interchange at Narcoossee Road rather than west of it (West 1A). They also placed a priority on access to West 1A/1B at Lake Nona Boulevard rather than Laureate Boulevard. In lieu of the Medical City Drive stub developed during the prior OCX PD&E Study, they proposed a diamond interchange at West 1A/1B and the future east-west arterial—along the western edge of the Poitras Property.

October 26, 2017 – Major Land Owners: A meeting was held with representatives of major landowners Tavistock and Southern Land Reserve. The participants reviewed proposals for the new East 4A, which avoids impacts to the Del Webb parcel and the NED commercial center while minimizing impacts to SOFWEA and avoiding completely the Florida scrub-jay territory. The study team presented a new alternative, East 5, that moved the alignment to the southern edge of SOFWEA without affecting the power transmission lines or Cyrils Drive. To the extent possible, East 5 moves the corridor's curves outside SOFWEA and avoids impacts to the Northeast District commercial center, the Del Webb parcel, and the existing homes west of SOFWEA.

November 13, 2017 – Major Land Owners: A meeting was held with representatives of major land-owners Tavistock and Deseret Ranches and with Osceola County Transportation Planning. The group discussed East 5 and East 7. East 5 hugs the southern boundary of SOFWEA, minimizing impacts on SOFWEA but impacting some residential properties along the south side of Clapp Simms Duda Road. East 7 is a reworking of East 2 changing the through movement to east-to-west instead of east-to-south.

A Tavistock consultant presented a new route designated East 4B. This segment crosses SOFWEA south of East 4A, but north of East 2, 5, and 7. The consultant estimated that this new route would impact approximately 54 acres of SOFWEA and leave a remainder parcel of approximately 124 acres between the roadway and the southern boundary of SOFWEA.

A Deseret representative urged that the project connect to SR 417 with a system interchange, rather than the currently shown SPUI. He expressed concern that a SPUI would not handle long-term traffic demands for the interchange. The Osceola County Transportation representative seconded this opinion.

The group agreed that access from OPE to Laureate Boulevard could be eliminated from Segments West 1A, West 1B, and West 2.

Tavistock noted that the previous PD&E Recommended Alternative interchange at SR 417 could encroach on a shopping center under construction in the southwest corner of Boggy Creek Road and SR 417. Tavistock agreed to provide computer-aided design and drafting files for the shopping center.

November 17, 2017 – Audubon Society: CFX met with representatives of Tavistock and the Audubon Society. Because of this meeting, two new alignments (East 4C and East 6) were developed by the study team. East 4C pushes the corridor farther south within SOFWEA than East 4B and East 6 is a complete avoidance of SOFWEA. It would have no impacts to SOFWEA and would run just south of Cyrils Drive, thus not conflicting with Osceola County's planned widening of Cyrils Drive. Multiple alignments were discussed to avoid and/or minimize impacts to SOFWEA.

November 30, 2017, Split Oak Forest Stakeholders: CFX hosted a gathering of environmental advocates and agency representatives, municipal staff, and large landholders. The goal of the meeting was to discuss concerns and possible solutions to potential impacts to SOFWEA from proposed alternatives for OPE.

CFX Director of Engineering Glenn Pressimone described the history of the study corridor. He noted that the PD&E Recommended Alternative developed by OCX was chosen for the roadway geometry (fewer reverse curves) and to minimize impacts to planned development in the area.

Mr. Pressimone noted that through community engagement on the current study, protecting and minimizing impacts to SOFWEA quickly became a focus. Because of this public input, the study team was directed to keep the alignment out of Orange County, restrict impacts to the Florida scrub-jay territory along the eastern boundary of SOFWEA, and minimize any remainders that would be cut off from the rest of SOFWEA by the roadway.

Mr. Pressimone presented Alignment East 4A, which has less-pronounced reverse curves, avoids the Orange County portion of SOFWEA and the Florida scrub-jay territory, and cuts the remainder to the south to less than half of the previous PD&E Recommended Alternative. The total acreage taken from SOFWEA for the OPE would be 286 acres. In exchange, he presented a proposal by landowners to bring into conservation an additional 1,373 acres bordering SOFWEA.

In discussion, stakeholders raised several issues including:

- Quality of title to the new conservation land. How would it be legally protected?
- Opportunity for management and restoration of the new conservation land.
- Could the alignment be moved farther south to lessen loss of good habitat and move it farther from the Florida scrub-jay territory? Mr. Pressimone said that shifting the alignment farther south would create more significant reverse curves. He added that a previous alignment farther south was not cost-feasible because it directly impacts the Del Webb development beginning construction in 2018.
- What would become of the land taken out of conservation? Would it become a community park or passive recreation area? Would it preserve access for the Florida National Scenic Trail planned to cross the OPE?
- While noting the value of the proposed addition to conservation land, environmental advocates stressed that they needed to see the land in question.

The meeting concluded with a statement of next steps:

- CFX would send the presentation to all those invited to the meeting.
- CFX would schedule a site visit to the potential additional conservation lands.
- Key stakeholders would reconvene in January.
- CFX will try to shift the alignment farther south.

December 15, 2017 – Field Visit: CFX staff joined environmental advocates for a tour of the land being proposed for preservation as part of a potential regional mitigation strategy. A drone video to showcase land that could not be accessed by vehicle was requested and provided to the group on January 5, 2018.

January 9, 2018 – Split Oak Forest Stakeholders: A follow-up meeting was held with environmental advocates to review elements of the potential regional mitigation strategy presented on November 30, 2017.

January 22, 2018 – Lake Ajay Homeowners' Association: CFX Director of Engineering Glenn Pressimone, CFX public involvement consultant Mary Brooks, and CFX Board Chair and Osceola County Commissioner Fred Hawkins met with approximately 50 members of the Lake Ajay Homeowners' Association to give an update on the OPE and gain input about the latest alignments being considered during the concept study. Residents understood concerns about possible roadway impacts to SOFWEA but preferred alignments through SOFWEA rather than alignments that would affect longtime property owners. Residents thought a proposal to expand conservation lands in exchange for impacting a small portion of SOFWEA was a reasonable compromise.

8.2.5 Public Involvement and Meetings

The Corridor-wide Public Involvement Plan, implemented in conjunction with the section-specific public involvement plans, included conducting large-scale public meetings at select milestones to present the latest study information and to gather vital feedback. CFX provided information on all four study corridors at each meeting. This was done for the community's convenience and understanding that many stakeholders were interested in more than one section.

Each of the two rounds of meetings was held in three locations spaced throughout the 60-mile corridor. The meetings were conducted as open houses, presenting identical exhibits, handouts, and audiovisual presentations. Members of the public were able to have one-on-one discussions with study team staff and to get their questions addressed. All meetings were held in readily accessible and well-known locations throughout the community.

More than 1,300 people attended the six public workshops, where they offered more than 630 written comment forms. Additionally, hundreds of other emails and calls were received during the study process.

Kick-off Public Meetings were held as follows in September and October 2017:

September 19, 2017, Kick-off Public Meeting #1. A Kick-off Public Meeting for CFX's Concept, Feasibility & Mobility Studies was conducted on September 19, 2017, at the Association of Poinciana Villages Community Center in Poinciana, FL. The meeting was originally scheduled for September 14, 2017; it was subsequently rescheduled because of Hurricane Irma.

Public meeting invitation letters were sent on August 23, 2017, by email to 61 elected officials and their aides, 50 appointed officials, 30 regional agency contacts, and 33 federal and state agency contacts. An additional 12,295 meeting invitation letters were mailed to property owners within the four corridors.

The Kick-off Public Meeting was advertised in advance with display ads in the *Lakeland Ledger* on September 1, 2017; in the *Osceola News Gazette* on September 7 and 9, 2017; in *El Sentinel* on September 9, 2017; and in the *Orlando Sentinel* on September 10, 2017. An ad was printed in the *Florida Administrative Register* (FAR) on September 7, 2017, and a press release was distributed to major media outlets on September 1, 2017.

The original media release and updates were posted on Orange and Osceola County websites. Informational fliers were left at the Poinciana Branch Library, Hart Memorial Central Library, West Osceola Branch Library, and Buena Ventura Lakes Branch Library.

Because of Hurricane Irma, the Kick-off Public Meeting date was rescheduled to September 19, 2017. New notifications were posted in the *Lakeland Ledger* on September 14, 2017; in the *Osceola News-Gazette* on September 16, 2017; and in the *Orlando Sentinel* on September 17, 2017. A press release with rescheduled meeting information was distributed to the media outlets and officials on September 12, 2017, and September 19, 2017. Notification emails also were sent to those in the study database.

A total of 54 attendees signed in, including Tawny Olore, Osceola County Department of Transportation and Transit; Joshua DeVries, Osceola County Department of Transportation and Transit; Leigh Ann Wachter, City of St. Cloud; Christopher Mills, City of St. Cloud; Renzo Nastasi, Orange County Transportation Planning; and Beth Jackson, Orange County Department of Environmental Protection. Seven comment forms were received at the meeting, and five comments were received by email after the meeting.

September 26, 2017, Kick-off Public Meeting #2. A Kick-off Public Meeting for the CFX Concept, Feasibility & Mobility Studies was conducted on September 26, 2017, from 5:30 p.m. to 7:30 p.m. at the First Baptist Church of St. Cloud. The meeting was originally scheduled on September 19, 2017; it was

subsequently rescheduled because of Hurricane Irma. This meeting was the second of three kick-off public meetings scheduled to take place throughout the 60-mile-long corridor.

Public meeting invitation letters were emailed on August 23, 2017, to 61 elected officials and their aides, 50 appointed officials, 30 regional agency contacts, and 33 federal and state agency contacts. An additional 12,295 meeting invitation letters were mailed to property owners along the four corridors.

The Kick-off Public Meeting was advertised in advance with display ads in the *Lakeland Ledger* on September 1, 2017; in the *Osceola News-Gazette* on September 7 and 9, 2017; in *El Sentinel* on September 9, 2017; and in the *Orlando Sentinel* on September 10, 2017. An ad was printed in FAR on September 7, 2017, and a press release was distributed to major media outlets on September 1, 2017.

The original media release and updates were posted on Orange and Osceola County websites. Informational fliers were left at the Poinciana Branch Library, Hart Memorial Central Library, West Osceola Branch Library, and Buena Ventura Lakes Branch Library.

Because of Hurricane Irma, the second Kick-off Public Meeting date was rescheduled to September 26, 2017. New notifications were posted in the *Lakeland Ledger* on September 14, 2017; in the *Osceola News-Gazette* on September 16, 2017; and in the *Orlando Sentinel* on September 17, 2017. A press release with rescheduled meeting information was distributed to the media outlets and officials on September 12 and 19, 2017. Notification emails also were sent to those in the study database.

A total of 137 attendees signed in, including Osceola County Commissioner and CFX Board member Fred Hawkins; Tawny Olore, Osceola County Department of Transportation and Transit; Joshua DeVries, Osceola County Department of Transportation and Transit; Josiah Banet, Florida's Turnpike Enterprise; Leigh Ann Wachter, City of St. Cloud; and Chris Mills, City of St. Cloud. A total of 35 comment forms were received at the meeting, and 13 comments were received by email after the meeting.

October 5, 2017, Kick-off Public Meeting #3. A Kick-off Public Meeting for the CFX Concept, Feasibility & Mobility Studies was conducted on October 5, 2017, from 5:30 p.m. to 7:30 p.m., at the Lake Nona High School Cafeteria in Orlando, FL. The meeting was originally scheduled on September 26, 2017; it was subsequently rescheduled because of Hurricane Irma. This meeting was the last of three kick-off public meetings scheduled to take place throughout the 60-mile-long corridor.

Public meeting invitation letters were emailed August 23, 2017, to 61 elected officials and their aides, 50 appointed officials, 30 regional agency contacts, and 33 federal and state agency contacts. An additional 12,295 meeting invitation letters were mailed to property owners along the four corridors.

The Kick-off Public Meeting was advertised in advance with display ads in the *Lakeland Ledger* on September 1, 2017; in the *Osceola News-Gazette* on September 7 and 9, 2017; in *El Sentinel* on September 9, 2017; and in the *Orlando Sentinel* on September 10, 2017. An ad was printed in FAR on September 7, 2017, and a press release was distributed to major media outlets on September 1, 2017.

The original media release and updates were posted on Orange and Osceola County websites. Informational fliers were left at the Poinciana Branch Library, Hart Memorial Central Library, West Osceola Branch Library, and Buena Ventura Lakes Branch Library.

Because of Hurricane Irma, the Kick-off Public Meeting date was rescheduled to October 5, 2017. New notifications were posted in the *Lakeland Ledger* on September 14, 2017; in the *Osceola News-Gazette* on September 16, 2017; and in the *Orlando Sentinel* on September 17, 2017. A press release with rescheduled meeting information was distributed to the media outlets and officials on September 12, 2017; September 19, 2017; and October 3, 2017. Notification emails also were sent to those in the study database.

A total of 219 signed in, including Orange County Commissioner Jennifer Thompson and her aide Jason Russo; City of Orlando Commissioner Jim Gray; Cedric Moffett, Orange County Planning; Josh DeVries, Osceola County Department of Transportation and Transit; and Tawny Olore, Osceola County Department of Transportation and Transit.

CFX received 108 comment forms at the meeting and 70 comments by email after the meeting. The comments included a petition from Amy Stiling of Eagle Creek Village with more than 300 signatures.

Attachment H-3 provides meeting minutes (where available).

Input from the Kick-off Public Meetings and other community engagement, as well as continued engineering analysis, was used to refine some alternatives and develop new ones. The latest alternatives were displayed at a second round of public meetings on February 13, 15, and 21, 2018.

February 13, 2018, Second Round Public Meeting #1. The first meeting of the second round of public meetings for CFX's Concept, Feasibility & Mobility Studies was held on February 13, 2018, from 5:30 p.m. to 7:30 p.m. at the St. Cloud High School Cafeteria in St. Cloud, FL. This meeting was the first of three opportunities scheduled to take place throughout the 60-mile-long corridor to allow the community to view the latest alignment alternatives and other draft report materials.

Public meeting invitation letters were emailed on January 26, 2018, to 62 elected officials and their aides, 50 appointed officials, 30 regional agency contacts, and 33 federal and state agency contacts. An additional 12,669 meeting invitation letters were mailed to property owners and tenants within the four corridors on January 23, 2018.

The public meetings were advertised in advance with display ads in the *Lakeland Ledger* on February 4 and 11, 2018; in the *Osceola News-Gazette* on February 8 and 10, 2018; in *El Sentinel* on February 3 and 10, 2018; and in the *Orlando Sentinel's* Orange and Osceola editions on January 28 and February 8, 2018. An ad was printed in the FAR on January 30, 2018, and a press release was distributed to major media outlets on February 9, 2018.

A total of 360 attendees signed in, including Tawny Olore, Osceola Department of Transportation and Transit; Joshua DeVries, Osceola County Department of Transportation and Transit; Nathan Blackwell, City of St. Cloud; and Nick Lepp, MetroPlan Orlando Long Range Planning.

A total of 77 written comments were received during the public meeting.

February 15, 2018, Second Round Public Meeting #2. The second meeting of the second round of public meetings for CFX's Concept, Feasibility & Mobility Studies was held on February 15, 2018, from 5:30 p.m. to 7:30 p.m., at the Lake Nona Middle School Cafeteria in Orlando, FL. This meeting was the second of three opportunities scheduled to take place throughout the 60-mile-long corridor to allow the community to view the latest alignment alternatives and other draft report materials.

Public meeting invitation letters were emailed on January 26, 2018, to 62 elected officials and their aides, 50 appointed officials, 30 regional agency contacts, and 33 federal and state agency contacts. An additional 12,669 meeting invitation letters were mailed to property owners within the four corridors on January 23, 2018.

The public meetings were advertised in advance with display ads in the *Lakeland Ledger* on February 4 and 11, 2018; in the *Osceola News-Gazette* on February 8 and 10, 2018; in *El Sentinel* on February 3 and 10, 2018; and in the *Orlando Sentinel* Orange and Osceola editions on January 28 and February 8, 2018. An ad was printed in the FAR on January 30, 2018, and a press release was distributed to major media outlets on February 9, 2018.

At the meeting, 423 attendees signed in, including Pete Clarke, Orange County Commissioner; Tawny Olore, Osceola County Department of Transportation and Transit; Joshua DeVries, Osceola County

Department of Transportation and Transit; Bill Burchfield, Osceola County Property Appraiser's Office; Nathan Blackwell, City of St. Cloud; Renzo Nastasi, Orange County Transportation Planning; and Nick Lepp, MetroPlan Orlando Long Range Planning.

A total of 231 comment forms were received at the meeting.

February 21, 2018, Second Round Public Meeting #3. The third meeting of the second round of public meetings for CFX's Concept, Feasibility & Mobility Studies was held on February 21, 2018, from 5:30 p.m. to 7:30 p.m., at the Association of Poinciana Villages Community Center in Poinciana, FL. This meeting was the last of three opportunities scheduled to take place throughout the 60-mile-long corridor to allow the community to view the latest alignment alternatives and other draft report materials.

Public meeting invitation letters were emailed on January 26, 2018, to 62 elected officials and their aides, 50 appointed officials, 30 regional agency contacts, and 33 federal and state agency contacts. An additional 12,669 meeting invitation letters were mailed to property owners within the four corridors on January 23, 2018.

The public meetings were advertised in advance with display ads in the *Lakeland Ledger* on February 4 and 11, 2018; in the *Osceola News-Gazette* on February 8 and 10, 2018; in *El Sentinel* on February 3 and 10, 2018; and the *Orlando Sentinel* Orange and Osceola editions on January 28 and February 8, 2018. An ad was printed in FAR on January 30, 2018, and a press release was distributed to major media outlets on February 9, 2018.

A total of 141 attendees signed in, including David Washington, aide for Orange County Commissioner Maribel Cordero; and Joshua DeVries, Osceola County Department of Transportation and Transit.

A total of 42 comment forms were received at the meeting.

8.3 Summary of Public Comments

The more than 630 comment forms received at the six public meetings touched on an array of topics, with concerns about impacts to the environment and conservation lands, as well as potential impacts to residential properties, being the most common themes.

As most of the comments were received during the second round of public meetings – more than 450 – and dealt with the latest alternatives, following is a summary of the feedback received from those meetings related to OPE:

February 13, 2018, Public Meeting Comments

- Stay out of Lake Ajay Village. (29)
  - Preserve this established neighborhood.
  - It is a unique neighborhood with large lots.
  - Family neighborhood more than 40 years old.
- Stay out of Split Oak Forest. (5)
  - Land was purchased for conservation.
  - Important natural resource.
  - Concern for native flora and fauna.
- Most logical alignment is (Refinement) 1A. (11)
  - Stay away from neighborhoods while still preserving much of Split Oak Forest.
- Move line farther south (reference to Split Oak Forest).
- The East 5 route is unacceptable (goes through property).

- The East 4C route is a good compromise.
- Please do not build to the north of Lake Ajay; stay away from Clapp Simms Duda Road.
- Split Oak Forest should be compromised before neighborhoods. (5)

General Comments

- Consider alternatives that don't displace animals or humans. (5)
- Upset with presentation, meeting style. (2)
- Ensure land purchase for wildlife conservation.
- No toll roads; work on local roads first.
- We don't need all these roads and development. (2)

February 15, 2018, Public Meeting Comments

- Support (Refinement) 1A with full compensation package. (66)
  - Purchase lands (no mitigation).
  - Move water treatment plant.
  - Low impact lighting.
  - Wildlife connectors.
- Support (Refinement) 1A – did not mention compensation package. (67)
- Stay out of Split Oak Forest. (40)
  - Land was purchased for conservation.
  - Important natural resource.
  - Concern for native flora and fauna.
- Compromise Split Oak Forest before taking homes.
- Stay out of Lake Ajay Village. (29)
- If a new road is necessary, then PLEASE reconsider the OCX E1 plan which was originally proposed by Osceola County; saves wilderness. (4)
- Prefer West 2 as an alternative to West 1B. (2)
- Go north of Boggy Creek through Medical City.
- Please consider the SE bend in Split Oak Forest as it is very sharp and could turn into another I-4 "bend" which led to many accidents; Refinement 1A or East 4E look reasonable.
- Extension should end at CR 15 as recommended by the USFWS and the Army Corp of Engineers and others. If the road should continue east of CR 15, alignment East 6 is the only route I can accept.
- Something had to be done with traffic on Boggy Creek [Road].
- Please make the interchange at the Narcoossee Rd. and Osceola Parkway bigger with flyover ramps, not just a diamond interchange like at 417 and Narcoossee.
- Traffic on Boggy Creek [Road] terrible; oppose green scenario; would accept orange.
- The flyover that's planned as the Narcoossee-Boggy Creek intersection will totally disrupt our community – alignment East 4C. (3)
- Buy lots at Eagle Creek to move road farther from Lake Ajay; I want 1400' north to be extended to 2500' and 2000' east to be extended to 2500'.

- I live at Fells Landing and I am very concerned with my property value getting affected by traffic and noise; oppose West 1B and West 2.

General Comments

- No more development/opposed to expressway. (33)
- Please consider the highway's impact on the area schools and neighborhoods that would be impacted by the increase in traffic and pollution.

February 21,2018, Public Meeting Comments

- Stay out of Lake Ajay Village. (2)
- Protect Split Oak Forest/Conservation areas (7)
- East 5 is least objectionable.
- Include OCX E1 alignment for future consideration.

General Comments

- Oppose project. (2)
- Must put in sound walls.

Additionally, 384 emailed comments were received through March 7, following the public meetings held February 13, 15, and 21, 2018. The information below reflects the general nature of comments received. Many emails noted multiple topics, so referenced numbers may exceed the total number of emailed comments. Following is a summary of those emailed comments that were relevant to OPE:

- Support Friends of Split Oak option/stay out of Split Oak/Build only western portion. (85)
- Why special treatment for Lake Ajay residents? Ridiculous for them to advocate for taking forest when other communities have the road closer or through them.
- Either take the road through Southern Oaks or do not build at all. (3)
- Stay away from Lake Ajay – do not destroy this established community. (23)
- If you allow this road to be built across Split Oak – in violation of the Deed of Conservation – you will be setting a precedent that will affect ALL protected lands in Florida.
- Consider extending the SR 417 from east of Narcoossee Road to run south and east of the Split Oaks Forest. (2)
- Option West 2 seems to be best for everyone – does not take homes and is more cost-effective.
- Would accept (Refinement) 1A with compensation package. (18)
- Move water treatment plant. (12)

General Comments

- Lack of notification. (2)
- Road will actually expand urban sprawl and add to congestion. (3)
- At what point do you say enough is enough? Stop marketing the area and driving more people here.
- The quick sprawl of development in this area is leaving no room for our native wildlife, and no areas of open space that is important to people's well-being. (2)

A group called Friends of Split Oak created a website and organized events to oppose any alignments that cross SOFWEA. A petition on their website that calls for avoidance of SOFWEA has received more than 4,000 signatures (as of March 7, 2018).

8.4 Project Website

Concept Study information was housed for easy access on a public involvement website (https://www.cfxway.com/agency-information/plans-studies/project-studies/public-involvement/) and individual study corridor pages on the www.cfxway.com website. The pages were updated with the latest corridor exhibits, schedules, handouts, presentations, meeting notices and summaries, photos, and news releases. Information from the EAG and PAG meetings also were posted on the webpages.

An electronic comment form was available on the public involvement page, as well as a form to request to receive email updates. In total, the webpages received more than 5,000 visits during the 12-month studies.

Additionally, a study Facebook page provided meeting notices and summaries, exhibits, photos, links to information available on the website, and more.

8.5 Media Coverage

The Corridor-wide Public Involvement Program included using the media to help share information and meeting notices about the four concept studies throughout the 60-mile-long corridor. A kick-off media release was sent on May 24, 2017. News releases also were sent to the media in advance of each round of public meetings in September, October, and February.

Additionally, several letters to the editor were submitted to Osceola County media outlets on behalf of the CFX Board Chairman regarding public participation in the studies, and particularly the public meetings. CFX and public involvement staff accommodated numerous media interview requests pertaining to the studies.

A news release was sent, and multiple news agencies ran stories on the March 8 CFX Board meeting, where the Board advanced the Poinciana Parkway Extension and Osceola Parkway Extension to the PD&E Study phase. The Board decided to revisit the Southport Connector Expressway and Northeast Connector Expressway corridors periodically as community conditions changed.

Most of the media coverage focused on the potential impacts of OPE on SOFWEA and adjacent communities.

Stories appeared in the *Orlando Sentinel*, *Orlando Business Journal, Osceola News-Gazette*, *El Osceola Star*, and the *Orlando Weekly*. Television coverage included stories on Spectrum News 13 (formerly CFNews 13) and WFTV Ch. 9 (ABC). Online media coverage included the *Florida Politics* website and *Growth Spotter (Orlando Sentinel* Online Development publication). *Positively Osceola* also posted interviews from several of the public meetings on their Facebook page. In total, at least 34 stories were published or broadcast about the concept studies.

Table 8-1. Media Coverage About the Proposed OPE

Date	Media Outlet	Medium	Type of Report	Headline	Summary
03/05/17	*Orlando Sentinel*	Print	News	Revered Split Oak Parkland Faces Road Threat	History of Split Oak. Describes road and development plans.
03/07/17	Spectrum News 13	TV	News	Osceola Parkway Plan Calls for Splitting Split Oak Reserve	Report on opposition at Orange County Board Meeting.
03/09/17	Florida Politics	Online	News	Central Florida Expressway Authority to look closely at Split Oak Park highway proposal	Report on opposition at Orange County Board Meeting.
03/09/17	*Orlando Sentinel*	Print	News	Agency wants comment on road slated to cross Split Oak forest	Report on launch of study.
09/14/17	*Orlando Business Journal*	Online	News	CFX Evaluates New Connections for I-4, Poinciana Parkway, More	Report on four studies and focus on future I-4 connection.
09/26/17	*Growth Spotter (Orlando Sentinel)*	Online	News	Feasibility Studies for Four New Osceola Toll Roads at Midway Point	Update on the Osceola Parkway Extension and fall public meetings.
10/02/17	*El Osceola Star*	Print	Letter	To My Osceola County Neighbors	County Commissioner invites residents to public meeting.
10/04/17	*Orlando Sentinel*	Print	News	Expressway Authority to Hold Public Meeting for Road Across Split Oak Forest	Scene setter for public meeting.
11/04/17	*Orlando Sentinel*	Print	Editorial	Don't Cut Wildlife Preserve in Two with Osceola Parkway Extension	Cited habitat and public desire to protect environment.
11/24/17	*Osceola News Gazette*	Print	News	Residents to Commission: Protect Split Oak	Report on opposition to project.
12/11/17	*Orlando Sentinel*	Print	News	Central Florida's Toll Road Agency Presents Proposal to Build Road in Park Land	Report on offer to conserve other acreage in return for Split Oak land.
12/14/17	*Orlando Sentinel*	Print	News	Wekiva Parkway interchange is nixed as proposal advances for road through Split Oak	Report on CFX Board Meeting.

Table 8-1. Media Coverage About the Proposed OPE

Date	Media Outlet	Medium	Type of Report	Headline	Summary
01/12/18	*Orlando Sentinel*	Print	News	Florida National Scenic Trail to Move Away from Roads	Article on trail mentions opposition to Osceola Parkway Extension.
01/23/18	*Osceola News-Gazette*	Print	News	OSWCD[a] Urging CFX to Avoid Split Oak in Road Expansion	Report that Osceola Soil and Water Conservation District urges CFX to avoid Split Oak Forest.
01/24/18	*Osceola News-Gazette*	Print	News	Residents still fighting to save Split Oak	Quotes Larry Schneck of Osceola Soil and Water Conservation District urging avoidance of Split Oak. Mentions land swap.
02/02/18	*Growth Spotter (Orlando Sentinel)*	Online	News	Feasibility Studies Nearly Complete for Four New Osceola & CFX Toll Roads	Promoted the second round of public meetings and recapped study progress.
02/07/18	*Orlando Weekly*	Print	News	Environmental activists rally to save Split Oak Forest from expanding toll road	Noted concerns about potential alternative impacts to Split Oak.
02/08/18	WFTV Ch. 9	TV	News	Future Osceola Parkway Extension Might Develop Through Neighborhood	Describes concerns of Lake Ajay residents.
02/09/18	*Orlando Business Journal*	Print	News	Here's two Spots Where New Road Might be Built – Both Controversial	Noted various alternative impacts to SOFWEA and Lake Ajay development.
02/09/18	*Orlando Sentinel*	Print	News	Split Oak Forest Fight Pits Preservationists Against Neighborhood	Quotes Lake Ajay residents and preservationist on Osceola Parkway Extension routes.
02/15/18	*Orlando Sentinel*	Print	Opinion	Toll Road Motives	Real reason for Osceola Parkway Extension is to support development.
02/21/18	*Osceola News-Gazette*	Print	News	County moves forward with controversial parkway extension	Osceola County Commission on Monday accepts $37 million in private funds to extend Osceola Parkway amid growing debate.

Table 8-1. Media Coverage About the Proposed OPE

Date	Media Outlet	Medium	Type of Report	Headline	Summary
02/28/18	*Osceola News-Gazette*	Print	News	Transportation officials tour Split Oak ahead of toll road meeting	Officials go onsite to get a closer look at the publicly owned conservation land.
03/05/18	*Orlando Sentinel*	Print	Letter	My Word: Don't imperil fragile wildlife to extend the Osceola Parkway	Opposed alternatives with potential impacts to Split Oak even if other land is preserved.
03/05/18	*Growth Spotter (Orlando Sentinel)*	Online	News	CFX Study: New Toll Road Would Minimize Impacts to Split Oak Forest	Noted latest alternatives and which study corridors CFX Board approved to move forward.
03/07/18	*Florida Politics*	Online	News	Planned Osceola Parkway extension through park draws fire in Orange meeting	CFX may conduct an entirely new study for the Osceola Parkway project.
03/08/18	*Osceola News-Gazette*	Print	News	Why isn't the Osceola County Commission standing up for Split Oak?	Details various officials' current stance on project options.
03/08/18	*Orlando Sentinel*	Print	News	Expressway authority advances toll road at Split Oak Forest and Lake Ajay Village	CFX will spend the next year evaluating engineering and design for extending the Osceola Parkway.
03/08/18	*Orlando Rising*	Online	News	Central Florida Expressway Authority moves ahead with study of Split Oak road	CFX moves ahead with study of options for new road through or around Split Oak Forest.
03/09/18	*Orlando Business Journal*	Online	News	Controversial Osceola Parkway Extension gets OK to move forward, may cost $1B	Recapped CFX Board advancing two studies to PD&E.
03/14/18	*Spectrum News 13*	TV	News	Osceola Parkway Expansion Worries Residents	Lake Ajay resident concerns, Osceola Parkway Extension moves forward to PD&E Study.

[a] Osceola Soil and Water Conservation District

SECTION 9

Feasibility and Viability of the Proposed Project

9.1 Benefits of the Proposed Project

The primary purpose of the OPE is to respond to future travel demand, provide system linkage/network connectivity, and address social and economic needs, as part of CFX's *Visioning + 2040 Master Plan*. The need is supported by future growth planned and approved in Orange County's Innovation Way Overlay and Osceola County's Narcoossee Community and NED planning areas. The benefits of the OPE include enhancing the regional network connectivity to existing SR 417 and SR 528 in east Orange County and serving the transportation needs of the residents, commuters, and visitors by separating local and through regional trips. In Osceola County, system linkage would be provided to the planned Sunbridge Parkway and the proposed Northeast Connector Expressway, which would provide further connectivity to Florida's Turnpike and US 192. Secondary benefits of the OPE include enhancing the mobility of the area's growing population and economy, relieving congestion on local roads by providing a new limited-access mobility option, providing for incorporation of transit options, and promoting regional connectivity particularly to central-southern Brevard County with a future eastward extension and an additional crossing of the St. Johns River.

9.1.1 System Linkage

System linkage indicates how well the project fits into the area's existing and future transportation system. The proposed OPE provides a key linkage in CFX's *Visioning + 2040 Master Plan* to the existing expressway system in the region via its connection to SR 417. Together, the OPE, the Northeast Connector Expressway, the Southport Connector Expressway, and the Poinciana Parkway Extension/I-4 Connector make up the CFX *Visioning + 2040 Master Plan*. The expressway system connects existing and emerging cities and centers to the regional interstate (I-4), the existing CFX expressway system (SR 417 and SR 429), and Florida's Turnpike.

As population and employment in the region continue to grow, the transportation facilities that serve existing residences and businesses are anticipated to be overwhelmed by future residents, commuters, and commercial vehicles. The OPE will provide a vital east-west direct connection between planned development and SR 417, thereby relieving congestion. During three public involvement meetings in February 2017, attendees noted that Narcoossee Road, Boggy Creek Road, and Lake Nona Boulevard are already congested during peak travel hours. Additionally, attendees expressed concern that these roadways would become more congested as already approved developments are constructed.

9.1.2 Regional Connectivity and Mobility

Because of anticipated population and employment growth in the Study Area, the proposed OPE project will accommodate future travel demands and improve movement of goods and people. The proposed OPE project would fulfill the need for a new limited-access east-west corridor along the Orange/Osceola County line. The need for a new corridor was identified in the *East Central Florida Corridor Task Force Summary Report* (ECFCTF, 2014). ECFCTF also called for development of a new multimodal corridor from the OIA/Lake Nona area to the SR 520 corridor, serving the NED and portions of the Deseret Ranches. The OPE would partially fulfill this need by connecting the OIA/Lake Nona area to NED, with future

projects potentially connecting OPE to SR 520. The OPE would also help connect the Greater Orlando area to the future north-south Corridor I identified by ECFCTF.

The OPE would improve regional mobility by relieving traffic on existing and planned roadways. Projected future traffic would lead to severe congestion of numerous area roads. Traffic analysis for the 2045 No-Build condition indicates that several road facilities in the Study Area are likely to fail (LOS of E/F) including SR 417, Boggy Creek Road near Simpson Road, Jeff Fuqua Boulevard, Narcoossee Road south of the Orange/Osceola county line, and the Sunbridge Parkway.

9.1.3 Secondary Benefits

The Study Area's population is expected to grow rapidly in the coming decades, with the population of Osceola County potentially increasing by 96 percent by 2045. The population of the Orange County portion of the Study Area is projected to increase by 120 percent by the year 2045. Analysis of DRIs and PDs indicates a 107 percent increase in dwelling units in the Study Area by 2045. Dwelling units within the Lake Nona/Medical Center DRI in the western portion of the Study Area would increase by more than 200 percent (FKA, 2017). These population trends will strain the existing transportation network. Employment in the Study Area is also expected to grow, increasing daily trips by commuters. All of this growth will lead to a need for more transportation alternatives.

This project is generally consistent with local plans and policies. The OPE would support Osceola County's plans for the development of NED (Osceola County, 2010). It would also support plans by Orange County for development in the areas of OIA, Lake Nona/Medical City, and the Poitras Property. Corridors that impact SOFWEA are not consistent with Orange County or Osceola County plans. Both counties designate SOFWEA as preservation land, which is generally not available for development. Both counties' planning policies call for minimizing and/or avoiding impacts to wildlife corridors and sensitive environmental lands. In addition, both counties also have policies that discourage the taking of existing residences. The eastern segments that avoid impacts to SOFWEA would require the taking of existing residences. Segments that minimize taking of existing or planned residences would take conservation land from SOFWEA. Balancing conflicting policies will be a key factor in selecting an alignment.

9.2 Controversy of the Proposed Project

The greatest controversy regarding the proposed OPE revolves around the ROW for the eastern segment. Potential impacts to SOFWEA have generated objections. Routes that avoid SOFWEA would impact existing and planned residences.

Many comments received from the public have urged minimizing and/or avoiding impacts to SOFWEA. Several commenters specified complete avoidance of SOFWEA as the only acceptable alignment. Commenters' arguments included:

- Conservation land should be preserved in perpetuity.
- SOFWEA includes valuable wildlife habitat, including for threatened species.
- SOFWEA is a valuable recreational and natural resource in a fast-developing region.

Other comments focused on impacts to existing and planned residences. More than 300 residents of the Eagle Creek Village development signed a petition urging avoidance of Eagle Creek Village. They argued that the proposed project would take homes in Eagle Creek and would pass unacceptably close to Eagle Creek Elementary School. The portion of Eagle Creek Village through which the proposed project would pass has planned residential lots, but no existing homes. Also, all the proposed segments would pass at least 1,000 feet south of Eagle Creek Elementary School.

During public meetings, the Study Team heard concerns from residents of areas including Boggy Creek Road, Clapp Simms Duda Road, Lake Ajay Village, areas east of Lake Ajay, and Cyrils Drive. Where such impacts occur would depend on which segment is selected and may depend on future refinements to designs.

During earlier studies of the proposed project, some government agencies expressed concerns. Orange County officials expressed concern about impacts in Orange County, especially to portions of SOFWEA within Orange County. Orange County officials noted that they had concerns about impacts to SOFWEA within Osceola County as well, in that cutting off part of SOFWEA would affect the management of the entire property and prescribed burning activities.

During the ETDM screening for the OCX PD&E (FTE, 2017) study of this project, USFWS, FDEP, and NFMS recommended that the OPE terminate at Narcoossee Road, and not extend further east.

In January 2018, the Osceola County Soil and Water Conservation District Board of Supervisors passed a resolution saying, “the proposed alignment of the Extension through the (Split Oak) Forest is unacceptable and incompatible with future conservation of land and wildlife within the Forest’s boundaries.”

9.3 Support for the Proposed Project

Public support for the OPE will ultimately depend on the specific alignment selected. Results of the public involvement plan highlighted the challenge of identifying an alignment that would satisfy all groups. Many commenters strongly oppose any alignment that takes land from SOFWEA. East 6 avoids SOFWEA but would take existing homes in the Lake Ajay Village development as well as the Split Oak Estates neighborhood under construction (as of early 2018) and adjacent rural residences along Cyrils Drive. Lake Ajay Village residents strongly opposed that proposal.

During public meetings, some members of the public supported the idea of a limited-access expressway that would relieve traffic on existing roads. After seeing development plans for NED, more members of the public acknowledged the need for new roads to accommodate that growth.

Major landowners along the corridor strongly support the OPE. They noted that it would be important to have efficient traffic flow to and from the new residential developments and job centers planned along the corridor. They also noted the importance of new developments having access to OIA, which is a multimodal transportation center for the Central Florida region. Section 8 provides details about stakeholder involvement including public meetings.

9.4 Projected Project Costs

For the segments recommended for further consideration in Section 6.6, these costs are summarized in Table 9-1. These costs include roadway construction, bridge construction, interchange construction, toll equipment, ROW (including ponds), and mitigation costs for wetlands and species. The West alternative segments range in cost from $584,800,000 to $640,400,000, while the East alternative segments range in cost from $1,145,000,000 to $1,189,300,000. Preliminary cost estimates are presented in millions of dollars (based on 2017 unit costs).

Table 9-1. Cost Comparison Matrix[a]

Alignment or Segment	Length (Miles)	2045 AADT[a]	Construction Costs ($ Millions)	ROW Costs ($ Millions)	Mitigation Costs (Millions)	Total Cost ($ Millions)
No-Build	0.0	N/A	$ 0	$ 0	$ 0	$ 0
PD&E Recommended Alternative	12.1	42,100	$ 709.3	$ 355.0	$ 32.9	$ 1,097.2
West 1B	7.53	22,500	$ 402.6	$ 166.7	$ 15.5	$ 584.8
West 2	7.40	22,500	$ 394.3	$ 227.4	$ 18.7	$ 640.4
East 4A	5.30	38,900	$ 673.2	$410.1	$ 61.7	$ 1,145.0
East 4C	5.40	38,900	$ 685.4	$407.7	$ 61.8	$ 1,154.9
East 5	5.70	38,900	$ 592.6	$ 501.0	$ 56.2	$ 1,149.8
East 6	5.70	38,900	$ 622.8	$ 512.1	$ 54.4	$ 1,189.3

[a] Costs for each of the East segments include costs for Segment West 1B including the direct airport connector.
Note:
N/A = not applicable

9.5 Projected Traffic and Revenue

9.5.1 2045 Revenue Analysis

Using the CFX 3.0 travel demand model, CDM Smith prepared planning-level estimates of annual transaction and toll revenue attributable to the OPE project. Traffic and revenue estimates were prepared for each alignment developed by the Concept, Feasibility & Mobility Study consultants based on the physical alignments and connection points to the local street system. Toll collection was assumed to be all-electronic with one toll collection location per segment (between interchanges). Toll rates were set on a per-mile basis, with a base toll rate of $0.18/mile in FY 2018 dollars, escalated at 1.5 percent per year, which is consistent with the CFX Customer First Toll Policy. Toll sensitivity analysis was completed for each of the project alignments with a No-Build, Build No Toll, and a range of toll rates between $0.13/mile to $0.28/mile. These estimates contain a Traffic and Revenue (T&R) estimate from new toll collection locations on OPE plus the increments in T&R collected at existing toll facilities within the Boggy Creek Plaza Group on SR 417. The Medium SE data set was used for the traffic and revenue estimates, with sensitivity testing completed using the low- and high-side SE data sets. Figures 9-1 and 9-2 show the annual transactions and annual toll revenue, respectively, of each alignment for the 30-year study period.

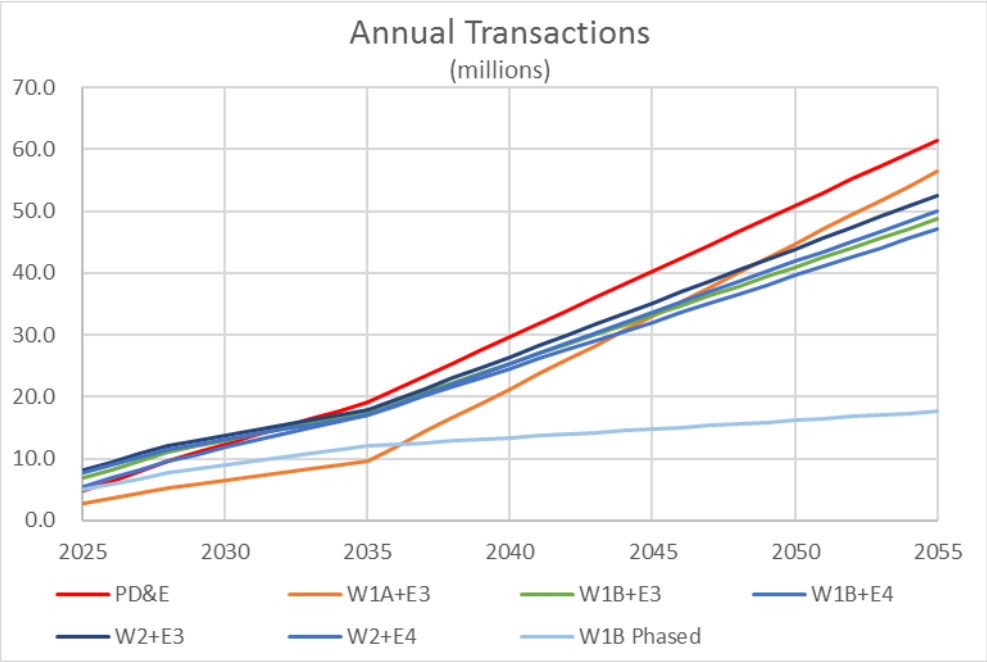

Figure 9-1. OPE Alignments Annual Transactions

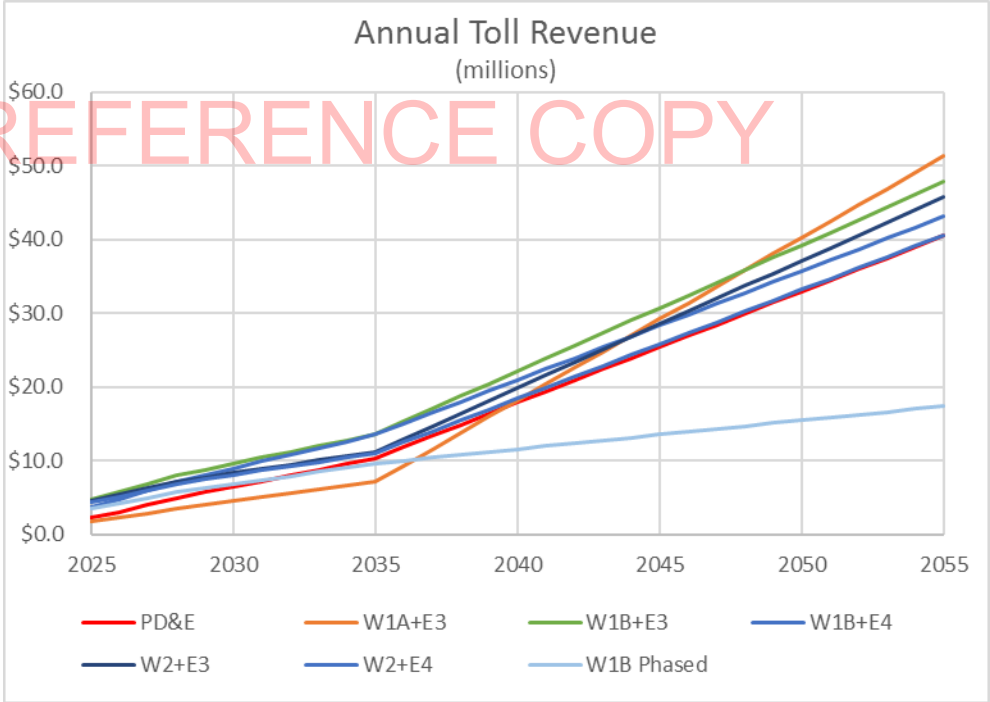

Figure 9-2. OPE Alignments Annual Toll Revenue

9.5.2 Present Value

To determine the general viability of the Osceola Parkway Extension, the present value (PV) of the 30-year toll revenue stream was calculated. Tables 9-2 and 9-3 summarize this analysis by alignment is for projects with and without the Direct Airport Connector, respectively. The PV for the 30-year revenue stream with a discount rate of 4.00 percent starting on July 1, 2018, ranges from $201.3M to $256.1M

for the revenues collected on the OPE for the full project and adjusts to $191.1M to $234.6M considering the impacts of T&R on SR 417 for those alignments with the Direct Airport Connector. The PV for the "W1B Phased", which is the project from the Airport to Narcoossee Road, is $132.6M for revenues collected on the project and $107.8M considering the impacts of T&R on SR 417, which also includes the Direct Airport Connector. The PV for the 30-year revenue stream ranges from $111.2M to $154.4M for the revenues collected on the OPE for the full project and adjusts to $108.5M to $151.2M considering the impacts of T&R on SR 417 for those alignments without the Direct Airport Connector. The PV for the "W1B Phased" without the Direct Airport Connector, which is the project from SR 417 to Narcoossee Road, is $69.9M for revenues collected on the project and $63.5M considering the impacts of T&R on SR 417. Given the conceptual nature of the study, the PV of the alignments can range ±25 percent for the full projects and ±10 percent on the phased project with the Direct Airport Connector to ±20 percent for the full projects and ±10 percent on the phased projects without the Direct Airport Connector. Revenue estimates were not completed for West 2 Phased.

Table 9-2. Present Value of Revenue Stream for OPE Alignments (with the Direct Airport Connector)

Revenue	Alignment Name						
	PD&E	W1A + E3	W1B + E3	W1B + E4	W2 + E3	W2 + E4	W1B Phased
Collected on OPE	$201.3	$209.1	$256.1	$237.6	$233.2	$215.2	$132.6
With Increment on SR 417	$206.2	$191.1	$234.6	$221.1	$211.6	$192.2	$107.8
Range on PVs (+/-)	25%	25%	25%	25%	25%	25%	10%
Length toll road (miles)	12.1	11.3	11.7	12.4	10.9	11.6	6.1

Dollar values are in millions

Table 9-3. Present Value of Revenue Stream for OPE Alignments (without the Direct Airport Connector)

Revenue	Alignment Name			
	W1B + E4	W1B Phased	W2 + E4	W2 Phased
Collected on OPE	$154.4	$69.9	$111.2	--
With Increment on SR 417	$151.2	$63.5	$108.5	--
Range on PVs (+/-)	20%	10%	20%	--
Length toll road (miles)	7.8	3.7	7.8	--

Dollar values are in millions

9.6 Alternative Comparison Matrix

The potential environmental impacts associated with each alignment were estimated by calculating the direct impacts to natural, sociocultural, and physical environmental resources using the project GIS databases. Section 7 provides a full discussion of these potential effects. Table 9-4 summarizes the environmental impacts estimated costs for each alignment. These alignments and the alternatives comparison matrix (Table 9-4) were displayed at the public meetings in January and February 2018.

Table 9-4. OPE Alternatives Evaluation Matrix

Osceola Parkway Extension

Alternatives Evaluation Matrix

January / February 2018

Last Updated: 3/7/2018

Evaluation Criteria	Unit of Measure	West 1B (w/ Direct Airport Connector)	West 2 (w/ Direct Airport Connector)	PD&E Recommended Alternative	West 1B (w/ Direct Airport Connector) + East 4A w/o Northeast Con	West 2 (w/ Direct Airport Connector) + East 4A w/o Northeast Con	West 1B (w/ Direct Airport Connector) + East 4C w/o Northeast Con	West 2 (w/ Direct Airport Connector) + East 4C w/o Northeast Con	West 1B (w/ Direct Airport Connector) + East 5 w/o Northeast Con	West 2 (w/ Direct Airport Connector) + East 5 w/o Northeast Con	West 1B (w/ Direct Airport Connector) + East 6 w/o Northeast Con	West 2 (w/ Direct Airport Connector) + East 6 w/o Northeast Con
Design												
Alternative Length (Approximate)	Miles	7.53	7.4	12.1	12.8	12.6	12.9	12.8	13.2	13.0	13.3	13.1
Proposed Right-of-Way Width (Width Varies; Minimum / Maximum)	Feet	150 / 338	150 / 338	260 / 400	150 / 338 / 400	150 / 338 / 400	150 / 338 / 400	150 / 338 / 400	150 / 338 / 400	150 / 338 / 400	150 / 338 / 400	150 / 338 / 400
Proposed Bridges (Total Number of Structures per Alternative)	Structures	8	7	37	27	26	28	27	28	27	30	29
Proposed Bridges (Total Length of all Structures per Alternative)	Feet	10,370	11,155	20,848	22,437	23,222	22,302	23,087	21,785	22,570	16,105	16,890
Proposed Interchanges	Number	4	4	5	6	6	6	6	6	6	6	6
Projected 2045 Annual Average Daily Traffic (AADT) Volume (As Tolled Facility)	Vehicles	22,500		42,100	38,900	39,700	38,900	39,700	38,900	39,700	38,900	39,700
Physical												
Major Utility Conflicts - Existing	No. of Conflicts	2	2	2	4	4	4	4	4	4	4	4
Major Utility Conflicts - Planned	No. of Conflicts	0	0	0	0	0	1	1	1	1	0	0
Contamination Sites & Facilities	No. of Conflicts	0	0	2	2	2	2	2	1	1	1	1
Railroad Involvement	No. of Conflicts	1	1	0	1	1	1	1	1	1	1	1
Cultural Environment Effects												
Public Lands	Acres	0	0	56	162	162	166	166	112	112	56	56
Section 4(f) Coordination Required (Public Recreation Lands, Wildlife Refuges, etc.)	Y/N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N
Potential Historic Resources	No. of Conflicts	1	0	2	2	1	2	1	1	0	1	0
Potential Historic Linear Resources (Canals)	No. of Resources	3	2	2	5	4	5	4	5	4	5	4
Potential Archaeological Resources	No. of Resources	1	1	1	1	1	1	1	1	1	2	2
Natural Environment												
Water Features												
Ponds / Lakes	Acres	0	0	0	0	0	0	0	0	0	1	1
Canals/Regulated Floodways	No. of Conflicts	3	0	2	5	2	5	2	5	2	5	2
Flood Hazard Areas - 100 Year Floodplain	Acres	39	26	194	169	157	186	173	177	165	181	169
Wetlands (Non-Forested and Forested)	Acres	61	93	110	366	398	367	399	338	370	341	373
Potential Habitat - Federal Listed Species	Acres	191	168	-	464	441	474	451	485	462	470	447
Potential Habitat - State Listed Species	Acres	163	143	-	489	469	501	481	496	476	487	467
Potential Bald Eagle Nest	Y/N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Potential Species Impacts (Composite Rating)	Rating	2.53	2.72	-	7.4	7.6	7.4	7.6	7.3	7.5	7.1	7.3
Conservation Easements												
Eagle Creek, World Gateway DRI, Eagles Roost, Split Oak	Acres	353	351	1114	992	990	956	954	731	729	606	604
Split Oak - Total Impact (ROW + Remainder)	Acres	0	0	675	275	275	229	229	49	49	0	0
Social												
Right-of-Way Area (including proposed ponds)	Acres	425	346	546	1094	1015	1112	1033	1133	1054	1061	982
Potential Residential Impacts (Includes Partial Impacts)	Total Parcels	24	22	291	372	370	374	372	370	368	451	449
Existing	*Parcels*	5	3	33	6	4	6	4	7	5	31	29
Planned	*Parcels*	19	19	258	366	366	368	368	363	363	420	420
Potential Non-Residential Impacts (Includes Partial Impacts)	Total Parcels	16	12	16	28	24	26	22	28	24	27	23
Existing	*Parcels*	16	12	16	21	17	21	17	21	17	18	14
Planned	*Parcels*	0	0	0	7	7	5	5	7	7	9	9
Community Facilities	No. of Conflicts	1	1	2	2	2	2	2	2	2	2	2
Parks and Recreational Facilities (Public and Private)	No. of Conflicts	0	0	0	0	0	0	0	0	0	0	0
Trails	No. of Conflicts	3	3	5	6	6	6	6	4	4	5	5
Existing	*No. of Conflicts*	0	0	1	1	1	1	1	0	0	0	0
Planned	*No. of Conflicts*	3	3	4	5	5	5	5	4	4	5	5
Community Cohesion Effects	Ranking	Low	Low	Moderate	Low	Low	Low	Low	Low	Low	Low	Low
Socioeconomic Impacts to Special Populations	Ranking	High	High	-	High	High	High	High	High	High	High	High
Proposed Development (PD)/Development of Regional Impact (DRI)	Acres	427	166	416	757	496	763	502	836	575	826	565
Estimated Costs												
Roadway Construction		$173,547,487	$160,596,713	$298,200,000	$331,200,000	$318,262,102	$339,000,000	$326,040,528	$327,000,000	$314,093,277	$327,800,000	$314,814,611
Bridge Construction		$162,455,000	$172,249,442	$163,300,000	$272,900,000	$282,720,519	$277,300,000	$287,054,656	$196,500,000	$206,322,020	$225,900,000	$235,685,175
Interchange Construction		$64,465,381	$59,318,652	$243,200,000	$64,500,000	$59,318,652	$64,500,000	$59,318,652	$64,500,000	$59,318,652	$64,500,000	$59,318,652
Toll Collection Equipment		$2,100,000	$2,100,000	$4,600,000	$4,600,000	$4,620,000	$4,600,000	$4,620,000	$4,600,000	$4,620,000	$4,600,000	$4,620,000
Right-of-Way Costs (including proposed ponds)		$166,700,000	$227,400,000	$355,000,000	$410,100,000	$470,800,000	$407,700,000	$468,400,000	$501,000,000	$561,700,000	$512,100,000	$572,800,000
Mitigation, Wetlands, & Wildlife		$15,521,032	$18,688,997	$32,900,000	$61,700,000	$64,822,722	$61,800,000	$64,975,028	$56,200,000	$59,343,561	$54,400,000	$57,524,226
Total Estimated Alternative Costs		**$584,800,000**	**$640,400,000**	**$1,097,200,000**	**$1,145,000,000**	**$1,200,600,000**	**$1,154,900,000**	**$1,210,500,000**	**$1,149,800,000**	**$1,205,400,000**	**$1,189,300,000**	**$1,244,800,000**
Projected Traffic Revenue (2045)		**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**

The evaluation criteria used in Table 9-4 were defined by CFX and Dewberry for consistency among the four transportation corridors included in the CFX Concept, Feasibility & Mobility Studies. This allows for a comparative assessment of the western segments (West 1B and West 2) plus the eastern segments (East 4A, East 4C, East 5, East 6), for a total of eight alignments. The 2017 OCX PD&E Recommended Alternative was added to the matrix as a "base case" but not included in the comparative analysis. For each evaluation criterion, a comparison was made using a standard deviation calculation to compare the eight alignments. Red indicated that the potential impacts are substantially higher than average when compared to the other alignments (potential impacts greater than one standard deviation above the mean), yellow was assigned to evaluation criteria within one standard deviation of the mean, and green indicated that the potential impacts were substantially lower than average when compared to the other alignments (zero or greater than one standard deviation below the mean).

The engineering considerations used to compare the alignments were also listed in Table 9-4. Design factors such as alignment lengths, ROW widths, interchanges, structures, construction costs, ROW costs, and AADT volumes were included. Preliminary drainage calculations were performed to estimate required stormwater and floodplain impact compensation ponds. These drainage calculations are documented in the *Pond Sizing and Siting TM* in Attachment E.

The following paragraphs detail the methodology used to calculate the values of several of the criteria.

Socioeconomic Impacts to Special Populations: Section 3 presented the socioeconomic data for minority populations, populations below the poverty level, and disabled populations. To determine the total special populations across each alignment, the area of each alignment in each Census Block (provided by the U.S. Census) was multiplied by the percent of each special population present in that block and then summed. That value was then compared to the average county values (adjusted for the percentage of the alignment in each county). A value of Low, Medium, or High was then assigned to each alignment.

Potential Species Impacts (Composite Rating): The FWC Integrated Wildlife Habitat Ranking System 2009 (IWHRS) was used to determine the composite rating for potential species impacts across each alignment. The IWHRS is a GIS tool that ranks the Florida landscape based on habitat needs of wildlife to identify ecologically significant lands in the state and to assess potential impacts of land development projects. The IWHRS area (polygon) within each alignment was multiplied by the specific IWHRS value of that area and summed for a total IWHRS Ranking-Acres for the alignment. The total was then divided by the total area of IWHRS area in the alignment to determine an overall ranking (High, Medium, or Low) for the alignment.

Upon completion of the standard deviation analysis, additional refinements were made to the matrix for the following criteria:

- **Potential Habitat – Federal and State Listed Species**: the data in the matrix reflect the acreage of the largest impacted species; the western segments reflect Audubon's crested caracara (federal) and the Florida sandhill crane (state); the eastern segments reflect the red-cockaded woodpecker (federal) and Sherman's fox squirrel (state).
- **Split Oak Total Impact (ROW + Remainder):** Because of high impacts associated with segments East 4A and 4C and lower impacts associated with segments East 5 and 6 (minimization and avoidance, respectively, of SOFWEA), the standard deviation is high (119 acres). Comparison of the values for alignments West 1B/East 4C (229 acres) and West 2/East 4C (229 acres) versus West 1B/East 5 (49 acres) and West 2/East 5 (49 acres) have a large disparity and, therefore, the color was changed from yellow to red for alignments associated with segment East 4C.

- **Potential Non-Residential Impacts (Includes Partial Impacts) – Planned:** The standard deviation for this criterion is 24 parcels, where the high threshold is 413 parcels and the low threshold is 365 parcels. Alignments associated with segment East 5 (363 parcels) are close to the values for those alignments associated with segment East 4C (368 parcels). Because of public sensitivity, the mean was adjusted and impacts associated with segment East 5 were changed from green to yellow on the matrix. Similarly, impacts associated with segment East 4A (404 parcels) were changed from yellow to red because of public sensitivity and the low numerical difference relative to East 6 (420 parcels).
- **Public Lands:** The values for alignments West 1B/East 4A (162 acres), West 2/East 4A (162 acres), West 1B/East 4C (166 acres), and West 2/East 4C (166 acres) are within 7 acres of the high threshold of 169 acres. Because of the small difference to the high threshold, the locations of the alignments to the surrounding public lands, and public sensitivity to the resource value, the color was changed from yellow to red for these alignments.

Should the OPE project continue to the PD&E study phase, the project will be required to follow Part 1, Chapter 4 of the FDOT (2017b) *PD&E Manual*. The project may be required to go through the ETDM process because the screening was performed in 2012 and the project beginning and end points have changed. The project will be required to use the ACE process to identify, evaluate, and eliminate alternative corridors. The ACE process identifies and evaluates alignments using the Methodology Memorandum agreed upon by the project stakeholders. The Methodology Memorandum identifies alternative alignments, and details the data and procedure that will be used to develop, evaluate, and screen these alignments. Therefore, should a matrix similar to Table 9-4 be used, the criteria and the methodology used to develop and evaluate them will be agreed upon by all project stakeholders prior to beginning the analysis.

9.7 CFX Financial Viability Criteria

CFX's financial viability criteria state that CFX will "Fund new toll roads that will generate toll revenues in excess of the cost of the project. For those projects where toll revenue is insufficient to cover project cost, we may consider entering into partnerships with other public or private entities, whereby we could pledge to cover up to 50 percent of project costs from system revenues. The remaining 50 percent of the project could be covered by a combination of toll revenues from the project and partner contributions." In 2016 Osceola County, OCX, and CFX entered an interlocal agreement regarding OPE and the adjoining three corridors. This agreement put additional viability criteria in place specific to each of these corridors.

Table 9-5 summarizes the initial viability analysis considering only the toll revenues shown in Tables 9-2 and 9-3. Per the CFX policy quoted above, a CFX toll road must generate sufficient toll revenue for a 30-year period to cover its projected costs (construction, ROW, soft costs, etc.). The first section in Table 9-5, Partial Alignments, shows that for a project from Jeff Fuqua Boulevard to Narcoossee Road – with or without the Direct Airport Connector – projected revenues divided by projected costs range from 17.1 percent to 23.0 percent.

The second section of Table 9-5 shows Full Alignments: those that run from the SR 417/airport area to the proposed Sunbridge Parkway. These projects would generate between 16.8 percent and 23.6 percent. Thus, no partial or full alignment generates sufficient toll revenue to cover its full project cost.

Table 9-5. Projected Toll Revenues as a Percentage of Total Cost

Alignment	Total Cost	Revenue at $0.18/mile	Range (Low)	Range (High)	Projected Low Revenue	Percent of Total Cost	Projected High Revenue	Percent of Total Cost
Partial Alignments (Jeff Fuqua Blvd. to Narcoossee Road only)								
West 1B w/ DAC	$ 584.8	$ 107.8	-10.0 %	+ 20.0 %	$ 100.0	17.1 %	$ 130.0	22.2 %
West 1B w/o DAC	$ 347.6	$ 63.5	-10.0 %	+ 20.0 %	$ 60.0	17.3 %	$ 80.0	23.0 %
Full Alignments								
PD&E Recommended Alt	$ 1,097.2	$ 206.2	-10.0 %	+ 20.0 %	$ 190.0	17.3 %	$ 250.0	22.8 %
Full Alignments (Jeff Fuqua Blvd. to Sunbridge Pkwy.) Including Direct Airport Connector but no Northeast Connector interchange								
West 1B + East 4A	$ 1,145.0	$ 222.1	-10.0 %	+ 20.0 %	$ 200.0	17.5 %	$ 270.0	23.6%
West 1B + East 4C	$ 1,154.9	$ 222.1	-10.0 %	+ 20.0 %	$ 200.0	17.3 %	$ 270.0	23.4 %
West 1B + East 5	$ 1,149.8	$ 222.1	-10.0 %	+ 20.0 %	$ 200.0	17.4 %	$ 270.0	23.5 %
West 1B + East 6	$ 1,189.3	$ 222.1	-10.0 %	+ 20.0 %	$ 200.0	16.8 %	$ 270.0	22.7 %

As noted above, CFX policy does allow for projects that do not fully fund themselves through 30-year projected toll revenues. These projects may use partnerships that could include cooperating agency funding, dedications of ROW, and other mechanisms. Such projects must generate at least 50 percent of their projected costs for 30 years as a combination of toll revenues and partnership contributions. The remaining 50 percent of costs would be borne through CFX system revenues. If this project moves into a PD&E Study, these types of cooperating agency funding and ROW partnerships will be explored as means to achieve the threshold of meeting project costs.

9.8 Findings of the Study

Throughout this Concept, Feasibility & Mobility study, multiple segments have been developed. Pairing a west segment plus an east segment creates a complete alignment or full project. The West segments recommended for further study are West 1B and West 2. The East segments recommended for further study are East 4A, East 4C, East 5, and East 6.

The six alternative segments identified in this study are hereby presented to the CFX Board for consideration and further analysis and evaluation in a future PD&E study. This study will more thoroughly examine the remaining segments through additional field investigation, improvements to alignment geometry, more detailed construction and ROW cost estimates, and continuing coordination with the public, cooperating agencies, and other stakeholders. A thorough investigation of the alignment segments coupled with rigorous environmental surveys associated with PD&E studies and additional public and stakeholder involvement will be instrumental in determining a preferred alternative. Moreover, significant agency and County involvement and coordination will be required for the proposed project.

SECTION 10

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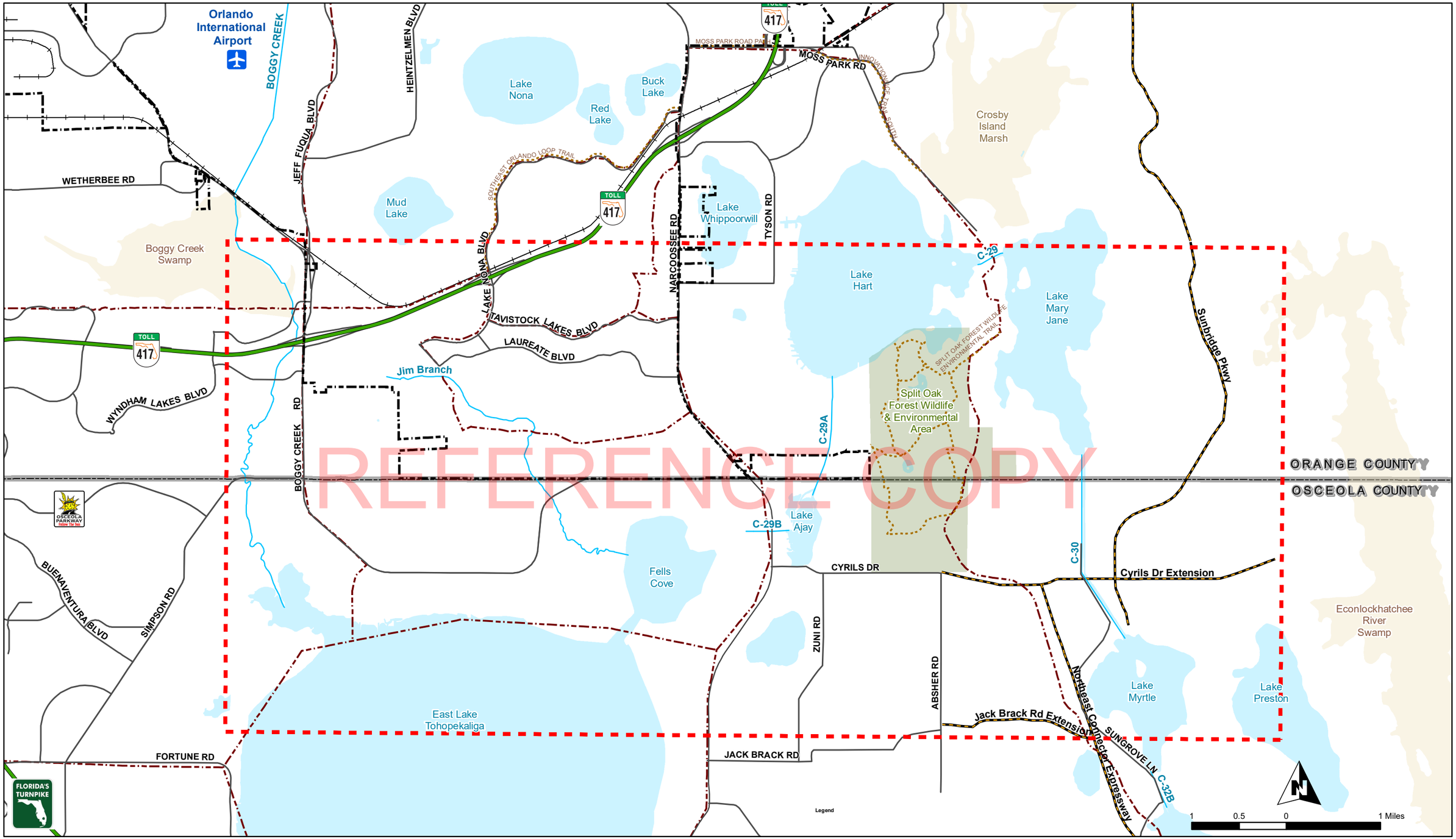
Attachment A
Background Information

Attachment A-1
Base Map



Legend

- Study Area
- County Boundary
- Orlando City Limits
- RailRoad
- Existing Trails
- Planned Florida Greenways & Trails
- Planned Roads

Legend

Base Map

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180301
BaseMap
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, CH2M, ESRI, Orange and Osceola County, Central Florida Geographic Information DRI Interactive Mapping, FDEP, National Hydrography Data (NHD))</ITA>

Attachment A-2
SR 528/Innovation Way Interchange
Fact Sheet

CONSTRUCTION QUICK FACTS

TOLL 528

PROJECT: SR 528 / INNOVATION WAY INTERCHANGE

To improve connectivity to State Road 528 (Martin B. Andersen Beachline Expressway) in east Orange County and to accommodate the development of the Innovation Way Corridor, the Central Florida Expressway Authority will build a new interchange between SR 528 and Innovation Way.

This project will include four ramps with two ramp plazas and an extension of Alafaya Trail to Aerospace Parkway with a connection to International Corporate Park Boulevard. The ramp plazas will feature both exact coin and E-PASS only lanes.

This project will also involve the removal of the existing SR 528/ICP Boulevard interchange.

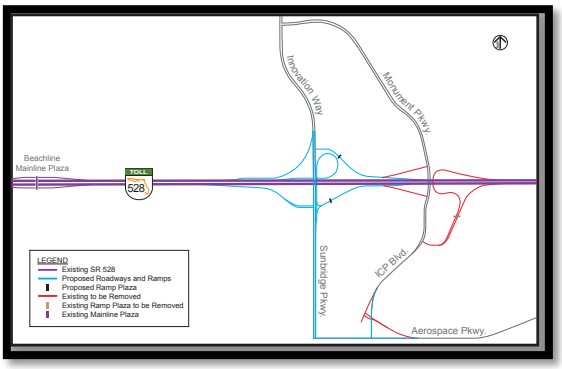
The estimated cost of construction is $62.5 million. Work is expected to be complete by early 2018.

WORK ZONE SAFETY

For the safety of motorists and work crews, speed limits will be strictly enforced during construction. Speeding fines are doubled in work zones when workers are present. Motorists are reminded to change lanes for safety when they see Road Rangers assisting other motorists or flashing lights – it's Florida law.

Distracted driving is a major cause of traffic accidents. Even just two seconds of distraction time doubles the chances of an accident. Use your cell phone when stopped and never text while driving. Instead, "Designate a Texter."

PROJECT MAP (REVERSE FOR LARGE MAP)



PROJECT LIMITS & LANE CLOSURES

During construction, temporary lane closures will be necessary. As always, the Expressway Authority will take steps to minimize the impact of construction to motorists.

Lane closures will not be permitted in the project area during the following peak travel times:

- Eastbound SR 528 between 4 p.m. and 7 p.m.
- Westbound SR 528 between 5:30 p.m. and 6:30 p.m.

There will be night and weekend work on this project. Travel notifications will be posted prior to all scheduled lane or roadway closures.

PUBLIC INFORMATION

Phone: 407-383-5817
E-mail: construction@CFXway.com
Website: www.CFXway.com

Follow us on Twitter @DriveEPASS for current project information.

QUICK FACTS

PROJECT START
Construction began July 2016

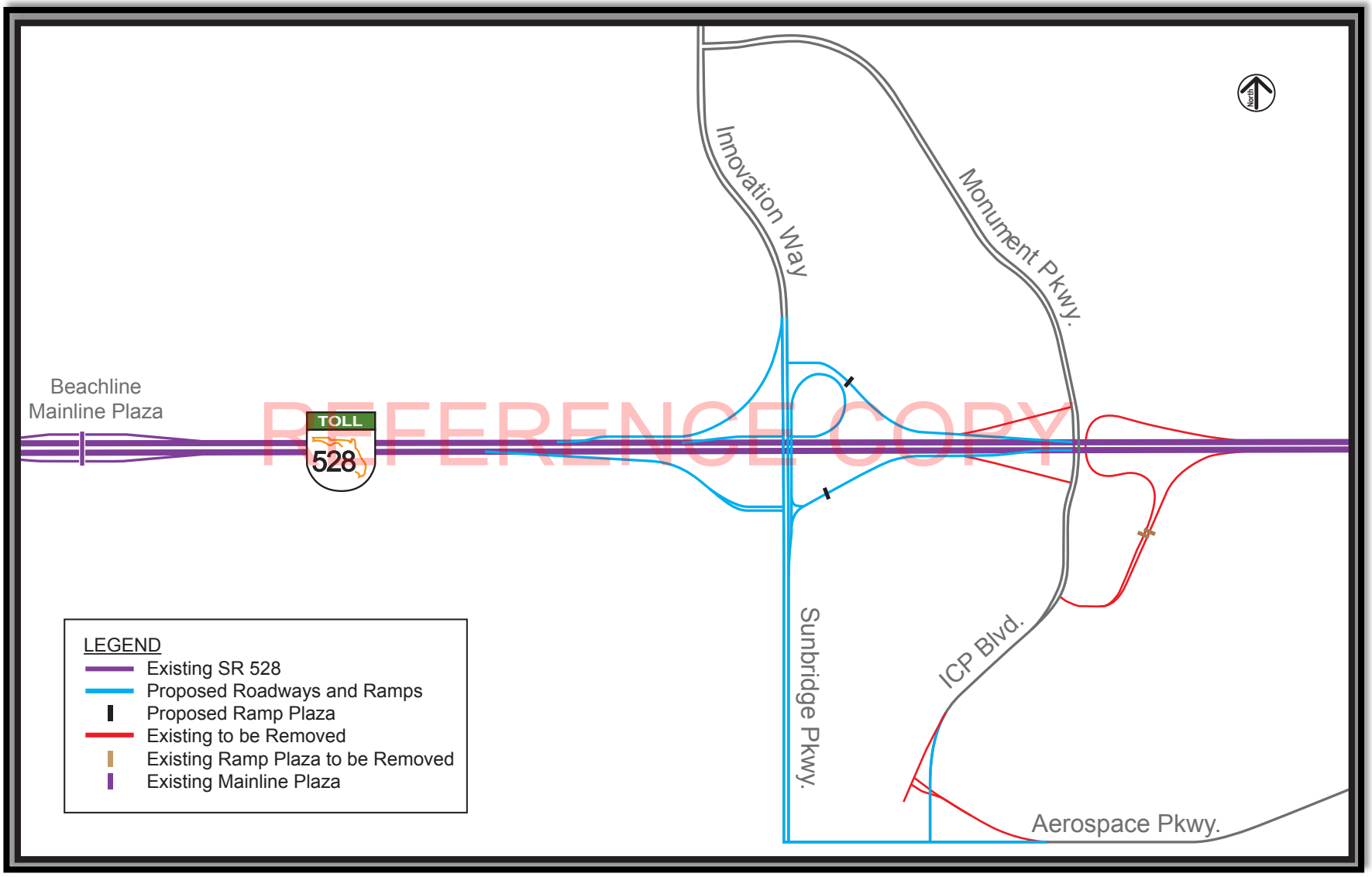
ESTIMATED COMPLETION
Work is expected to be complete in early 2018

PROJECT COST
Estimated $62.5 million for construction

The Central Florida Expressway Authority's jurisdiction includes Orange, Seminole, Lake, and Osceola Counties. CFX is responsible for the construction, maintenance and operation of a 109-mile limited-access expressway system. It may also acquire, construct and equip rapid transit, trams and fixed guideways within its rights-of-way. CFX's system includes SR 408 (Spessard Holland East- West Expressway), SR 528 (Martin Andersen Beachline Expressway), SR 417 (Central Florida GreeneWay), SR 429 (Daniel Webster Western Beltway), SR 414 (John Land Apopka Expressway) and State Road 451.

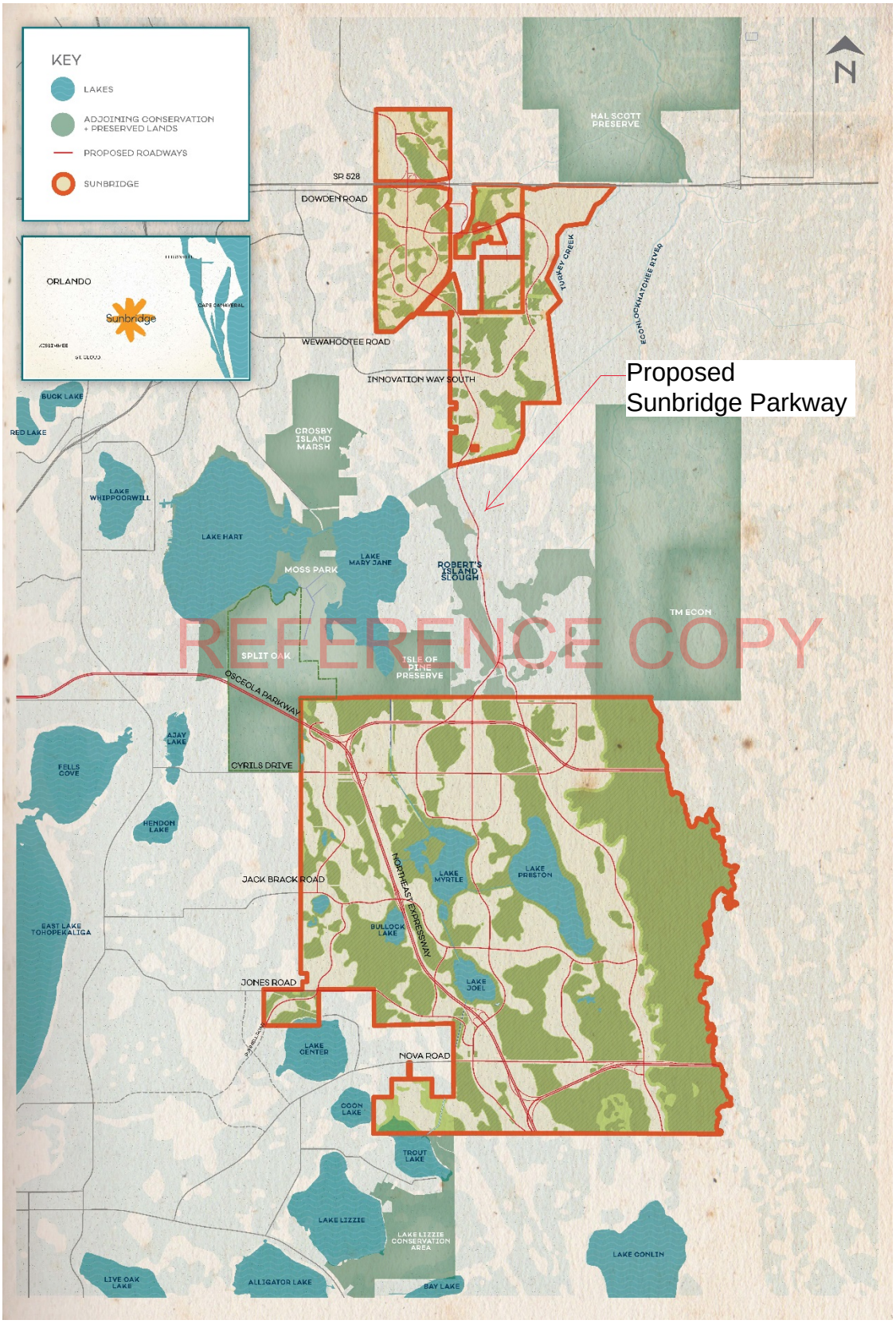
Central Florida Expressway Authority: 4974 ORL Tower Road, Orlando, Florida 32807
Phone: 407.690.5000 | Fax: 407.690.5011 | Email: construction@CFXWay.com

CENTRAL FLORIDA EXPRESSWAY AUTHORITY


Innovation Way
Monument Pkwy.
Beachline
Mainline Plaza
TOLL
528
REFERENCE COPY
Sunbridge Pkwy.
ICP Blvd.
Aerospace Pkwy.
LEGEND
Existing SR 528
Proposed Roadways and Ramps
Proposed Ramp Plaza
Existing to be Removed
Existing Ramp Plaza to be Removed
Existing Mainline Plaza

Attachment A-3
Sunbridge Development Map

Sunbridge Development Map



Attachment A-4
Orange County District 4 Future Roadway Map

Dean Road
at Curameng Drive
Design Complete: Apr 2017
Construction Begin: Nov 2017
Construction End: Nov 2018

Future County Project

Lake Underhill Road
From Econlockhatchee Trail to Rouse Road
Design: Feb 2018
Construction Begin: Sep 2020
Construction End: Sep 2022

Avalon Park Boulevard Realignment
at North of One-Way Pair
Design Complete: Apr 2017
Construction Begin: Oct 2017
Construction End: Oct 2018

Future Partnership Project

Avalon Park Boulevard Realignment
at North of One-Way Pair
Design Complete: Apr 2017
Construction Begin: Oct 2017
Construction End: Oct 2018

Future Partnership Projects

Taft-Vineland Road Seg 2
From Bachman Rd to Orange Avenue
Design Complete: Dec 2017
Construction Begin: TBD
Construction End: TBD

Taft-Vineland Road Seg 1
From Orange Blossom Trail to Bacham Rd
Design Complete: Dec 2017
Construction Begin: Mar 2019
Construction End: Mar 2021

Boggy Creek Road - North
From South Access Road to Wetherbee Road
Design Complete: Feb 2017
ROW Acquisition: TBD
Construction Begin: May 2018
Construction End: Dec 2019

Boggy Creek Road - South
From Osceola County Line to SR 417 (Greene Way)
Design Complete: May 2016
ROW Acquisition: TBD
Construction Begin: Oct 2018
Construction End: Oct 2020

Future Partnership Project

Future Partnership Projects

Future City Projects

Future Partnership Projects

Future Partnership Projects

Future Partnership Projects

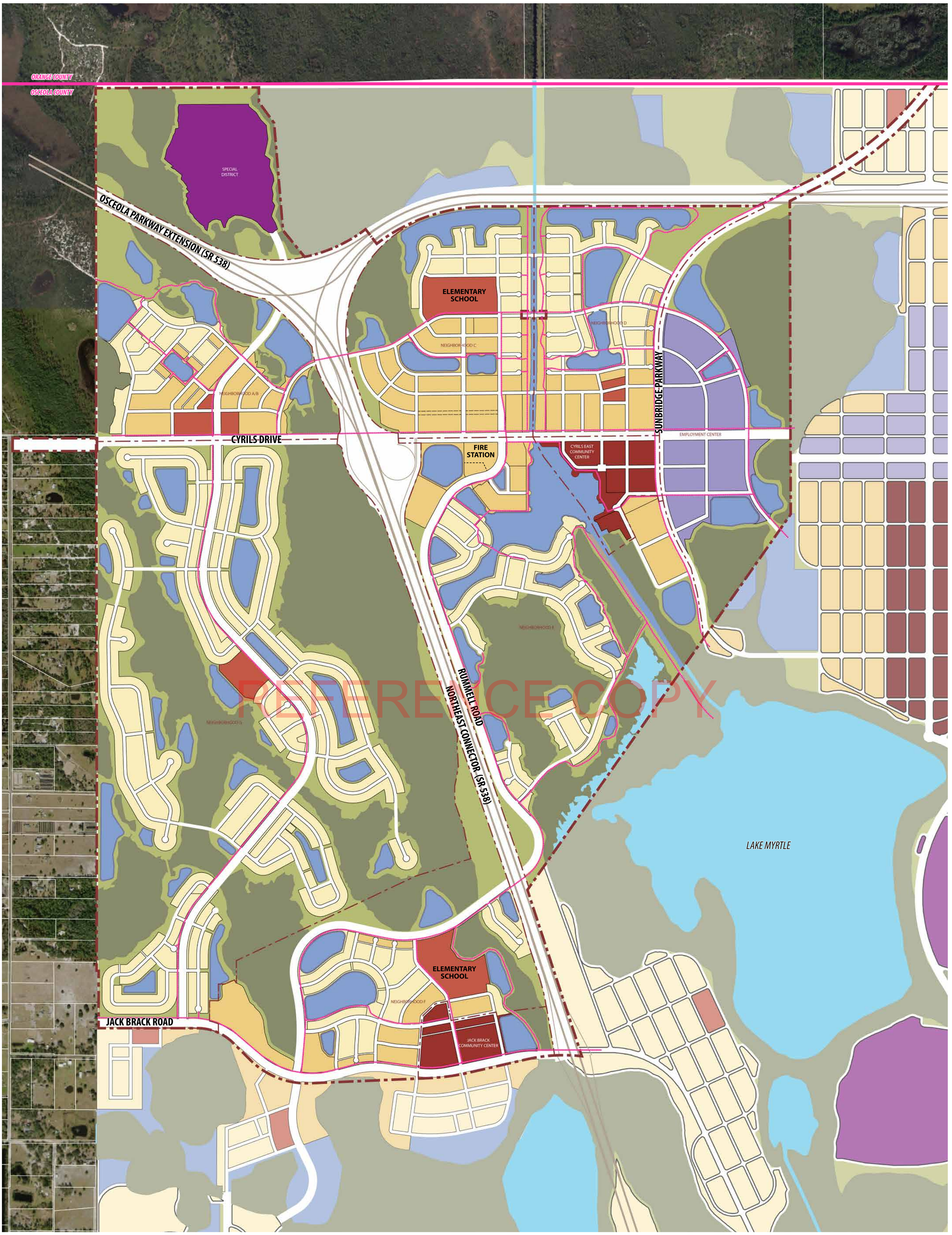
Future Partnership Projects

Future Partnership Projects

Map Produced By: Community, Environmental and Development Services Department Transportation Planning Division (407) 836-8070
Production Date: December 1, 2012
Revised Date: June 8, 2017
Map information is intended for illustrative purposes.

District 4 Orange County Future Roadway Program

Attachment A-5
Sunbridge Information



NOTE: AREA WITHIN CONCEPT PLAN BOUNDARY REFLECTS CURRENT SUNBRIDGE PHASE ONE CONCEPT PLAN PROPOSAL. AREA SOUTH OF JACK BRACK ROAD, NORTH OF WETLAND REVISED PER COUNTY DIRECTION. ALL OTHER AREAS REFLECT ADOPTED OSCEOLA COUNTY NED CMP.

Sunbridge

SHEET 2: DEVELOPMENT PROGRAM AND PLACE TYPES

July 12, 2017

PLACE TYPES
- Special District
- Employment Center
- Community Center
- Neighborhood Center
- Neighborhood Type 2
- Neighborhood Type 1
- Open Space District

MISCELLANEOUS
- Concept Plan Boundary
- Preserved Wetlands
- Stormwater Ponds
- Trails
- Neighborhood

NORTH

10 ACRES

0 200' 400' 800' 1320'

TAVISTOCK DEVELOPMENT COMPANY

COMMUNITY SOLUTIONS GROUP

A GAI Consultants, Inc. Service Group

APPROVED BY ORANGE
COUNTY BOARD OF COUNTY
COMMISSIONERS

BCC Mtg. Date: April 25, 2017

DOC# 20170253449
05/08/2017 11:32:05 AM Page 1 of 141
Rec Fee: $1,200.00
Deed Doc Tax: $0.00
DOR Admin Fee: $0.00
Intangible Tax: $0.00
Mortgage Stamp: $0.00
Phil Diamond, Comptroller
Orange County, FL
MB - Ret To: TAVISTOCK

This instrument prepared by and after recording return to:

Linda Loomis Shelley
Buchanan Ingersoll & Rooney PC
101 N Monroe Street, Suite 1090
Tallahassee, FL 32301

Project: Sunbridge PD

Tax Parcel I.D. No(s):
10-24-32-0000-00-004, 06-24-32-0000-00-001, 25-23-31-0000-00-001, 36-23-31-3849-00-060, 36-23-31-0000-00-007, 36-23-31-3849-08-000, 36-23-31-3849-09-000, 36-23-31-3849-07-000, 36-23-31-3849-05-000, 36-23-31-3849-00-010, 36-23-31-3849-02-000, 36-23-31-0000-00-003, 36-23-31-0000-00-006, 36-23-31-3849-00-040, 36-23-31-3849-00-050, 36-23-31-3849-00-020, 31-23-32-0000-00-002, 31-23-32-0000-00-005, 36-23-31-3849-06-000, 36-23-31-0000-00-002, 06-24-32-0000-00-017, 31-23-32-3859-00-008, 36-23-31-3849-00-030, 32-23-32-0000-00-001, 25-23-31-0000-00-003, 18-24-32-0000-00-004, 06-24-32-0000-00-019.

TRANSPORTATION AGREEMENT FOR SUNBRIDGE PARKWAY (From Dowden Road to Osceola County Line)

THIS TRANSPORTATION AGREEMENT FOR SUNBRIDGE PARKWAY (the "**Agreement**"), effective as of the latest date of execution (the "**Effective Date**"), is made and entered into by and among **TAVISTOCK EAST HOLDINGS, LLC** ("**Applicant**"), a Florida limited liability company, 6900 Tavistock Lakes Blvd, Suite 200, Orlando, FL 32827, on behalf of all owners of real property which is subject to this Agreement, and **ORANGE COUNTY**, a charter county and political subdivision of the State of Florida whose mailing address is P.O. Box 1393, Orlando, Florida 32802-1393 ("**County**"). The Applicant and County may sometimes be referred to collectively as the "**Parties**."

SUBURBAN LAND RESERVE, INC., a Utah corporation, 79 S Main Street, Suite 500, Salt Lake City, UT 84111, individually and as the duly authorized representative of other owners of real property within the Sunbridge Planned Development, hereby consents to and joins in this Agreement, and is referred to collectively herein as the "**Owners**."

WITNESSETH:

WHEREAS, Applicant is under contract to be the fee simple owner of certain real property, as shown in the project location map identified as Exhibit "A," and as more particularly described on Exhibit "B" (legal description and sketch of description), both of which are attached hereto and incorporated herein by this reference (the "**Property**"); and

WHEREAS, Farmland Reserve, Inc., a Utah non-profit corporation, Central Florida Property Holdings 100, LLC, a Florida limited liability company, Central Florida Property Holdings 200, LLC, a Florida limited liability company (collectively "FRI"), and Suburban Land Reserve, Inc., ("SLR") are the current fee simple owners of the Property ("**Owners**") and by execution of the attached Acknowledgement, Joinder and Consent have recognized the Applicant's rights to purchase, develop and pursue entitlements on the Property; and

WHEREAS, Applicant is developing a portion of the Property as a large-scale master planned community including residential, office, industrial, retail and

hotel uses to be known as the Sunbridge Planned Development ("**Sunbridge PD**"); and

WHEREAS, Applicant submitted a Road Term Sheet to the County which outlined the major components of its obligations and responsibilities relating to Sunbridge Parkway and such Road Term Sheet was approved by the County as part of its deliberations on the Sunbridge PD rezoning on November 29, 2016; and

WHEREAS, Applicant is willing to convey or cause the conveyance of certain portions of the Property to County in return for credits against transportation impact fees ("**Impact Fee Credits**") to be paid in the future in connection with the Sunbridge PD; and

WHEREAS, Applicant is willing to construct those Segments of Sunbridge Parkway identified in Section 4 below and associated stormwater facilities within the Property (referred to and defined herein as the "**Improvements**") in return for Impact Fee Credits; and

WHEREAS the Orange County Engineer has declared that portions of Sunbridge Parkway are impact fee eligible; and

WHEREAS, construction of the Improvements by Applicant and conveyance of road right-of-way, ponds and associated easements ("ROW&E") will serve the health, safety, and general welfare of the public; and

WHEREAS, County and Applicant desire to set forth certain terms, conditions, and agreements between the parties as to the construction of the Improvements, design, engineering and permitting of the Improvements, and conveyance of the ROW&E to County.

NOW, THEREFORE, for and in consideration of the above premises, the mutual covenants and agreements set forth herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Applicant and County (the "Parties") agree as follows:

Section 1. Recitals. The above recitals are true and correct and are incorporated herein by this reference.

Section 2. Preliminary Design Study. Applicant shall fund and conduct a single preliminary design study ("PDS") for Segments 2, 3a, 3b, and 4 of Sunbridge Parkway pursuant to the scope of services attached hereto and incorporated herein as Exhibit "C." The Applicant shall receive transportation impact fee credits for the actual, reasonable, County-approved cost incurred for the PDS, which is currently estimated to be $451,312.45.

Upon request by Applicant, the County is not requiring Applicant to conduct a PDS for Segment 1. The PDS process requires collection and analysis of environmental data. It is not necessary to include Segment 1 within the PDS because this Segment is wholly contained within the former International

Corporate Park of Development of Regional Impact ("ICP DRI") and therefore the environmental attributes of that portion of the Property have already been extensively analyzed and are subject to existing permits issued by the County (Orange County CAI Permit No. 10-010 and Extension Request through 6/23/17) and the South Florida Water Management District (SFWMD Conceptual Permit No. 48-02172-P and Extension Request through 10/11/18). In addition, this Property is subject to the County's Environmental Land Stewardship Program, which has gone through an extensive public engagement and hearing process.

Section 3. Improvements Included Within This Agreement. For purposes of this Agreement, the Parties agree that the Improvements include only the Segments of Sunbridge Parkway referenced in Section 4.A, below, and associated stormwater facilities relating to the Segments.

Section 4. Sunbridge Parkway Design, Permitting and Construction. Upon completion of the PDS by Applicant and acceptance of the PDS by the County, Applicant will deliver road designs and proceed to permit and construct Sunbridge Parkway within the segments depicted on Exhibit "E," attached hereto and incorporated herein (the "Segments," and each a "Segment").

A. The Segments are as follows:

i. Segment 1 – Design as 4-lane Urban, construct as 4- lane Urban (except as noted in Section 4.C. below)

ii. Segment 2 – Initially Design as 2-lane Rural, initially construct as 2- lane Rural

iii. Segment 3a – Initially Design as 2-lane Rural, initially construct as 2- lane Rural

iv. Segment 3b – Design as 2-lane Rural, construct as 2-lane Rural

v. Segment 4 – Design as 2-lane Rural, construct as 2-lane Rural

Due to the uncertainty of timing of urban development and the potential for premature construction of utility and stormwater systems, the Applicant shall initially design, engineer, permit and construct Segments 2 and 3a as two lane rural segments. The Applicant shall thereafter design, engineer, permit and reconstruct the applicable rural section to an urban section when an application is submitted for a Preliminary Subdivision Plan ("PSP") adjacent to the relevant Segment 2 or Segment 3a (the "Urban Section Trigger"), with the reconstruction of such Segment being completed prior to the issuance of a Certificate of Completion ("**C of C**") for the subdivision improvements. Alternatively, the Applicant shall be responsible for the additional cost that the County would incur when reconstructing the two lane rural sections to two lane urban sections, as part of the expansion to four lane urban sections.

In the event Applicant reconstructs Segment 2 or Segment 3a or Applicant pays for the additional cost that the County would incur when reconstructing the

two lane rural sections to two lane urban sections as part of the County's expansion to four lane urban sections, the Applicant shall also provide a design for four-laning the relevant Segment(s) as four lane urban sections. The four-lane design for each of Segment 2 and 3a shall be commenced by Applicant within ninety (90) days of its receipt of notice from the County that the volume to capacity ratio based on actual traffic counts on the applicable Segment exceeds eighty (80) percent. Applicant shall submit design plans to County at 30%, 60%, 90%, 100% and Final design completion for County approval. The Applicant shall complete the design within fifteen (15) months of receipt of the notice provided by County pursuant to this paragraph.

If the County proceeds with construction of Segments 2 or 3a from two lane rural to four lane urban prior to the Urban Section Trigger, then, within one hundred eighty (180) days after the decision to proceed is made, the County shall develop and provide to Applicant, in County's reasonable discretion, an estimate of the expected costs and expenses to be incurred in connection with the construction and provide Applicant with written notice of such estimate. If the Applicant affirmatively accepts the County's estimate, Applicant shall, with ninety (90) days of acceptance, provide evidence satisfactory to the County that reimbursement of the County's costs and expenses will be made. If the Applicant does not affirmatively accept the County's estimate with in thirty (30) days, the parties

agree to meet in good faith to negotiate. If the parties are unable to resolve their disagreement within thirty (30) days, County shall be entitled to obtain at least three (3) bids, accepting bids only from qualified and responsive construction contractors, select the bid from the lowest responsive and responsible bidder, and notify Applicant in writing of the bid selection by providing Applicant copies of the itemized bids and bid selection. Applicant shall with ninety (90) days of receipt of the notice of bid selection, provide evidence satisfactory to the County that reimbursement of the County's costs and expenses will be made.

B. Within 180 days of the approval of this Agreement, the Applicant shall submit final construction plans for Segment 1 for permitting to the County. Within 180 days of approval of permits for Segment 1, the Applicant shall present a construction contract to the County pursuant to Section 7 below. Upon County's approval of each such construction contract, the Applicant shall commence the applicable construction within 180 days.

C. The Applicant, at its option, may initially construct Segment 1 as a 2-lane Urban segment. In such instance, the Applicant shall be required to complete construction of the remaining two lanes not later than the development threshold identified in Exhibit "J," attached hereto and incorporated herein. The Applicant shall commence construction of the expansion of Segment 1 from two lane urban

to four lane urban within 180 days of the County's approval of the construction permits.

D. Within 180 days of the County's approval of the PDS, the Applicant shall submit proposals for the DEP Work for Segments 2, 3a, 3b, and 4 to the County pursuant to Section 5 below. Within 180 days of the approval of the DEP Work for Segments 2, 3a, 3b and 4, the Applicant shall submit final construction plans for Segments 2, 3a, 3b, and 4 for permitting to the County. Within 180 days of approval of permits for Segments 2, 3a, 3b and 4, the Applicant shall present a construction contract for one or more Segments to the County pursuant to Section 7 below. Upon County's approval of said construction contract, the Applicant shall commence construction within 180 days.

E. Notwithstanding the above, the provisions of Section 16 below allow modification of the timing requirements of subsections 4B and 4D above.

F. Impact fee credits for the four-lane design of Segments 2 and 3a shall be based upon the applicable excess capacity percentages shown in Exhibit "F," attached hereto and incorporated herein, which are exclusive of the upgrades to Segments 2 and 3a from two lane rural to two lane urban described in Subsection 4.A above.

Section 5. Design, engineering and permitting of the Improvements. Applicant shall design, engineer, and permit ("**DEP Work**") the Improvements, subject to review and approval by County.

A. The scope of the DEP Work shall be as set forth in the scope of services document attached hereto as Exhibit "G" and incorporated herein by this reference.

i. It shall be the responsibility of the Applicant to obtain all applicable permits, except that County, at its election, may be a co-applicant where reasonable and preferable to County.

ii. All required mitigation for the Segments shall be the sole responsibility of Applicant.

B. Each design contract for any one or more of the Segments shall be subject to County review and approval.

i. The Applicant has selected Donald W. McIntosh Associates, Inc. as the design and engineering consultant for Segment 1 and the County has approved the choice of the firm selected by Applicant. For all other Segments, the Applicant shall obtain at least three (3) proposals from design consultants and sub-consultants pre-qualified to perform work for the Florida Department of Transportation ("FDOT") under applicable FDOT regulations and guidelines (Group 3.1 and 3.2 for highway design roadway, and Group 4 for highway design

bridges, or the relevant prequalifications for a sub-consultant's area of work, as applicable). The choices of the prime and sub-consultants selected by Applicant are subject to County approval.

ii. Each design contract shall clearly identify an individual lead consultant acceptable to County who shall serve as project manager ("PM") and be the primary point of contact for, and be required to coordinate with, County staff throughout the design process The PM shall be solely responsible for all communications to and coordination with any and all consultants and sub-consultants.

iii. Each design contract shall designate County as a 3rd party beneficiary to all plans and electronic media associated with the Improvements.

iv. Plans for each Segment shall all be subject to County review and approval. Submission of insufficient plans may result in delays and/or County may refuse to accept such submissions for review.

C. The design of the Improvements shall address drainage requirements. The location of the ponds for both the initial and ultimate design of the roads shall be a component of the PDS.

i. Drainage facilities ("Ponds or individually, a "Pond") shall be conveyed to County as fee simple or easement interests, at County's option.

ii. Any Pond intended to be used jointly by the parties shall remain as property of Applicant, who shall enter into a separate recorded joint-use pond agreement with County that establishes Applicant's obligation to maintain such joint-use pond(s) to County standards.

D. Applicant and County shall cooperate in establishment of a municipal service benefit unit ("MSBU") or other assessment mechanism acceptable to the County to address lighting and landscaping requirements.

E. Applicant shall submit design plans to County at 30%, 60%, 90%, 100%, and Final design completion for review and approval.

F. Costs for the DEP Work shall initially be the responsibility of Applicant, subject to eligibility for Impact Fee Credits, as defined further in this Agreement. The anticipated costs of the DEP Work shall be reviewed for approval by the County following completion of the PDS, and as part of the County's review of each design contract, and as part of negotiations regarding an amendment to this Agreement, as contemplated in Subsection 5.H, below, if necessary.

G. If updates to the DEP Work are needed after the County has accepted the DEP Work completed by Applicant, the update will be the responsibility of the County, unless such changes are requested or initiated by Applicant or required as

a result of changes in Applicant's design, engineering, or permitting of the Sunbridge Parkway.

H. The conditions that will be included in the Florida Department of Transportation permit for the railroad grade crossing located within Segment 2 of the Sunbridge Parkway are unknown at the time this Agreement will be approved. The Parties agree that it may be necessary to amend this Agreement to address the design, engineering and permitting provisions herein, as well as the Total Estimated Cost of Improvements (as defined in Section 10, below), and requirements for ROW&E conveyances, once those conditions are finalized. Any decision by County to enter into any such amendment may be made by County in its reasonable discretion.

Section 6. Reimbursement for costs of DEP Work. Subject to the following provisions of this Section 6, County agrees to reimburse Applicant with Impact Fee Credits only for a portion of the actual, reasonable, incurred costs of the DEP Work as follows:

A. Promptly upon County's acceptance of the final plans pursuant to the DEP Work for any Segment, completion of all required mitigation by Applicant for a Segment, and issuance of all necessary permits for the Improvements of such Segment, County shall credit to the account of Applicant, for purposes of Article IV of Chapter 23 of the Orange County Code and any successor code provisions

(the "Impact Fee Ordinance"), an amount of transportation impact fee credits to which Applicant is entitled under the Impact Fee Ordinance, as further detailed in Section 6.B below.

B. Except as set forth in the immediately following sentence, the Applicant will be responsible without reimbursement by Impact Fee Credits for the design, engineering, permitting and mitigation costs associated with the Segments and for the first two lanes of all other on-site roads within the Sunbridge PD. Notwithstanding the foregoing, the parties agree that 43.8% of the DEP Work costs for Segments 2 and 3a as a four lane urban section shall be impact fee eligible. For information only, such percentage is based on the Segment 2 and 3a excess capacity available to the County weighted by Segment length. The calculation is based on the capacities set forth in attached Exhibit "F."

C. Credits shall be awarded in an amount equal to 43.8% of approved actual, reasonable, costs of the DEP Work for Segments 2 and 3a as a four lane urban section incurred by Applicant, including amounts approved for requested change orders that do not exceed 10% of the cost of the DEP Work, individually or cumulatively. Requested change orders that amount to more than 10% of the cost of the DEP Work, individually or cumulatively, shall require approval by the BCC.

D. Such Impact Fee Credits may only be used within Sunbridge PD or transportation impact fee zone 3.

E. As transportation impact fees become payable from time to time in connection with the Sunbridge PD, and if so instructed by Applicant, County shall deduct such amounts payable from Applicant's account.

F. For purposes of the foregoing, County shall make deductions from Applicant's account from time to time only upon receipt of written direction from Applicant (or from such person or entity to whom Applicant expressly may assign this authority, in writing, in the future, or to whom Applicant has expressly assigned this authority by separate written instrument) to effect the particular deduction.

G. Nothing herein shall prevent Applicant from assigning transportation impact fee credits as provided for in Section 23-95(e) of the Orange County Code, as may be amended from time to time.

Section 7. Construction of the Improvements. Applicant shall be responsible for construction of the Improvements.

A. For each construction contract for any one or more of the Segments, Applicant shall obtain at least three (3) bids from qualified contractors acceptable to County. County must approve the awarding of each bid.

B. Each scope of the construction work shall be substantially consistent with the outcome of the PDS.

Applicant shall be responsible to obtain all applicable permits, except that County at its election may be a co-applicant where reasonable and preferable to County.

C. Each construction contract shall be subject to County review and approval.

i. Each construction contract shall clearly identify Applicant's project manager ("PM"), who shall serve as the primary point of contact for, and be required to coordinate with, County staff throughout the construction process. The PM shall be solely responsible for all communications to and coordination with any and all contractors and sub-contractors.

ii. County shall be designated as a 3rd party beneficiary to each contract.

iii. Prior to commencement of construction of any Segment(s), Applicant shall provide payment and performance bonds satisfactory to County for the costs of the Improvements to be made in such Segment(s), together with a rider to such bonds identifying County as a dual-obligee.

D. Any required temporary construction easements, right-of-way utilization permits, and/or rights of entry shall be the responsibility of Applicant.

Section 8. Inspection, acceptance by County.

A. County shall have the right to inspect work on the Improvements throughout the duration of construction. County shall have the authority to request any construction or construction materials testing for any work on the Improvements. The cost of laboratory testing routinely performed on the job site or subsequent to samples typically retrieved from the job site shall be borne by the County, except for testing which is regularly called for in the County's Technical Provisions to be provided by the Contractor. Concrete and Soil-Cement mix design and groundwater testing costs shall be borne by the Contractor. The Record Laboratory is the testing laboratory contracted by the County. Only results of testing by the Record Laboratory shall be considered in evaluating the Contractor's compliance with contract requirements.

B. Upon completion of construction of each Segment, County shall conduct a final inspection and upon approval of the applicable Improvements and Applicant's compliance with all attendant requirements, shall issue a certificate of completion ("**C of C**") for the Improvements.

C. Prior to issuance of the C of C, Applicant shall also deliver to the County a one year maintenance surety covering all Improvements constructed, such surety to be in form of a letter of credit or cash as acceptable to County. From the date of completion until such time as the Improvements are accepted for

maintenance by the County, Applicant shall be responsible for maintaining such, at its expense, to County standards as set forth in Chapter 34, Orange County Code, including landscaping, irrigation, and other improvements within the road right-of-way.

D. Upon any failure by Applicant to complete construction of any Segment or part thereof in accordance with the development thresholds identified in Exhibit "J" attached hereto and incorporated herein, in addition to any other remedies under the law and/or this Agreement, if the final approved plans are not sufficient for County to proceed with construction, Applicant shall immediately pay to County, in the form of cash or a letter of credit acceptable to County, an amount equal to 120% of the anticipated costs to amend the plans to County standards.

Section 9. Indemnification and Insurance.

A. Indemnification. The Owners/Applicant agree, on behalf of itself, its agents, contractors, successors and assigns, that it shall, to the fullest extent permitted by law, defend, indemnify, and hold harmless the County, its officials, agents, and employees from and against any and all liabilities, claims, damages, losses, costs and expenses (including attorneys' fees) or obligations of any kind including without limitation environmental assessments, evaluations, remediation, fines, penalties and clean-up costs asserted against the County and

arising out of or resulting from the performance of the construction activities, excepting those acts or omissions arising out of the sole negligence of the County provided that any such liability, claim, damage, loss, cost or expense:

i. Is attributable to bodily injury, sickness, disease or death, or injury to or destruction of tangible property (other than the construction activities themselves) including the loss of use resulting therefrom, and

ii. Is caused in whole or part by an act or omission relating to the construction of the Improvements by the Owners/Applicant, its agents or employees, or any contractor employed by the Owners/Applicant, or anyone directly or indirectly employed by the Owners/Applicant or its contractor(s), their subcontractors, or anyone for whose acts any of them may be liable;

iii. Is caused in whole or in part by any discharge or disposal of any hazardous or toxic materials, trash, debris, refuse, waste or other materials related in any way to the construction activities related to the construction of the Improvements;

Provided, however, if this Agreement or any underlying contract for construction of any Improvements is deemed by a court of competent jurisdiction to be a construction contract under Section 725.06, Florida Statutes, any obligation of the contractors to defend, indemnify or hold harmless the County, its officers, and employees shall be limited to an obligation to indemnify and hold harmless to

the extent caused by the negligence, recklessness or intentionally wrongful conduct of the contractors and persons employed or utilized by the contractors in the performance of the construction activities.

The indemnification provision contained herein shall survive the termination of this Agreement.

B. Insurance. Prior to commencing construction of any portion of the Improvements and throughout the course of construction of the Improvements, the Owners/Applicant or its agents and contractors, shall procure and maintain insurance with such limits and terms as specified in the following Schedule of Limits (see below):

(i) Workers' compensation insurance with statutory workers' compensation limits and no less than the limits specified in the Schedule of Limits for Employer's Liability with a waiver of subrogation in favor of the County its employees and officials.

(ii) Commercial general liability insurance for all operations including, but not limited to contractual, products and completed operations and personal injury with limits of not less than the limits specified in the Schedule of Limits per occurrence and an aggregate limit of at least twice the per occurrence limit.

(iii) Business automobile liability insurance for all owned, hired, or non-owned vehicles with limits of not less than the limits specified in the Schedule of Limits per occurrence.

(iv) Professional Liability (errors and omissions) for engineering design in amounts not less than One Million and 00/100 Dollars ($1,000,000.00) per occurrence.

(v) Contractors pollution liability insurance including remediation and monitoring expense for all construction operations with limits of not less than One Million Dollars and 00/100 ($1,000,000.00) per occurrence.

Schedule of Limits:

Contract Amount	Workers'Comp/ Employers' Liability	General Liability	Automobile Liability
Up to $10 million	Statutory/$500,000	$1,000,000	$1,000,000
$10 - $20 million	Statutory/$1,000,000	$5,000,000	$5,000,000
Over $20 million	To be determined by the County		

The Owners/Applicant shall be responsible for ensuring that each of its contractors and subcontractors of every tier procure and maintain the insurance specified above and shall furnish to the County evidence of such insurance prior to commencement of construction. The County shall be specifically named (scheduled) as an additional insured on all policies except for workers' compensation coverage. All coverage shall be primary and not contributory with

any insurance or self-insurance maintained by the County. All coverage shall be primary and not contributory with any insurance or self-insurance maintained by the County. The Owners/Applicant shall provide the County notice of any material change, cancellation, non-renewal of any policy required herein at least thirty (30) days prior to the occurrence thereof.

Section 10. Reimbursement for costs of construction; Change orders.

Promptly upon County's issuance of a C of C for a Segment, County shall credit to the account of Applicant, for purposes of Article IV of Chapter 23 of the Orange County Code and any successor code provisions (the "Impact Fee Ordinance"), an amount of transportation impact fee credits to which Applicant is entitled under the Impact Fee Ordinance for such Segment, as detailed in this Section 10, below.

A. For each Segment, Impact Fee Credits shall be granted for the excess capacity percentage above and beyond what is required to accommodate the impacts of development of the Sunbridge PD, as reflected on Exhibit "D" attached hereto and incorporated herein, for the Sunbridge Parkway. Credits for each Segment shall be calculated by multiplying the actual, reasonable approved costs incurred for construction for such Segment by the excess capacity percentage reflected on Exhibit "D."

B. The total estimated cost of constructing the Improvements, including the cost of the DEP Work and construction, is $30,177,084 ("**Total Estimated Cost of Improvements**"). The actual construction costs may vary based upon adjustments made as a result of the PDS, the DEP Work, and final construction.

C. Once a final construction contract is approved by the County, change orders that individually or cumulatively exceed 10% of the Total Estimated Cost of Improvements shall require approval by the Board of County Commissioners.

D. Such transportation impact fee credits may only be used within the Sunbridge PD or transportation impact fee zone 3.

E. As impact fees become payable from time to time in connection with the Sunbridge PD, and if so instructed by Applicant, County shall deduct such amounts payable from Applicant's account.

F. For purposes of the foregoing, County shall make deductions from Applicant's account from time to time only upon receipt of written direction from Applicant (or from such person or entity to whom Applicant expressly may assign this authority, in writing, in the future) to effect the particular deduction.

G. Nothing herein shall prevent Applicant from assigning transportation impact fee credits as provided for in Section 23-95(e) of the Orange County Code, as may be amended from time to time.

H. The County will allow impact fee credits authorized for Monument Parkway as contained in Account (TCA) #200 and the ICP Interchange to be used for development within any portion of the Sunbridge PD.

Section 11. Conveyance of ROW&E to County by Applicant.

A. *ROW&E Defined.* For purposes of this Agreement, "**Road ROW**" shall include lands necessary for construction of Sunbridge Parkway, as follows: Segments 1, 2, and 3a as four lane urban roads, calculated as a minimum of 145 feet in width, and Segments 3b and 4 as four lane rural roads, calculated as a minimum of 160 feet in width (regardless if the actual right-of-way required for the Segments is less wide). For purposes of this Agreement, "**Ponds**" shall include lands necessary for the detention, retention and treatment of stormwater from Sunbridge Parkway, as such lands are identified by the DEP Work. For purposes of this Agreement, "**Easements**" shall include all easements necessary for the construction, maintenance and/or operation of Sunbridge Parkway, as identified by the DEP Work, including without limitation temporary and permanent easements for construction, conveyance, drainage, landscaping, shared Ponds if any, and other multi-purpose uses, as needed. For purposes of this Agreement, "**ROW&E**" shall include Road ROW, Ponds and Easements.

B. *Timing for conveyance.* Prior to County approval of the initial plat for the Sunbridge PD, Applicant shall convey or cause the conveyance to County of

marketable fee title to Road ROW, easement interests in all Easements, and Ponds in fee or by easement at County's election.

C. *Procedure.* Conveyances shall be by special warranty deed or easement, as applicable. All conveyances shall be free and clear of all liens and encumbrances, except for matters of record acceptable to County, if any. Applicant shall pay all costs associated with the conveyances, including all recording fees and documentary stamps related to such conveyances. Ad valorem taxes in connection with the conveyances shall be prorated as of the date of transfer of title and said prorated amount shall be paid by Applicant to the Orange County Tax Collector, in escrow, pursuant to Section 196.295, Florida Statutes, unless the conveyance occurs between November 1 and December 31 of the year of conveyance, in which case ad valorem taxes shall be paid in full by Applicant for the year of conveyance.

D. *Title Policy.* No less than thirty (30) days prior to any conveyance, Applicant shall deliver to County, at Applicant's sole cost and expense, a commitment to issue an Owners' Policy of Title Insurance naming County as the insured (the "Title Commitment"). The original Owners' Policy of Title Insurance (the "Title Policy") shall be delivered to County within thirty (30) days of any conveyance.

E. *Value of Road ROW and Ponds; Entitlement to Impact Fee Credits.* The value of the Road ROW and Ponds to be conveyed in fee by Applicant to County has been determined in accordance with Section 23-95, Orange County Code, as may be amended from time to time.

The Parties hereby agree that the value of the Road ROW and any Ponds conveyed in fee to be conveyed by Applicant to County in return for Impact Fee Credits is an agreed-upon fair market value of $27,840.31 per acre, or fraction thereof, and a total estimated acreage of 158.68 acres, is estimated to be $4,417,700. The estimate of Impact Fee Credits that will be allocated for the Road ROW and Ponds conveyed in fee is $2,103,559. This calculation is based on 100% of the Road ROW value for the third and fourth lanes of Segments 2, 3b, and 4. Because development of Sunbridge PD will require a portion of the four lane capacity on Segment 3a, the Impact Fee Credits for Segment 3a will be calculated based on the number of Sunbridge PD trips in excess of the two lane capacity divided by the capacity increase associated with four laning that Segment.

The size and location of all Road ROW as depicted on the attached Exhibit "E" are approximate, although the final size and location shall be substantially similar to that shown on Exhibit "E" and will be finalized during the DEP Work. Size and location of Ponds and Easements shall also be determined during the DEP Work. Exhibit "E" includes a depiction of Sunbridge Parkway as shown

in the final Sunbridge Planned Development / Regulating Plan approved by the County on November 29, 2016. The dimensions and location for a particular component of the ROW&E shall be finalized by County and Applicant prior to County approval of the Preliminary Subdivision Plan or Development Plan ("PSP/DP") that includes the ROW&E, and shall be in full compliance with this Agreement. County and Applicant agree that the legal descriptions used to convey the ROW&E to County may be revised based upon final engineering.

F. *Environmental Audit.* No less than thirty (30) days prior to conveyance, Applicant shall submit to County a current (within 6 months of conveyance to County) Phase I environmental audit of the areas encompassed by the ROW&E. The Phase I environmental audit shall be conducted in accordance with the requirements of the All Appropriate Inquiries Final Rule, or with the standards set forth in the American Society for Testing and Materials (ASTM) E-1527-13. In the event the Phase I environmental audit presents a matter of concern, as determined by County, then prior to the conveyance, Applicant shall submit to County a Phase II environmental audit. If the Phase II environmental audit is performed and reveals the need for remediation to the ROW&E, one of the following events shall occur: (i) Applicant shall remediate the ROW&E to County's satisfaction prior to the conveyance; or (ii) Applicant and County shall

negotiate and enter into a separate agreement whereby Applicant shall pay the full cost of remediation; or (iii) County may terminate this Agreement at its option.

G. *Compliance with Section 286.23, Florida Statutes.* Applicant shall execute and deliver to County the "Disclosure of Beneficial Interests" required pursuant to section 286.23, Florida Statutes.

Section 12. Transportation Impact Fee Credits for Conveyances of Road ROW and Ponds Conveyed in Fee. For purposes of this Agreement, the impact fee eligible road is Sunbridge Parkway.

Promptly upon County's approval of any environmental assessments and title commitment required under Section 11, and upon approval and acceptance of the special warranty deed, County shall credit on its books to the account of Applicant, for purposes of Article IV of Chapter 23 of the Orange County Code and any successor code provisions (the "Impact Fee Ordinance"), the aforementioned amount of transportation impact fee credits to which Applicant is entitled under the Impact Fee Ordinance for Road ROW and Ponds conveyed in fee, as calculated in Section 11E above. Such transportation impact fee credits may only be used in Sunbridge PD or transportation impact fee zone 3. Thereafter, as impact fees become payable from time to time in connection with the Sunbridge PD, and if so instructed by Applicant, County shall deduct such amounts payable from Applicant's account.

For purposes of the foregoing, County shall make deductions from Applicant's account from time to time only upon receipt of written direction from Applicant (or from such person or entity to whom Applicant expressly has assigned or may in the future assign this authority, in writing, in the future) to effect the particular deduction.

Nothing herein shall prevent Applicant from assigning transportation impact fee credits as provided for in Section 23-95(e) of the Orange County Code, as may be amended from time to time.

Section 13. Dowden Road and IWS Right-of-Way

If the County determines that right-of-way and/or ponds and easements for Dowden Road or IWS Road, as shown on Exhibit "E," within Sunbridge PD are needed to complete a network connection to the west prior to the time development in that portion of the Sunbridge PD has taken place, the County has the right to require dedication upon reasonable notice to Applicant, provided that an agreement has been executed which secures the right-of-way and funding to complete either Dowden to SR 417 or IWS to Moss Park Road.

Impact Fee Credits for conveyance of either Dowden Road or IWS right-of-way, and/or ponds and easements shall be determined in accordance with Section 23-95, Orange County Code, as may be amended from time to time. Conveyances

shall be completed in a manner substantially consistent with the processes set forth in Section 11, above.

Section 14. Good Faith Negotiations Required.

Developer will negotiate in good faith with landowners whose property is necessary to construct Innovation Way South from Sunbridge Parkway to Moss Park Road and thereby provide an east-west interconnection between Sunbridge PD and Moss Park Road. A separate agreement will be required to provide details for funding, timing, right-of-way acquisition, design, permitting, construction, cost allocations and impact fee credits for IWS.

Section 15. Coordination With Adjacent Development Required.

Prior to any PSP or DP adjacent to Camino Reale, as depicted on attached Exhibit "E," the Applicant shall document to the County reasonable coordination efforts for the access points as depicted in the Sunbridge PD-RP. A separate agreement will be required to provide details for funding, timing, right-of-way acquisition, design, permitting, construction, cost allocations and impact fee credits for Camino Reale access.

Subsequent to the construction of any portion Section 2 of Sunbridge Parkway, the County shall have the ability to require conveyance of right-of-way for a two-lane connection to Camino Reale as generally depicted on Exhibit E. The County shall not require conveyance until after Camino Reale has an approved

regulatory plan, term sheet, and Road Network Agreement that addresses the timing of infrastructure and development, including restrictions regarding the amount of development that can occur on a single access point prior to the completion of Innovation Way South, west to State Road 417.

Section 16. Orange County Gun Range. The County is the owner of property located at 14500 Wewahootee Rd. Orlando, Florida 32832, on which the Orange County Gun Range is located. The Applicant has entered into a School Mitigation Agreement for Capacity Enhancement ("CEA") with the School Board of Orange County, Florida (**"School Board"**), which was approved at the November 1, 2016 meeting of the School Board. Due to the proximity of the property to the Orange County Gun Range, the School Board has established an Excluded Area on the property, which prohibits the location of any school within one mile of the Orange County Gun Range or any location west of the railroad tracks.

Due strictly to this restriction, the Applicant reserves the reasonable right to delay the PDS, DEP Work, and/or construction of any segment of Sunbridge Parkway only until such time that the gun range provisions of the Excluded Area in the CEA are waived, modified or satisfied.

Section 17. Vested Trips for Sunbridge PD. The Sunbridge PD is vested for 70,673 annual average daily net external vehicle trips. These vested trips are

based on a calculation of an originally vested 82,000 trips for the International Corporate Park Development of Regional Impact (ICP DRI), less the 11,327 annual average daily net external vehicle trips assigned to development within the former ICP DRI, now known as the ICP PD. The 70,673 may be "spread" within the Sunbridge PD, and trips between the former ICP DRI and Innovation Way East will not be considered to be external trips in the calculation of trips. An application for a new or amended vested certificate rights is not required to validate the vested rights to the 70,673 trips.

A. Upon completion of each Segment, the Sunbridge PD shall be vested for the peak hour, peak directional Sunbridge PD trips shown in Exhibit "D" (Excess Capacity Calculation) along the specific section of Sunbridge Parkway. These trips are in addition to the current vesting of 70,673 annual average daily net external trips, as they are intended to reflect a combination of internal and external traffic through buildout of the Sunbridge PD. In the event that the monitoring studies conclude that the Sunbridge PD impact exceeds or is expected to exceed total vested trips, the Sunbridge PD may be required to mitigate additional impacts.

B. Applicant shall conduct monitoring of gross daily trip-end generation in accordance with Exhibit "H," attached hereto and incorporated herein.

C. In assessing transportation impacts for projects impacting roads that are also impacted by the Sunbridge PD, the County shall consider the vested trips of the Sunbridge PD as committed trips on those roads.

Section 18. Lake Mary Jane Alliance Commitments.

A. The connection of any road within Sunbridge PD, including but not limited to Sunbridge Parkway, to Lake Mary Jane Road, as shown on Exhibit "I," attached hereto and incorporated herein, or to any road within the Lake Mary Jane Rural Settlement that connects to Lake Mary Jane Road, shall be prohibited.

B. There shall be no public access to or use by the general public of the existing private road shown on the attached Exhibit "I" as TM Ranch Driveway, provided, in the event of a declared emergency, TM Ranch Driveway may be temporarily used for emergency ingress or egress and Capri Road may be used and maintained for agricultural pursuits and purposes, consistent with the current usage.

C. Applicant will not propose any crossings of Roberts Island Slough as shown on attached Exhibit "I" to connect the portion of Camino South identified as CS-1 on the attached Exhibit "I" to Sunbridge Parkway. The road ingress and egress to and from CS-1 will be from Lake Mary Jane Road.

D. There will be no roads connecting parcel CS-2, as shown on the attached Exhibit "I" to any roads within the Lake and Pine Estate section within

the Lake Mary Jane Settlement, located along the southwestern boundary of the Camino South parcel. Any ingress or egress by road to said parcel CS-2 shall only occur via direct connection to the Sunbridge Parkway. Access over the Roberts Island Slough shall be permitted in connection with ingress and egress to and from CS-2 and for Sunbridge Parkway as depicted on Exhibit "I".

Section 19. Utilities. This agreement does not address utility requirements. Applicant shall coordinate with the Orange County Utilities Director, or a designee, with respect to any utility easements necessary to accommodate appropriately-sized wastewater sewer mains or lines, potable water mains or lines, and/or reclaimed water mains or lines.

Section 20. Notice. Any notice delivered with respect to this Agreement shall be in writing and shall be deemed to be delivered (whether or not actually received) (i) when hand delivered to the person(s) hereinafter designated, or (ii) upon deposit of such notice in the United States mail, postage prepaid, certified mail, return receipt requested, addressed to the person at the address set forth opposite the party's name below, or to such other address or to such other person as the party shall have specified by written notice to the other party delivered in accordance herewith.

As to Applicant: Tavistock East Holdings, LLC
Attention: James Zboril, President
6900 Tavistock Lakes Blvd, Suite 200
Orlando, FL 328927

As to County: Orange County Administrator
P.O. Box 1393
201 S. Rosaline Ave
Orlando, FL 32802-1393

With a copy to: Orange County Community, Environmental, and Development Services Department
Manager, Transportation Planning Division
Orange County Public Works Complex
4200 S. John Young Parkway
Orlando, FL 32839-9205
Orlando, Florida 32839-9205

As to Owners: Suburban Land Reserve, Inc.
Central Property Holdings 100, LLC
Central Property Holdings 200, LLC
Attention: R. Steven Romney
79 South Main St., Suite 500
Salt Lake City, UT 84111

With copies to: Vivien Monaco
Burr & Forman, LLP
200 South Orange Ave, Suite 800
Orlando, FL 32801

Loyal Hulme
Kirton McConkie
50 East South Temple, Suite 400
Salt Lake City, UT 84111

And: Farmland Reserve, Inc.
Attn: E. Erik Johnson
79 South Main Street, Suite 1000
Salt Lake City, UT 84111

Section 21. Covenants Running with the Land. This Agreement shall run with the Property and shall be binding upon, and shall inure to the benefit and

burden of, the heirs, legal representatives, successors, and assigns of the Applicant and the Owners and to any person, firm, corporation, or other entity that may become a successor in interest to the Property. Notwithstanding the foregoing, however, the authority under Sections 6, 10 and 12 to instruct County to make deductions from Applicant's transportation impact fee account shall remain with Applicant unless expressly assigned in writing to another by Applicant.

Section 22. Recordation of Agreement. An executed original of this Agreement shall be recorded, at Applicant's expense, in the Public Records of Orange County, Florida within thirty (30) days of the Effective Date.

Section 23. Applicable Law. This Agreement and the provisions contained herein shall be construed, controlled, and interpreted according to the laws of the State of Florida.

Section 24. Time is of the Essence. Time is hereby declared of the essence to the lawful performance of the duties and obligations contained in this Agreement.

Section 25. Further Documentation. The Parties agree that at any time following a request therefor by the other party, each shall execute and deliver to the other party such further documents and instruments reasonably necessary to confirm and/or effectuate the obligations of either party hereunder and the consummation of the transactions contemplated hereby.

Section 26. Limitation of Remedies. County and Applicant expressly agree that the consideration, in part, for each of them entering into this Agreement is the willingness of the other to limit the remedies for all actions arising out of or in connection with this Agreement.

A. *Limitations on County's remedies.* Upon any failure by Applicant or any Owner to perform its obligations under this Agreement, County shall be limited strictly to only the following remedies:

i. action for specific performance or injunction; or

ii. the right to set off, against the amounts of impact fees to be credited in favor of Applicant under this Agreement, (A) any amounts due to County from Applicant or any Owner under this Agreement but remaining unpaid and (B) the cost to County of performing any action or actions required to be done under this Agreement by Applicant or any Owner, but which Applicant, or such Owner has failed or refused to do when required; or

iii. the withholding of development permits and other approvals or permits in connection with the Sunbridge PD and/or the Property; or

iv. any combination of the foregoing.

In addition to the foregoing, nothing in this Agreement prohibits or estops County from exercising its power of eminent domain with respect to the ROW&E or any other portion of the Property as County may lawfully elect.

B. *Limitations on Applicant's remedies.* Upon any failure by County to perform its obligations under this Agreement, Applicant shall be limited strictly to only the following remedies:

i. action for specific performance; or

ii. action for injunction; or

iii. action for declaratory judgment regarding the rights and obligations of Applicant; or

iv. any combination of the foregoing.

Both parties expressly waive their respective rights to sue for damages of any type for breach of, or default under, this Agreement by the other. Both parties expressly agree that each party shall bear the cost of its own attorney fees for any action arising out of or in connection with this Agreement. Venue for any actions initiated under or in connection with this Agreement shall be in the Circuit Court of the Ninth Judicial Circuit in and for Orange County, Florida.

Section 27. Amendment. This Agreement may be amended only in writing, formally executed in the same manner as this Agreement.

Section 28. Counterparts. This Agreement and any amendment(s) may be executed in up to three counterparts, each of which shall be deemed an original and all of which shall constitute one and the same instrument.

Section 29. Authority to Contract. The execution of this Agreement has been duly authorized by the appropriate body or official of each party hereto.

Section 30. Entire Agreement. This Agreement embodies and constitutes the entire understanding of the parties with respect to the subject matter addressed herein, and all prior or contemporaneous agreement, understandings, representations, and statements, oral or written, are merged into this Agreement.

Section 31. Interpretation. This Agreement shall not be construed more strictly against one party than against the other merely by virtue of the fact that it may have been prepared by counsel for one of the parties, it being recognized that all parties have contributed substantially and materially to the preparation hereof. Captions and section headings in this Agreement are provided for convenience only and shall not be deemed to explain, modify, amplify, or aid in the interpretation, construction, or meaning of this Agreement.

Section 32. Disclaimer of Third Party Beneficiaries. Except as stated below, this Agreement is solely for the benefit of the formal parties hereto and no right or cause of action shall accrue by reason hereof to or for the benefit of any third party not a formal party hereto. Nothing in this Agreement, expressed or implied, is intended or shall be construed to confer upon or give any person or entity any right, remedy, or claim under or by reason of this Agreement or any provisions or conditions hereof, other than the parties hereto and their respective

representatives, heirs, successors, and assigns. The Parties acknowledge that Owners, by virtue of their ownership of the Property, are third-party beneficiaries of this Agreement.

Section 33. Survival. The obligations of this Agreement to convey ROW&E shall survive termination of this Agreement.

Section 34. Severability. If any provision of this Agreement, the deletion of which would not adversely affect the receipt of any material benefits by any party hereunder nor substantially increase the burden of any party hereunder, shall be held to be invalid or unenforceable to any extent by a court of competent jurisdiction, the same shall not affect in any respect whatsoever the validity or enforceability of the remainder of this Agreement

Section 35. Termination; Effect of Annexation. This Agreement shall remain in effect so long as the Property remains in unincorporated Orange County, Florida, unless the Parties terminate it in writing. If any portion of the Property is proposed to be annexed into a neighboring municipality, and out of the unincorporated areas, County may, in its sole discretion, terminate this Agreement upon notice to the Applicant and the Owners.

[Signatures appear on following pages]

IN WITNESS WHEREOF, the Parties have caused this Agreement to be duly executed by their respective duly authorized representatives on the dates set forth below, but effective as of the Effective Date.

ORANGE COUNTY, FLORIDA
By: Board of County Commissioners

By: _____
for Teresa Jacobs
Orange County Mayor

Date: 5.1.17

ATTEST: Phil Diamond, CPA, County Comptroller
As Clerk of the Board of County Commissioners

By: _____
for Deputy Clerk

Printed name: Craig A. Stopyra

WITNESSES:

"APPLICANT"

TAVISTOCK EAST HOLDINGS, LLC

By: _____

Print Name: RICHARD LEVEY

James Zboril, President

Date: 4-6-17

Print Name: Diana Garcia

STATE OF FLORIDA

COUNTY OF Orange

The foregoing instrument was acknowledged before me by James Zboril, the President of Tavistock East Services, LLC, on behalf of the company, who is known by me to be the person described in herein and who executed the foregoing, this 17 day of April, 2017. He/she is personally known to me or has produced _____ as identification and did/did not take an oath.

WITNESS my hand and official seal in the County and State last aforesaid this 17 day of April, 2017.

Notary Public

DIANA GARCIA
Notary Public - State of Florida
My Comm. Expires Jul 9, 2017
Commission # FF 34699
Bonded Through National Notary Assn.

Print Name: Diana Garcia

My Commission Expires: 07-09-2017

JOINDER AND CONSENT OF SUBURBAN LAND RESERVE, INC.

Suburban Land Reserve, Inc., a Utah corporation, for itself and on behalf of all other owners of real property within the Sunbridge Planned Development, hereby joins in and consents to the Agreement as a "joinder" party for the express purpose of acknowledging and agreeing to the terms contained in this Agreement.

Signed, witnessed, executed and acknowledged on this 3rd day of April, 2017.

WITNESSES:

Print Name: Mallory Turner

Print Name: David Cannon

SUBURBAN LAND RESERVE, INC.
A Utah Corporation

By: djc
Name: R. Steven Romney
Title: President
Date: 4/3/2017

STATE OF UTAH
COUNTY OF SALT LAKE

The foregoing instrument was acknowledged before me by R. Steven Romney, the President of Suburban Land Reserve, Inc., on behalf of the corporation, who is known by me to be the person described in herein and who executed the foregoing, this 3rd day of April, 2017. He/she is personally known to me ~~or has produced _____ as identification~~ and did/did not take an oath.

WITNESS my hand and official seal in the County and State last aforesaid this 3rd day of April, 2017.

Notary Public

MALLORY TURNER
NOTARY PUBLIC - STATE OF UTAH
My Comm. Exp. 06/23/2018
Commission # 678163

Print Name: Mallory Turner

My Commission Expires: 06/23/2018

ACKNOWLEDGMENT, JOINDER, AND CONSENT

THIS ACKNOWLEDGMENT, JOINDER, AND CONSENT ("Acknowledgment") dated as of the Effective Date (the "Effective Date" is the date of the last signature hereto), is made by CENTRAL FLORIDA PROPERTY HOLDINGS 100, LLC, a Florida limited liability company ("CFPH 100"); CENTRAL FLORIDA PROPERTY HOLDINGS 200, LLC, a Florida limited liability company("CFPH 200") (collectively, "CFPH 100 and 200"); FARMLAND RESERVE, INC., a Utah non-profit corporation ("FRI"); and SUBURBAN LAND RESERVE, INC., a Utah corporation ("SLR"), in favor of ORANGE COUNTY, a charter county and political subdivision of the State of Florida (the "County").

This Acknowledgment is made with reference to the following facts:

A. FRI is the current fee simple owner, but not the developer, of a majority of that certain real property located in Orange County, Florida commonly referred to as Innovation Way East (the "FRI IWE Property"), and that certain real property commonly referred to as Camino Reale South (the "Camino South Property"). FRI is not in the land development business and is not a developer.

B. CFPH 100 and 200 is the current fee simple owner, but not the developer, of the southwest portion of that certain real property located in Orange County, Florida commonly referred to as Innovation Way East (the "CFPH 100 and 200 IWE Property").

C. SLR is the current fee simple owner of certain real property located in Orange County, Florida commonly referred to as ICP ("SLR ICP Property"). Collectively, the FRI IWE Property, the Camino South Property, the CFPH 100 and 200 IWE Property, and the SLR ICP Property are referred to herein as the "Property."

D. Pursuant to a purchase and sale agreement SLR has obtained the rights to purchase the FRI IWE Property, the Camino South Property, and the CFPH 100 and 200 IWE Property and the rights to perform any actions necessary to entitle and develop such property, subject to the fulfillment of certain conditions.

E. SLR does hereby state that SLR has granted to Tavistock East Holdings, LLC, a Florida limited liability company ("Tavistock"), its rights to purchase, entitle, and develop the Property, including the FRI IWE Property and the CFPH 100 and 200 IWE Property, pursuant to a separate agreement between Tavistock and SLR.

F. FRI and CFPH 100 and 200 understand and SLR does hereby state that, under certain conditions being met, including those set forth in a separate written agreement between SLR and Tavistock, SLR (i) will grant to Tavistock its rights to purchase the Property, and (ii) has authorized Tavistock to perform certain actions necessary to entitle, encumber, and develop the Property pursuant to a separate agreement between Tavistock and SLR.

G. FRI and CFPH 100 and 200 understand and acknowledge that Tavistock and/or SLR will be required to enter into certain agreements with the County to entitle, encumber, and obtain approvals to develop the FRI IWE Property, the Camino South Property, and the CFPH 100 and 200 IWE Property, respectively, prior to Tavistock's purchase of such properties, and that such agreements, including the Transportation Agreement for Sunbridge PD ("Transportation Agreement"), may apply to and affect the Property while FRI and CFPH 100 and 200 are the fee simple owners of their respective properties.

H. SLR understands and acknowledges that the authorization that SLR has granted to Tavistock to entitle, encumber, and develop the Property, pursuant to a separate agreement between Tavistock and SLR, will require Tavistock to enter into agreements with the County, including the Transportation Agreement, to entitle and obtain approvals for the Property, and that such agreements may apply to and affect the SLR ICP Property, the FRI IWE Property, the Camino South Property, and the CFPH 100 and 200 IWE Property while SLR, FRI, and CFPH 100 and 200 are the respective fee simple owners of such property, including, but not limited to the requirement to convey easements over certain designated portions of such property necessary for construction of Sunbridge Parkway (the " ROW&E") and other roads at certain designated times.

I. Due to FRI, CFPH 100 and 200, and SLR's current ownership of and existing rights in the Property, the County desires that SLR, CFPH 100 and 200, and FRI acknowledge, join in, and consent to the Transportation Agreement between the County and Tavistock.

NOW THEREFORE SLR, CFPH 100 and 200, and FRI, as applicable, hereby state the following:

1. FRI and CFPH 100 and 200 Acknowledgment, Joinder, and Consent. FRI and CFPH 100 and 200 acknowledge that SLR has a current and existing right to purchase, develop, and pursue entitlements on the FRI IWE Property, the Camino South Property, and the CFPH 100 and 200 IWE Property, respectively, which includes the right to pursue and finalize the Transportation Agreement, which will apply to and affect such properties. FRI and CFPH 100 and 200 join and consent to the Transportation Agreement solely for the purposes of (i) consenting to have the Transportation Agreement recorded in the Public Records of Orange County, Florida upon their respective properties, such that it will encumber, run with title to, and create a servitude upon the Property, and (ii)

agreeing to convey any ROW&E located within the FRI IWE Property, the Camino South Property, and the CFPH 100 and 200 IWE Property to the applicable governing entity, SLR or its successor in title prior to the time such conveyances are required pursuant to the Transportation Agreement so that SLR or Tavistock, or their respective successors in title, can perform under the Transportation Agreement, which conveyance(s) will be consistent with the rights obtained by SLR, or its successor in title, from FRI and CFPH 100 and 200 referenced herein in Recital D.

2. SLR Aknowledgment, Joinder, and Consent. SLR acknowledges that Tavistock has conditionally obtained from SLR its current and existing right to purchase, develop, and pursue entitlements on the Property, which includes the right to pursue and finalize the Transportation Agreement, and agrees to convey any ROW&E to the applicable governing entity, Tavistock, or its successor in title, or to the County, as may be applicable, prior to the time such conveyances are required under the Transportation Agreement, which conveyance(s) will be consistent with the rights obtained by Tavistock from SLR referenced herein in Recital E. SLR consents to having the Transportation Agreement recorded in the Public Records of Orange County, Florida upon its respective properties, such that it will encumber, run with title to, and create a servitude upon the Property.

[SIGNATURES ON FOLLOWING PAGES]

Signed, witnessed, executed, and acknowledged by the parties as set forth below.

FARMLAND RESERVE, INC.,
a Utah non-profit corporation

By: _____
Name (Print): K. Erik Jacobsen
Its: Pres
Date: 3/30/17

STATE OF Florida

COUNTY OF Osceola

The foregoing instrument was acknowledged before me this 30th day of March, 2017, by K. Erik Jacobsen, as President of Farmland Reserve, Inc., a Utah non-profit corporation, on behalf of the corporation. He is ✓ personally known to me or ___ produced _____ as identification.

WITNESS my hand and official seal in the State and County last aforesaid this 30th day of March, 2017.

[Affix Notary Seal]

Debra Lynn Justesen
NOTARY PUBLIC
STATE OF FLORIDA
Comm# FF901844
Expires 9/3/2019

Debra Lynn Justesen
Signature of Notary

SUBURBAN LAND RESERVE, INC.,
a Utah corporation

By: _____
Name (Print): R. Steven Romney
Its: President

Date: 4/3/2017

STATE OF UTAH

COUNTY OF Salt Lake

The foregoing instrument was acknowledged before me this 3rd day of April, 2017, by R. Steven Romney, President of Suburban Land Reserve, Inc., a Utah corporation, on behalf of the corporation. He is ___ personally known to me or ___ ~~produced~~ _____ ~~as identification.~~

WITNESS my hand and official seal in the State and County last aforesaid this 3rd day of April, 2017.

[Affix Notary Seal]

MALLORY TURNER
NOTARY PUBLIC - STATE OF UTAH
My Comm. Exp. 06/23/2018
Commission # 678163

_____
Signature of Notary

CENTRAL FLORIDA PROPERTY HOLDINGS 100, LLC
a Florida limited liability company

By: _____
Name (Print): K. Erik Jacobsen
Its: Pres

Date: 3/30/17

STATE OF FLORIDA

COUNTY OF Osceola

The foregoing instrument was acknowledged before me this 30th day of March, 2017, by K. Erik Jacobsen, as Manager of Central Florida Property Holdings 100, LLC, a Florida limited liability company, on behalf of the company. He is ✓ personally known to me or ___ produced _____ as identification.

WITNESS my hand and official seal in the State and County last aforesaid this 30th day of March, 2017.

[Affix Notary Seal]

Debra Lynn Justesen
Signature of Notary

Debra Lynn Justesen
NOTARY PUBLIC
STATE OF FLORIDA
Comm# FF901844
Expires 9/3/2019

CENTRAL FLORIDA PROPERTY HOLDINGS 200, LLC
a Florida limited liability company

By: _____
Name (Print): K. Erik Jacobsen
Its: _____
Date: 3/30/17

STATE OF FLORIDA

COUNTY OF Osceola

The foregoing instrument was acknowledged before me this 30th day of March, 2017, by K. Erik Jacobsen, as Manager of Central Florida Property Holdings 200, LLC, a Florida limited liability company, on behalf of the company. He is ✓ personally known to me or ___ produced _____ as identification.

WITNESS my hand and official seal in the State and County last aforesaid this 30th day of April, 2017.

[Affix Notary Seal]

Debra Lynn Justesen
Signature of Notary

Debra Lynn Justesen
NOTARY PUBLIC
STATE OF FLORIDA
Comm# FF901844
Expires 9/3/2019

List of Exhibits to Transportation Agreement

A Project Location Map

B Legal description of Property

C PDS Scope of Services

D Excess Capacity Calculation

E Sunbridge Parkway Segments Map

F Four Lane Design Excess Capacity

G DEP Work Scope of Services

H Biennial Monitoring Process for External Trips

I Lake Mary Jane Road Exhibit

J Development Thresholds

Exhibit A
Project Location Map
(1 page)

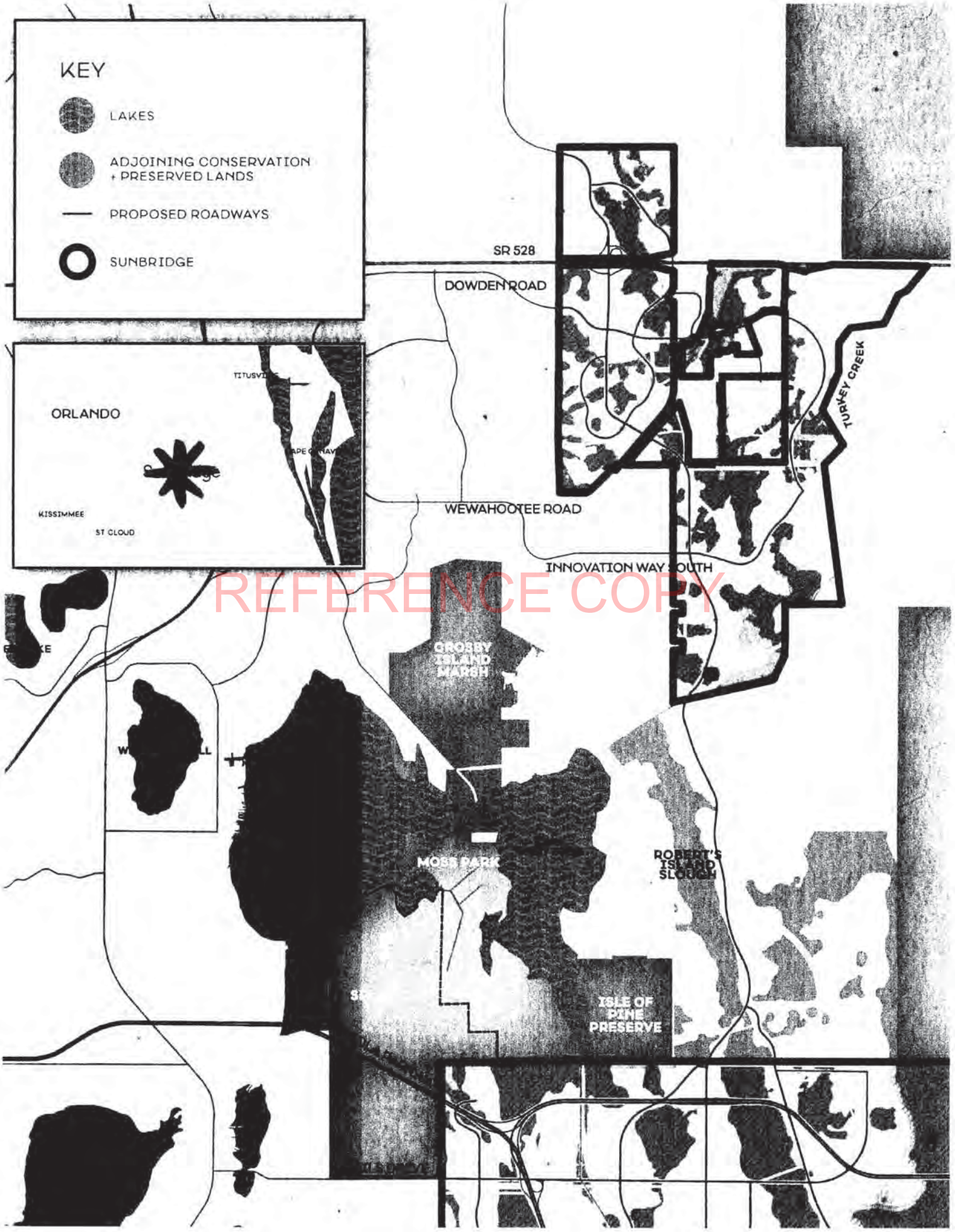


Exhibit B

Legal Description of Property

(15 pages)

SUNBRIDGE (Orange County)
(ICP, Camino Reale "110' Strip, and IWE (West of CPA Line) Less all CFX ROW)
CEA Agreement, APF Agreement, TRG List, CPA Application,
Reg. Plan Application and the RAC Application
(Prepared by DWMA)
September 10, 2016

DESCRIPTION:

PARCEL A:

That portion of Section 1, Township 24 South, Range 31 East, and a portion of Section 6, Township 24 South, Range 32 East, Orange County, Florida, more particularly described as follows:

Commence at the Northwest corner of Section 6, Township 24 South, Range 32 East; thence run North 89 degrees 57 minutes 33 seconds East along the North line of said Section 6, a distance of 300.00 feet to the point of intersection with the East line of an O.U.C. Railroad Right of Way Easement as recorded in Official Records Book 3307, Page 2154 (Official Records Book 3590, Page 355), Public Records of Orange County, Florida; thence run South 00 degrees 02 minutes 17 seconds West along the East line of said O.U.C. Railroad Right of Way Easement a distance of 1203.04 feet to the POINT OF BEGINNING; thence departing said Right of Way Easement line run South 16 degrees 05 minutes 22 seconds East, a distance of 1530.10 feet; thence run South 00 degrees 02 minutes 17 seconds West a distance of 1309.07 feet to the point of intersection with the centerline of Wewahootee Road; thence run South 89 degrees 39 minutes 56 seconds West along said centerline of Wewahootee Road a distance of 2867.66 feet to the point of intersection with the Easterly line of the aforementioned O.U.C. Railroad Right of Way as recorded in Official Records Book 3307, Page 2154 (Official Records Book 3590, Page 355); thence run North 41 degrees 09 minutes 44 seconds East along the Easterly line of said O.U.C. Railroad Right of Way a distance of 3673.80 feet to the POINT OF BEGINNING.

Together with easement rights for the benefit of Parcel A:

Master Drainage System Easement recorded May 5, 1987 in Official Records Book 3884, Page 433, Public Records of Orange County, Florida.

PARCEL B

(CONSISTING OF NORTHWEST PARCEL, NORTHEAST PARCEL, CENTER PARCEL, SOUTHEAST PARCEL, SOUTHWEST PARCEL AND TRACT 8 PARCEL)

NORTHWEST PARCEL:

A parcel of land located in Section 25, Township 23 South, Range 31 East, Orange County, Florida. Said parcel being more particularly described as follows:

Commence at Southeast corner of said Section 25; thence North 00° 02' 15" West, 315.07 feet to the Point of Beginning, said point being on the Northerly right of way line of State Road 528 (Bee Line Expressway) as shown on an Orlando - Orange County Expressway Authority Right of Way Map, Section 1.1 - 1.2, 75002 - 3501; thence the following courses and distances along said Northerly right of way line, South 78° 27' 52" West, 1320.50 feet; thence North 89° 33' 17" West, 1263.28 feet; thence South 89° 45' 47" West, 2878.58 feet to a point on the West line of said Section 25; thence leaving said Northerly right of way line, run North 00° 14' 09" East along said West line 2600.49 feet to the West 1/4

corner of said Section 25; thence continue along said West line, North 00° 16' 31" East, 2654.65 feet to the Northwest corner of said Section 25; thence leaving said West line, run North 89° 52' 15" East along the North line of said Section 25 a distance of 2656.50 feet to the North 1/4 corner of said Section 25; thence continue along said North line, North 89° 54' 29" East, 2750.01 feet to the Northeast corner of said Section 25; thence leaving said North line, run South 00° 05' 21" East along the East line of said Section 25 a distance of 2656.64 feet to the East 1/4 corner of said Section 25; thence continue along said East line, South 00° 02' 15" East, 2342.69 feet to the Point of Beginning.

LESS AND EXCEPT A, B, C AND D AS SET FORTH BELOW:

A) ALAFAYA TRAIL EXTENSION (Official Records Book 8893, Page 1974)
All of that part of the Northwest 1/4 and the Southwest 1/4 of Section 25, Township 23 South, Range 31 East, Orange County, Florida lying within 60.00 feet left and right of the following described centerline:

Commence at the Northwest corner of the Northwest 1/4 of Section 25, Township 23 South, Range 31 East, Orange County, Florida; thence run S. 00° 17' 00" W. along the West line of the Northwest 1/4 of said Section 25 a distance of 263.92 feet for a Point of Beginning; thence departing said West line run S. 74° 33' 39" E. for a distance of 622.97 feet to the point of curvature of a curve concave Southwesterly having a radius of 1206.23 feet; thence run Southeasterly along the arc of said curve through a central angle of 74° 33' 39" a distance of 1569.70 feet to the point of tangency; thence run S. 00° 00' 00" E. tangent to said curve a distance of 703.56 feet to the point of curvature of a curve concave Northeasterly having a radius of 1206.23 feet; thence run Southeasterly along the arc of said curve through a central angle of 44° 30' 10" a distance of 936.90 feet to the point of tangency; thence run S. 44° 30' 10" E. tangent to said curve a distance of 255.00 feet to the point of curvature of a curve concave Southwesterly having a radius of 1206.23 feet; thence run Southeasterly along the arc of said curve through a central angle of 44° 14' 56" a distance of 931.56 feet to the point of tangency; thence run S. 00° 15' 14" E. a distance of 144.58 feet to the end of said centerline. The right of way lines left and right of the above described centerline are intended to extend or shorten as necessary to terminate at the West line of the Northwest 1/4 of said Section 25.

B) That part of PARCEL 900 WATER RETENTION AREA POND NO. 1 (Official Records Book 8893, Page 1974) lying North of the Easterly prolongation of the South Right-of-way line of Parcel 1001A of Monument Parkway as described in Official Records Book 10042, Page 7271, Public Records of Orange County, Florida.

C) Lands conveyed to Orange County by General Warranty Deed recorded May 11, 2010 in Official Records Book 10042, Page 7271, Public Records of Orange County, Florida. (Monument Parkway)

D) Lands conveyed to the Central Florida Expressway Authority by Special Warranty Deed, recorded April 27, 2016 in Document #20160212591, Public Records of Orange County, Florida.

NORTHEAST PARCEL:

Tracts B, C and E, International Corporate Park, Phase One - Unit I, as recorded in Plat Book 23, Pages 38 through 41, of the Public Records of Orange County, Florida; Together with an un-platted portion of Section 31, Township 23 South, Range 32 East, Orange County, Florida. Said parcel being more particularly described as follows:

Commence at the Northwest corner of said Section 31; thence North 89° 50' 52" East along the North line of said Section 31 a distance of 1759.72 feet; thence leaving said North line, run South 00° 09' 08" East, 277.78 feet to the Point of Beginning, being a point on the Southerly right of way line of State Road 528 (Bee Line Expressway) as shown on an Orlando - Orange County Expressway Authority Right of Way

Map, Section 1.1 - 1.2, 75002 - 3501; thence South 89° 33' 17" East along said Southerly right of way line 3191.50 feet; thence South 77° 36' 38" East along said Southerly right of way line 379.91 feet to a point on the East line of said Section 31; thence leaving said Southerly right of way line, run South 00° 09' 42" West along said East line 2180.32 feet to a point on the Northerly right of way line of Aerospace Parkway as shown on said plat of International Corporate Park, Phase One - Unit I; thence the following courses and distances along said Northerly right of way line, also being a point on a non-tangent curve concave Southerly, having a radius of 1347.24 feet, a central angle of 36° 56' 23" and a chord of 853.63 feet that bears North 86° 30' 03" West; thence leaving said East line, run along the arc of said curve a distance of 868.59 feet to the point of compound curvature of a curve to the left, having a radius of 1070.69 feet and a central angle of 2° 10' 46"; thence along the arc of said curve a distance of 40.73 feet to the point of reverse curvature of a curve to the right, having a radius of 50.00 feet and a central angle of 84° 25' 07"; thence along the arc of said curve a distance of 73.67 feet to the point of tangency; thence North 22° 43' 54" West, 22.15 feet; thence South 67° 16' 06" West, 118.00 feet; thence South 22° 43' 54" East, 22.15 feet to the point of curvature of a curve to the right, having a radius of 50.00 feet and a central angle of 84° 25' 07"; thence along the arc of said curve a distance of 73.67 feet to the point of reverse curvature of a curve to the left, having a radius of 1070.69 feet and a central angle of 6° 14' 50"; thence along the arc of said curve a distance of 116.74 feet to the point of reverse curvature of a curve to the right, having a radius of 3000.00 feet and a central angle of 6° 16' 38"; thence along the arc of said curve a distance of 328.67 feet to the point of compound curvature of a curve to the right, having a radius of 3771.72 feet and a central angle of 10° 25' 58"; thence along the arc of said curve a distance of 686.78 feet to the point of tangency; thence South 72° 08' 58" West, 153.55 feet to the point of curvature of a curve to the right, having a radius of 759.00 feet and a central angle of 9° 59' 11"; thence along the arc of said curve a distance of 132.29 feet to the point of tangency; thence South 82° 08' 09" West, 125.46 feet to the point of curvature of a curve to the left, having a radius of 841.00 feet and a central angle of 19° 58' 23"; thence along the arc of said curve a distance of 293.17 feet to the point of tangency; thence South 62° 09' 46" West, 125.47 feet to the point of curvature of a curve to the right, having a radius of 759.00 feet and a central angle of 9° 59' 11"; thence along the arc of said curve a distance of 132.29 feet to the point of tangency; thence South 72° 08' 58" West, 263.87 feet to the point of curvature of a curve to the right, having a radius of 3771.72 feet and a central angle of 13° 02' 44"; thence along the arc of said curve a distance of 858.77 feet to a point on the East boundary line of International Corporate Park Parcel 10, as recorded in Plat Book 67, Pages 56 through 58, of the Public Records of Orange County, Florida; thence leaving said curve and Northerly right of way line, run the following courses and distances along said East boundary line, North 21° 32' 39" East, 1243.02 feet; thence North 02° 04' 41" East, 1563.62 feet; thence North 50° 48' 16" East, 212.12 feet; thence North 29° 05' 08" West, 267.49 feet; thence North 01° 45' 25" West, 282.79 feet to the Point of Beginning.

LESS AND EXCEPT A, B, AND C AS SET FORTH BELOW:

A) LOT 17B (Official Records Book 8863, Page 3058) A parcel of land located in Section 31, Township 23 South, Range 32 East, Orange County, Florida. Said parcel being more particularly described as follows:

Begin at the Southeast corner of Tract B, per the plat of International Corporate Park Phase One - Unit I, as recorded in Plat Book 23, Pages 38 through 41 of the Public Records of Orange County, Florida, said point also being a point on the Northerly right of way line of Aerospace Parkway per said plat; thence North 29° 27' 50" West along the Easterly line of said Tract B a distance of 71.13 feet; thence leaving said Easterly line, run North 46° 52' 12" East, 94.06 feet; thence North 03° 15' 47" West, 95.34 feet; thence North 29° 18' 31" West, 96.26 feet; thence North 03° 27' 06" East, 14.24 feet; thence North 60° 09' 14" East, 387.28 feet; thence South 29° 44' 05" East, 35.23 feet; thence South 82° 38' 26" East, 93.95 feet; thence North 85° 31' 12" East, 60.47 feet; thence South 89° 21' 05" East, 271.59 feet; thence North 76° 59' 12" East, 36.24 feet; thence South 40° 50' 55" East, 30.90 feet; thence South 62° 10' 43" East, 48.20 feet; thence South 68° 26' 08" East, 43.11 feet; thence South 48° 44' 34" East, 62.59 feet; thence South 60° 51' 00" East, 59.07 feet to a point on said Northerly right of way line of Aerospace Parkway; thence the following courses and distances along said Northerly right of way line of Aerospace

Parkway, said point also being a point on a non-tangent curve concave Southeasterly, having a radius of 841.00 feet, a central angle of 19° 58' 23" and a chord of 291.69 feet that bears South 72° 08' 58" West; thence along the arc of said curve a distance of 293.17 feet to the point of tangency; thence South 62° 09' 46" West, 125.47 feet to the point of curvature of a curve to the right, having a radius of 759.00 feet and a central angle of 9° 59' 11"; thence along the arc of said curve a distance of 132.29 feet to the point of tangency; thence South 72° 08' 58" West, 263.87 feet to the point of curvature of a curve to the right, having a radius of 3771.72 feet and a central angle of 3° 43' 34"; thence along the arc of said curve a distance of 245.29 feet to the Point of Beginning.

B) Tract C, International Corporate Park Phase One - Unit I, as recorded in Plat Book 23, Pages 38 through 41 of the Public Records of Orange County, Florida.

C) Central Florida Expressway Authority Parcel 2 as described in Official Records Book 11029, Page 6496 of the Public Records of Orange County, Florida.

CENTER PARCEL:

A parcel of land located in the Southwest quarter of Section 31, Township 23 South, Range 32 East, Orange County, Florida. Said parcel being more particularly described as follows:

Commence at the Southwest corner of said Section 31; thence North 89° 57' 33" East along the South line of the Southwest 1/4 of said Section 31, a distance of 400.00 feet to the Point of Beginning, said point being on the East right of way line of a 400.00' Orlando Utilities Commission railroad right of way, as recorded in Official Records Book 3435, Page 2304 of the Public Records of Orange County, Florida; thence North 00° 04' 18" West, along said East right of way 1827.01 feet to the Southerly right of way line of Aerospace Parkway, per the plat of International Corporate Park Phase One - Unit I, as recorded in Plat Book 23, Pages 38 through 41 of the Public Records of Orange County, Florida; thence leaving said East right of way line, run the following courses and distances along said Southerly right of way line, North 89° 57' 30" East, 501.51 feet to the point of curvature of a curve to the left, having a radius of 3867.72 feet and a central angle of 17° 48' 33"; thence along the arc of said curve a distance of 1202.20 feet to the point of tangency; thence North 72° 08' 58" East, 149.25 feet to the Westerly boundary line of Lot 1, per said International Corporate Park Phase One - Unit I; thence leaving said Southerly right of way line, run the following courses and distances along said Westerly boundary line, South 23° 53' 08" West, 1160.22 feet; thence South 00° 08' 58" East, 997.50 feet to said South line of the Southwest 1/4 of Section 31; thence leaving said Westerly boundary line, run South 89° 57' 33" West along said South line, 1356.91 feet to the Point of Beginning.

LESS AND EXCEPT:

LOT 11 (Official Records Book 8863, Page 3384)
A parcel of land located in Section 31, Township 23 South, Range 32 East, Orange County, Florida. Said parcel being more particularly described as follows:

Begin at the intersection of the Southerly right of way line of Aerospace Parkway according to the Plat of International Corporate Park Phase One - Unit I, as recorded in Plat Book 23, Pages 38 through 41 of the Public Records of Orange County, Florida and the East right of way line of a 400.00 foot wide Orlando Utilities Commission railroad right of way per Official Records Book 3435, Page 2304 of the Public Records of Orange County, Florida; thence run North 89° 57' 30" East, along said Southerly right of way line 501.63 feet to the point of curvature of a curve to the left, having a radius of 3867.72 feet and a central angle of 0° 29' 04"; thence along the arc of said curve and Southerly right of way line a distance of 32.70 feet; thence leaving said curve and Southerly right of way line, run the following courses and distances along the wetland line as flagged by Glatting Jackson Kercher Anglin Lopez Rinehart, Inc. and

field location by Vanasse Hangen Brustlin, Inc., South 31° 02' 45" West, 41.15 feet; thence South 45° 31' 39" West, 38.41 feet; thence South 24° 39' 04" West, 26.59 feet; thence South 85° 33' 10" West, 60.83 feet; thence South 20° 19' 12" West, 38.84 feet; thence South 82° 00' 51" West, 41.68 feet; thence South 20° 38' 33" East, 49.51 feet; thence South 20° 29' 01" East, 34.88 feet; thence South 32° 23' 04" East, 36.10 feet; thence South 64° 36' 19" West, 55.63 feet; thence North 77° 20' 10" West, 37.93 feet; thence South 48° 51' 17" West, 69.83 feet; thence South 46° 54' 16" West, 37.00 feet; thence North 45° 21' 47" West, 65.33 feet; thence South 48° 06' 38" West, 20.87 feet; thence North 84° 09' 20" West, 22.19 feet; thence South 64° 15' 23" West, 26.32 feet; thence North 08° 00' 36" East, 41.67 feet; thence South 34° 05' 24" East, 21.88 feet; thence North 71° 04' 51" East, 25.11 feet; thence North 00° 40' 18" East, 34.32 feet; thence North 87° 06' 41" West, 31.97 feet; thence South 55° 25' 44" West, 28.10 feet; thence South 66° 42' 19" West, 47.39 feet; thence South 74° 06' 57" West, 79.87 feet to a point on the aforesaid East right of way line of a 400.00 foot wide Orlando Utilities Commission railroad right of way; thence leaving said Wetland line, run North 00° 03' 46" West, along said East right of way line 295.53 feet to the Point of Beginning.

SOUTHEAST PARCEL:

A parcel of land located in Section 6, Township 24 South, Range 32 East, Orange County, Florida. Said parcel being more particularly described as follows:

Begin at the Northeast corner of said Section 6; thence South 00° 32' 57" East along the East line of said Section 6, a distance of 2654.81 feet to the East 1/4 corner of said Section 6; thence continue along said East line, South 00° 35' 47" East, 1311.44 feet to the centerline of Wewahootee Road; thence leaving said East line, run South 89° 39' 56" West, along said centerline of Wewahootee Road, 3324.79 feet to the East Boundary line of Correct Craft, Inc. as recorded in the Special Warranty Deed, Official Records Book 6091, Page 2523 of the Public Records of Orange County, Florida, and the East line of LOT 1, CORRECT CRAFT, as recorded in Plat Book 68, Pages 61 through 63, of said Public Records; thence leaving said centerline of Wewahootee Road, run North 00° 02' 17" East along said East boundary line and East line of said LOT 1, 3975.92 feet to the North line of said Section 6, thence leaving said East Boundary line, run North 89° 57' 33" East along said North line 636.81 feet to the North 1/4 corner of said Section 6; thence continue along the North line of said Section 6, North 89° 48' 12" East, 2646.20 feet to the Point of Beginning.

SOUTHWEST PARCEL:

Lot 2, Lot 3, Lot 4, Lot 5, Lot 6, Tract F, Tract G, Tract H, Tract I, and Tract J, International Corporate Park Phase One - Unit I, as recorded in Plat Book 23, Pages 38 through 41, of the Public Records of Orange County, Florida, together with additional land located in Section 1, Township 24 South, Range 31 East and Section 36, Township 23 South, Range 31 East Orange County, Florida. Said parcel being more particularly described as follows:

Commence at the Northeast corner of said Section 36, said point also being on the West right of way line of a 400.00 feet Orlando Utilities Commission Railroad right of way, as recorded in the Official Records Book 3435, Page 2304, of the Public Records of Orange County, Florida; thence the following courses and distances along said West right of way line and the East line of said Section 36, run South 00° 07' 13" East, 533.10 feet to the Point of Beginning; also being a point on the Southerly right of way line of State Road 528 (Bee Line Expressway) as shown on an Orlando - Orange County Expressway Authority Right of Way Map, Section 1.1 - 1.2, 75002 - 3501; thence continue along said West right of way line and East line, South 00° 07' 13" East, 2123.46 feet to the East 1/4 corner of said Section 36; thence continue along said West right of way line and East line, South 00° 04' 18" East, 2922.70 feet to the Southeast corner of said Section 36; thence leaving said East line of Section 36 and the West right of way line, run the following courses and distances along the East line of said Section 1 and the West right of way line of

a 300.00 feet Orlando Utilities Commission Railroad right of way, as recorded in the Official Records Book 3590, Page 355, of the Public Records of Orange County, Florida, South 00° 02' 07" West, 343.69 feet to the point of curvature of a curve to the right, having a radius of 1990.00 feet and a central angle of 41° 06' 13"; thence leaving said East line of Section 1, run along the arc of said curve and West right of way line a distance of 1427.61 feet to the point of tangency; thence South 41° 13' 36" West, 3123.90 feet to the centerline of Wewahootee Road, as recorded in the Official Records Book 5761, Pages 3567-3602, of the Public Records of Orange County, Florida; thence leaving said West right of way line, run the following courses and distances along said centerline, South 89° 39' 56" West, 21.10 feet to the point of curvature of a curve to the left, having a radius of 400.00 feet and a central angle of 44° 01' 33"; thence along the arc of said curve a distance of 307.36 feet to the point of tangency; thence South 45° 38' 23" West, 1557.46 feet to the point of curvature of a curve to the right, having a radius of 400.00 feet, a central angle of 38° 11' 16"; thence along the arc of said curve a distance of 266.60 feet to a point on the South line of said Section 1; thence leaving said centerline of Wewahootee Road, run North 89° 50' 55" West along said South line 1199.62 feet to the Southwest corner of said Section 1; thence leaving said South line, run North 01° 53' 15" West along the West line of said Section 1 a distance of 2660.90 feet to the West 1/4 corner of said Section 1; thence continue along said West line, North 00° 46' 04" East, 2646.14 feet to the Northwest corner of said Section 1; thence North 88° 06' 44" West along the South line of said Section 36 a distance of 10.78 feet to the Southwest corner of said Section 36; thence North 00° 09' 05" East along the West line of said Section 36 a distance of 2923.13 feet to the West 1/4 corner of said Section 36; thence continue along said West line, North 00° 10' 56" East, 2412.09 feet to said Southerly right of way line of State Road 528 (Bee Line Expressway); thence leaving said West line of Section 36, run the following courses and distances along said Southerly right of way, North 89° 45' 47" East, 2879.03 feet; thence South 89° 33' 17" East, 1261.51 feet; thence South 77° 38' 56" East, 1328.23 feet to the Point of Beginning.

LESS AND EXCEPT A, B, C, D, E, AND F AS SET FORTH BELOW:

A) Limited Access Right of Way (Official Records Book 4282, Page 3520)
Commence at the Southeast corner of the Northeast 1/4 of Section 36, Township 23 South, Range 31 East, Orange County, Florida; thence N00°07'13"W along the East line of said Northeast 1/4, 1047.59 feet to the POINT OF BEGINNING, said point of beginning of a line of limited access and a point on a curve concave Northerly and having a radius of 482.42 feet; thence departing said East line on a chord bearing of N69°04'46"W run Northwesterly along the arc of said curve, through a central angle of 16°47'58", 141.45 feet; thence S79°13'57"W, 27.35 feet to the end of the line of limited access; thence continue S79°13'57"W, 50.29 feet to a point on the Southeasterly right-of-way line of I.C.P. Boulevard, also being a point on a curve concave Northerly and having a radius of 811.94 feet; thence on a chord bearing of N29°19'13"E run Northeasterly along the arc of said curve through a central angle of 14°08'57", 200.51 feet to the beginning of a line of limited access; thence S20°35'32"E, 77.64 to a point on a curve concave Northerly and having a radius of 382.42 feet; thence on a chord bearing of S67°23'14"E run Southeasterly along the arc of said curve, through a central angle of 13°24'54", 89.54 feet to a point on the aforesaid East line of the NE 1/4 of Section 36 and the end of the line of limited access; thence S00°07'13"E, along said East line, 103.17 feet to the POINT OF BEGINNING.

B) Pump Station (Official Records Book 5543, Page 2698)
A portion of the NE 1/4 of Section 36, Township 23 South, Range 31 East, Orange County, Florida, being a portion of the land described in a Special Warranty Deed recorded February 5, 1988 in Official Records Book 3955, Pages 3115 through 3131, of the Public Records of Orange County, Florida;

Being more particularly described as follows: BEGIN at the Southeast corner of Tract "J", INTERNATIONAL CORPORATE PARK, PHASE ONE-UNIT I, according to the plat thereof recorded in Plat Book 23, Pages 38 through 41, of the Public Records of Orange County, Florida, thence run S00°07'13"E along the East line of the Northeast quarter of said Section 36, (said East line also being the West line of a 400' wide Orlando Utilities Commission railroad right-of-way per Official Records Book 3435, Page 2304,

Public Records of Orange County, Florida), for a distance of 105.12 feet; thence, leaving said East line of said Northeast quarter and said West O.U.C. (Orlando Utilities Commission) right-of-way line, run S89°52'47"W, (non-radial), a distance of 131.63 feet to a point on a curve concave Northwesterly having a radius of 811.94 feet, said point also being on the Easterly right-of-way line of I.C.P. Boulevard, as shown on aforesaid Plat Book 23, Pages 38 through 41; thence run Northeasterly along the arc of said curve and along said Easterly right-of-way line for a distance of 94.04 feet through a central angle of 06°38'11", said curve having a chord length of 93.99 feet bearing N22°43'15"E, to the Southwest corner of aforesaid Tract "J", of said Plat Book 23, Pages 38 through 41; thence, leaving aforesaid curve and aforesaid Easterly right-of-way line of I.C.P. Boulevard, run along the South boundary of said Tract "J" for the following four (4) courses: run S70°35'50"E (radial), 19.81 feet; thence N89°52'47"E, 56.48 feet; thence N00°07'13"W, 25.12 feet; thence run N89°52'47"E, 20.00 feet to the POINT OF BEGINNING.

C) Retention/Detention Pond Area (Official Records Book 4282, Page 3520)
Commence at the Southeast corner of the Northeast 1/4 of Section 36, Township 23 South, Range 31 East, Orange County, Florida; thence N00°07'13"W along the East line of said Northeast 1/4, 677.59 feet to the POINT OF BEGINNING; Continue N00°07'13"W, 370.00 feet to a point on the Southerly right-of-way line of the Bee Line Expressway (S.R. 528) access road and being a point on a curve concave Northerly and having a radius of 482.42 feet; thence departing said East line on a chord bearing of N69°04'46"W run Northwesterly along the arc of said curve, through a central angle of 16°47'58", 141.45 feet; thence S79°13'57"W, 27.35 feet to a line of limited access and a point on a curve concave Northwesterly having a radius of 846.94 feet; thence on a chord bearing of S41°15'40"W run Southwesterly along the arc of said curve through a central angle of 14°43'36", 217.69 feet to the end of said line of limited access; thence S38°45'10"E, 323.44 feet; thence N89°52'47"E, 100.00 feet to the POINT OF BEGINNING.

D) That part of Aerospace Parkway and International Corporate Park Boulevard per said plat of International Corporate Park Phase One - Unit I, a public right of way lying in Section 36.

E) Tract J, International Corporate Park Phase One - Unit I, as recorded in Plat Book 23, Pages 38 through 41 of the Public Records of Orange County, Florida.

F) Central Florida Expressway Authority Parcel 1 as described in Official Records Book 11029, Page 6496 of the Public Records of Orange County, Florida.

TRACT 8 PARCEL:

TRACT 8, INTERNATIONAL CORPORATE PARK - PARCEL 10, as recorded in Plat Book 67, Pages 56 through 58, of the Public Records of Orange County, Florida.

TOGETHER WITH EASEMENT RIGHTS 1 THROUGH 13 FOR THE BENEFIT OF PARCEL B:

1. Reservations and Easements set forth in Warranty Deed recorded October 6, 1983 in Official Records Book 3427, Page 1809; and First Amendment recorded September 18, 1992 in Book 4462, Page 4935, Public Records of Orange County, Florida (Offsite);

2. Master Drainage System Easement recorded May 5, 1987 in Official Records Book 3884, Page 433, Public Records of Orange County, Florida;

3. Right of Way Agreement recorded June 24, 1987 in Official Records Book 3897, Page 4993; and as amended by First Amendment to Right of Way Agreement recorded August 20, 1991 in Official Records Book 4317, Page 4727, Public Records of Orange County, Florida;

4. Underground Utility and Drainage Easement recorded October 19, 1987 in Official Records Book 3929, Page 1912, Public Records of Orange County, Florida;

5. Underground Utility Easement recorded October 19, 1987 in Official Records Book 3929, Page 1923, Public Records of Orange County, Florida;

6. Easement recorded October 26, 1987 in Official Records Book 3931, Page 179, Public Records of Orange County, Florida (Offsite);

7. Department of Corrections Temporary Construction Easement recorded October 26, 1987 in Official Records Book 3931, Page 186, Public Records of Orange County, Florida (Offsite);

8. Right of Way Agreement recorded December 30, 1987 in Official Records Book 3946, Page 3172, Public Records of Orange County, Florida;

9. Temporary Construction Easement Agreement recorded December 30, 1987 in Official Records Book 3946, Page 3186, Public Records of Orange County, Florida;

10. Easement Agreement recorded May 28, 1999 in Official Records Book 5761, Page 3567, Public Records of Orange County, Florida;

11. Rights and easements set forth in Special Warranty Deed recorded September 20, 2000 in Official Records Book 6091, Page 2513, Public Records of Orange County, Florida;

12. Rights and easements set forth in Special Warranty Deed recorded September 20, 2000 in Official Records Book 6091, Page 2523, Public Records of Orange County, Florida; and

13. Easement Agreement recorded July 19, 2001 in Official Records Book 6305, Page 5872, Public Records of Orange County, Florida.

PARCEL C:

A TRACT OF LAND, BEING A PORTION OF LOT 1, INTERNATIONAL CORPORATE PARK PHASE ONE - UNIT I, ACCORDING TO THE PLAT THEREOF, AS RECORDED IN PLAT BOOK 23, PAGES 38 THROUGH 41, PUBLIC RECORDS OF ORANGE COUNTY, FLORIDA, BEING DESCRIBED AS FOLLOWS:

COMMENCE AT THE SOUTHEAST CORNER OF SAID LOT 1 FOR A POINT OF REFERENCE; THENCE RUN SOUTH 89°48'23" WEST, ALONG THE SOUTH LINE OF SAID LOT 1, A DISTANCE OF 1145.89 FEET; THENCE RUN NORTH 00°11'48" WEST, 639.97 FEET TO THE POINT OF CURVATURE OF A CURVE CONCAVE SOUTHWESTERLY; THENCE RUN NORTHWESTERLY ALONG SAID CURVE, HAVING A RADIUS OF 1150.00 FEET, A CENTRAL ANGLE OF 21°11'40", AN ARC LENGTH OF 425.40 FEET, A CHORD LENGTH OF 422.98 FEET AND A CHORD BEARING OF NORTH 10°47'38" WEST TO THE POINT OF TANGENCY; THENCE RUN NORTH 21°23'28" WEST, 24.06 FEET TO THE POINT OF BEGINNING; THENCE RUN SOUTH 68°36'32" WEST, 30.00 FEET; THENCE RUN SOUTH 29°50'29" WEST, 32.92 FEET; THENCE RUN SOUTH 89°50'29" WEST, 1015.88 FEET; THENCE RUN NORTH 01°52'18" EAST, 425.48 FEET; THENCE RUN NORTH 88°07'35" WEST, 232.71 FEET; THENCE RUN SOUTH 00°22'18" EAST, 64.23 FEET; THENCE RUN SOUTH 16°02'55" WEST, 153.31 FEET; THENCE RUN SOUTH 60°51'00" WEST, 93.12 FEET; THENCE RUN SOUTH 63°16'37" WEST, 107.36 FEET; THENCE RUN SOUTH 89°00'01" WEST, 143.24 FEET; THENCE RUN NORTH 66°41'16" WEST, 65.77 FEET; THENCE RUN SOUTH 85°59'18" WEST, 107.53 FEET TO THE POINT OF CURVATURE OF A CURVE CONCAVE SOUTHEASTERLY; THENCE RUN SOUTHWESTERLY ALONG SAID CURVE, HAVING A RADIUS OF 38.75 FEET, A CENTRAL ANGLE OF 60°29'27", AN ARC LENGTH OF 40.91 FEET, A CHORD LENGTH OF 39.04 FEET, AND A CHORD BEARING

OF SOUTH 55°44'35" WEST TO THE POINT OF TANGENCY; THENCE RUN SOUTH 25°29'51" WEST, 137.40 FEET; THENCE RUN SOUTH 89°50'29" WEST, 399.17 FEET TO A POINT LYING ON THE WEST LINE OF SAID LOT 1; THENCE RUN NORTH 23°53'33" EAST, ALONG THE WEST LINE OF SAID LOT 1, A DISTANCE OF 1115.92 FEET TO THE NORTHWEST CORNER OF SAID LOT 1 AND THE SOUTHERLY RIGHT-OF-WAY LINE OF SPACE TRIANGLE PARKWAY; THENCE RUN NORTH 72°08'58" EAST, ALONG THE NORTH LINE OF SAID LOT 1 AND ALONG SAID SOUTHERLY RIGHT-OF-WAY LINE, 1070.19 FEET TO THE POINT OF CURVATURE OF A CURVE CONCAVE NORTHWESTERLY; THENCE RUN NORTHEASTERLY ALONG THE NORTH LINE OF SAID LOT 1, ALONG SAID SOUTHERLY RIGHT-OF-WAY LINE, AND ALONG SAID CURVE, HAVING A RADIUS OF 3867.72 FEET, A CENTRAL ANGLE OF 04°23'50", AN ARC LENGTH OF 296.84 FEET, A CHORD LENGTH OF 296.77 FEET, AND A CHORD BEARING OF NORTH 69°57'03" EAST; THENCE, NON-RADIAL TO SAID CURVE, RUN SOUTH 21°23'28" EAST, 1508.24 FEET TO THE POINT OF BEGINNING.

LESS AND EXCEPT ANY PORTION CONVEYED TO ORANGE COUNTY IN WARRANTY DEED RECORDED MARCH 6, 2009 IN OFFICIAL RECORDS BOOK 9839, PAGE 626, PUBLIC RECORD OF ORANGE COUNTY, FLORIDA.

TOGETHER WITH EASEMENT RIGHTS GRANTED IN:

1) MASTER STORMWATER DRAINAGE AGREEMENT RECORDED MAY 5, 1987 IN OFFICIAL RECORDS BOOK 3884, PAGE 440, PUBLIC RECORDS OF ORANGE
COUNTY, FLORIDA;

2) BORROW PIT EASEMENT RECORDED MAY 5, 1987 IN OFFICIAL RECORDS BOOK 3884, PAGE 442; AS AFFECTED BY SECTION 9 OF THAT CERTAIN DEVELOPMENT AGREEMENT RECORDED SEPTEMBER 14, 2006 IN OFFICIAL RECORDS BOOK 8860, PAGE 3134, PUBLIC RECORDS OF ORANGE COUNTY, FLORIDA;

3) DECLARATION OF CROSS EASEMENTS AND RESTRICTIONS RECORDED
SEPTEMBER 14, 2006 IN OFFICIAL RECORDS BOOK 8860, PAGE 3101, PUBLIC RECORDS OF ORANGE COUNTY, FLORIDA; AND

4) CROSS EASEMENT AGREEMENT RECORDED MARCH 19, 2008 IN OFFICIAL RECORDS BOOK 9632, PAGE 3846, PUBLIC RECORDS OF ORANGE COUNTY, FLORIDA.

AND:

That part of Section 1, Township 24 South, Range 31 East, Orange County, Florida, described as follows:

Commence at the Southeast corner of said Section 1; thence N00°08'02"W along the East line of the Southeast 1/4 of said Section 1 for a distance of 1218.30 feet to the POINT OF BEGINNING; thence S89°32'00"W, 2246.81 feet to the Southeasterly right-of-way line of a 300 foot wide Orlando Utilities Commission Railroad right-of-way, as recorded in Official Records Book 3471, Page 617, of the Public Records of Orange County, Florida; thence N41°08'54"E along said Southeasterly right-of-way line 147.13 feet to the centerline of Wewahootee Road, as recorded in Official Records Book 5761, Page 3567, of said Public Records; thence N89°32'00"E along said centerline 2149.73 feet to the aforesaid East line of the Southeast 1/4; thence S00°08'02"E along said East line 110.00 feet to the POINT OF BEGINNING.

AND:

A parcel of land within the Southeast 1/4 of Section 1, Township 24 South, Range 31 East, Orange County, Florida, lying South of the centerline of Wewahootee Road, and lying Northwesterly of the Northwest right-of-way line of a 300 foot wide Orlando Utilities Commission Railroad right-of-way, as

recorded in Official Records Book 3471, Page 617, of said Public Records, more particularly described as follows:

Commence at the South 1/4 corner of said Section 1; thence N00°16'08"W along the West line of the Southeast 1/4 of said Section 1 for a distance of 1056.39 feet to said Northwest right-of-way line of a 300 foot wide Orlando Utilities Commission Railroad right-of-way and the POINT OF BEGINNING; thence continue N00°16'08"W along said West line 204.81 feet to the centerline of said Wewahootee Road and a point on a non-tangent curve concave Southeasterly having a radius of 400.00 feet and a chord bearing of N74°23'53"E; thence Northeasterly along said centerline and the arc of said curve through a central angle of 30°43'36" for a distance of 214.51 feet to the point of tangency; thence N89°45'41"E along said centerline 25.70 feet to said Northwesterly right-of-way line; thence S41°08'54"W along said Northwesterly right-of-way line 347.84 feet to the POINT OF BEGINNING.

AND:

That part of the land described below lying Westerly of the following described line:

Commence at the Southwest corner of the Southeast 1/4 of Section 8, Township 24 South, Range 32 East; thence N89°46'01"E, along the South line of said Southeast 1/4 a distance of 175.57 feet to the POINT OF BEGINNING; thence departing said South line run N09°15'45"W, a distance of 6739.67 feet; thence N42°56'37"E, 1411.00 feet; thence N28°40'16"W, 1796.62 feet; thence N19°50'33"E, 1955.48 feet; thence N01°28'36"E, 1129.65 feet; thence N33°23'35"E, 923.57 feet; thence N79°28'20"E, 1623.18 feet; thence N29°46'06"E, 1397.71 feet; thence N48°04'07"E, 1962.60 feet to the South right-of-way line of the Martin Anderson Beachline Expressway (SR 528) as recorded in Official Records Book 1533, Page 371, of the Public Records of Orange County, Florida and the POINT OF TERMINATION.

That part of Sections 32, 33 and 34, Township 23 South, Range 32 East; all of Sections 5, 7 and 8, Township 24 South, Range 32 East; that part of Sections 4, 6, 9 and 18, Township 24 South, Range 32 East, all lying in Orange County, Florida, more particularly described as follows:

Commence at the Southwest corner of said Section 5; thence run N00°34'58"W, along the West line of the Southwest 1/4 of said Section 5 for a distance of 1333.50 feet to the POINT OF BEGINNING; thence continue N00°34'58"W along said West line, 1311.44 feet to the West 1/4 corner of said Section 5; thence N00°33'01"W along the West line of the Northwest 1/4 of said Section 5 for a distance of 2655.00 feet to the Northwest corner of said Section 5; thence N00°00'52"W along the West line of the Southwest 1/4 of said Section 32 for a distance of 2928.81 feet to the West 1/4 corner of said Section 32; thence N00°09'33"E along the West line of the Northwest 1/4 of said Section 32 for a distance of 2199.52 feet to the South right-of-way line of the Martin Anderson Beachline Expressway (SR 528) as recorded in Official Records Book 1533, Page 371, of the Public Record of Orange County, Florida; thence run the following seven (7) courses along said South right-of-way line: S77°35'21"E, 948.51 feet; thence N00°28'04"E, 61.26 feet; thence N78°29'36"E, 1328.78 feet; thence S89°34'41"E, 8325.62 feet; thence N89°16'47"E, 1078.27 feet; thence S00°49'55"E, 299.60 feet; thence N89°22'29"E, 180.67 feet to the centerline of the Econlockhatchee River and Reference Point A; thence Southerly along said centerline 18,672 feet more or less to a point which bears S15°55'50"W, 16,115.43 feet from said Reference Point A, said point being on the South line of the Southwest 1/4 of said Section 9; thence S89°53'19"W along said South line 2068.95 feet to the Southwest corner of said Section 9; thence S89°46'01"W along the South line of the Southeast 1/4 of said Section 8 for a distance of 2643.34 feet to the South 1/4 corner of said Section 8; thence S89°45'58"W along the South line of the Southwest 1/4 of said Section 8 for a distance of, 2657.52 feet to the Northeast corner of said Section 18; thence S00°04'46"W along the East line of the Northeast 1/4 of said Section 18 for a distance of 2373.19 feet to the centerline of the Disston Canal; thence run the following five (5) courses along said centerline: thence S24°55'59"W, 1234.87 feet to the point of curvature of a curve concave Northwesterly having a radius of 140.00 feet and a chord bearing of S51°12'01"W; thence Southwesterly along the arc of said curve through a central angle of 52°32'03"

for a distance of 128.37 feet to the point of tangency; thence S77°28'02"W, 3885.21 feet; thence S77°56'38"W, 914.16 feet; thence S58°14'24"W, 16.45 feet to the West line of the Southwest 1/4 of said Section 18; thence N00°00'08"W along said West line, 1938.09 feet to the West 1/4 corner of said Section 18; thence N00°07'29"W along the West line of the Northwest 1/4 of said Section 18 for a distance of, 498.15 feet to the Southwest corner of lands described in Official Records Book 4268, Page 1042, of said Public Records (City of Cocoa, Florida - Well Site Number 21); thence run the following three (3) courses along the South, East and North lines of said lands: N89°52'31"E, 450.00 feet; thence N00°07'29"W, 450.00 feet; thence S89°52'31"W, 450.00 feet to the West line of the Northwest 1/4 of said Section 18; thence N00°07'29"W along said West line, 1300.01 feet to the Southwest corner of said lands described in Official Records Book 4268, Page 1042, of said Public Records (City of Cocoa, Florida - Well Site Number 20); thence run the following three (3) courses along the South, East and North lines of said lands: N89°52'32"E, 450.00 feet; thence N00°07'28"W, 450.00 feet; thence S89°49'58"W, 449.95 feet to the West line of the Southwest 1/4 of said Section 7; thence N00°03'11"W, along said West line 2612.89 feet to the West 1/4 corner of said Section 7; thence N00°05'32"W along the West line of the Northwest 1/4 of said Section 7 for a distance of, 2655.69 feet to the Northwest corner of said Section 7; thence N00°08'02"W along the West line of the Southwest 1/4 of said Section 6 for a distance of 1328.30 feet to the centerline of the Wewahootee Grade; thence N89°32'00"E along said centerline, 721.40 feet; thence N89°44'57"E along said centerline, 1299.99 feet; thence N89°39'59"E, along said centerline 3324.43 feet to the POINT OF BEGINNING;

Less and Except the Central Florida Expressway Authority right-of-way Parcel A and Parcel B, as described in Official Records Book 11029, Page 6485, of the Public Records of Orange County, Florida.

Less and Except the following five City of Cocoa, Florida - Well Sites as described in Official Records Book 1012, Page 220, of the Public Records of Orange County, Florida:

Well Site "K"

Commencing at the Southwest corner of Section 5, Township 24 South, Range 32 East, Orange County, Florida; thence Northerly along the West line of said Section 5, a distance of 1337.28 feet (N00°34'58"W, 1333.50 feet measured) to an intersection with the centerline of Wewahootee Grade; thence Easterly along the said centerline a distance of 3832 feet (N89°34'02"E, 1449.20 feet and N89°36'27"E, 2382.74 feet measured) to the POINT OF BEGINNING; thence continuing along said centerline a distance of 208.71 feet (N89°36'27"E, 208.71 feet measured); thence Southerly at a right angle to said centerline a distance of 308.71 feet (S00°23'33"E, 308.71 feet measured); thence Westerly parallel to said centerline a distance of 208.71 feet (S89°36'27"W, 208.71 feet measured); thence Northerly at a right angle to said centerline a distance of 308.71 feet (N00°23'33"W, 308.71 feet measured) to the POINT OF BEGINNING. Subject to a right-of-way over the Northerly 100 feet for road purposes.

Well Site "L"

Commencing at the Southwest corner of Section 5, Township 24 South, Range 32 East, Orange County, Florida; thence Northerly along the West line of Section 5, a distance of 1337.28 feet (N00°34'58"W, 1333.50 feet measured) to an intersection with the centerline of Wewahootee Grade; thence Easterly along the said centerline a distance of 1450 feet (N89°34'02"E, 1449.20 feet measured) to the POINT OF BEGINNING; thence continuing along said centerline a distance of 208.71 feet (N89°36'27"E, 208.71 feet measured); thence Southerly at a right angle to said centerline a distance of 308.71 feet (S00°23'33"E, 308.71 feet measured); thence Westerly parallel to said centerline a distance of 208.71 feet (S89°36'27"W, 208.71 feet measured); thence Northerly at a right angle to said centerline a distance of 308.71 feet (N00°23'33"W, 308.71 feet measured) to the POINT OF BEGINNING. Subject to a right-of-way over the Northerly 100 feet for road purposes.

Well Site "M"

Commencing at the Southeast corner of Section 6, Township 24 South, Range 32 East, Orange County, Florida; thence Northerly along the East line of Section 6, 1337.28 feet (N00°34'58"W, 1333.50 feet measured) to an intersection with the centerline of Wewahootee Grade; thence Westerly along the said centerline a distance of 1180 feet (S89°39'59"W, 1179.67 feet measured) to the POINT OF BEGINNING; thence Southerly at a right angle to the Wewahootee Grade centerline a distance of 247.56 feet (S00°21'33"E, 244.31 feet measured); thence Westerly parallel to the said centerline a distance of 147.56 feet (S89°38'27"W, 147.56 feet measured); thence Northerly and at a right angle to said centerline a distance of 247.56 feet (N00°21'33"W, 244.37 feet measured) to the centerline of said grade; thence Easterly along the said centerline a distance of 147.56 feet (N89°39'59"E, 147.56 feet measured) to the POINT OF BEGINNING. Subject to a right-of-way over the Northerly 100 feet for road purposes.

Well Site "N"

Commencing at the Southeast corner of Section 6, Township 24 South, Range 32 East, Orange County, Florida; thence Northerly along the East line of Section 6 a distance of 1337.28 feet (N00°34'58"W, 1333.50 feet measured) to an intersection with the centerline of Wewahootee Grade; thence Westerly along the said centerline a distance of 3180 feet (S89°39'59"W, 3179.05 feet measured) to the POINT OF BEGINNING; thence Southerly at a right angle to the Wewahootee Grade centerline a distance of 247.56 feet (S00°21'33"E, 245.19 feet measured); thence Westerly parallel to the said centerline a distance of 147.56 feet (S89°38'27"W, 147.56 feet measured); thence Northerly and at a right angle to said centerline a distance of 247.56 feet (N00°21'33"W, 245.26 feet measured) to the centerline of said Grade; thence Easterly along the said centerline a distance of 147.56 feet (N89°44'57"E, 2.19 feet measured and N89°39'59"E, 145.37 feet measured) to the POINT OF BEGINNING. Subject to a right-of-way over the Northerly 100 feet for road purposes.

Well Site "O"

Commencing at the Southwest corner of Section 6, Township 24 South, Range 32 East, Orange County, Florida; thence Northerly along the West line of Section 6 a distance of 1326.04 feet (N00°08'02"W, 1328.30 feet measured) to an intersection with the centerline of Wewahootee Grade and the POINT OF BEGINNING; thence Easterly along said centerline a distance of 147.56 feet (N89°32'00"E, 147.56 feet measured); thence Southerly parallel to the West line of said Section 6, a distance of 247.56 feet (S00°08'02"E, 246.64 feet measured); thence Westerly parallel to the centerline of Wewahootee Grade a distance of 147.56 feet (S89°38'27"W, 147.56 feet measured) to the West line of said Section 6; thence Northerly along said West line a distance of 247.56 feet (N00°08'02"W, 246.36 feet measured) to the POINT OF BEGINNING.

Less and Except the following City of Cocoa, Florida - Well Site described in Order of Taking recorded in Official Records Book 4268, Page 1042, of the Public Records of Orange County, Florida:

Well Site #22:

Commence at the Northwest corner of Section 18, Township 24 South, Range 32 East, Orange County, Florida, and run S00°31'23"W, along the West line of said Section 18, a distance of 2160.40 feet (S00°07'29"E, 2160.40 feet measured); thence run S89°28'37"E a distance of 1135.60 feet (N89°52'31"E, 1136.01 feet measured); thence run S29°49'23"E a distance of 967.57 feet (S30°28'15"E, 967.23 feet measured) to the POINT OF BEGINNING; thence run S00°37'10"W a distance of 331.58 feet (S00°01'42"E, 331.58 feet measured); thence run S89°22'50"E a distance of 450.00 feet (N89°58'18"E, 450.00 feet measured); thence run N00°37'10"E a distance of 450.00 feet (N00°01'42"W, 450.00 feet measured); thence run N89°22'50"W a distance of 450.00 feet (S89°58'18"W, 450.00 feet measured); thence run S00°37'10"W a distance of 118.42 feet (S00°01'42"E, 118.42 feet measured) to the POINT OF BEGINNING.

Containing 4698.369 acres more or less and being subject to any rights-of-way, restrictions and easements of record.

CAMINO REALE PROPERTY
2015 BOUNDARY SURVEY

DESCRIPTION:

That part of Sections 13 and 24, Township 24 South, Range 31 East, and part of Sections 18, 19 and all of Sections 29, 30, 31 and 32, Township 24 South, Range 32 East, Orange County, Florida, described as follows:

Beginning at the Southeast corner of Section 19, Township 24 South, Range 32 East, Orange County, Florida; thence S89°57'12"W along the South line of said Section 19 a distance of 3146.18 feet; thence run North 05°38'25" East, 1169.63 feet to a 1/2" iron rod with cap marked "LB 6915", Atlantic Surveying, Inc.; thence run North 14°52'28" West, 929.69 feet to a 1/2" iron rod with cap marked "LB 6915"; thence run North 13°48'56" West, 1202.80 feet to a 1/2" iron rod with cap marked "LB 6915"; thence run North 13°44'26" West, 756.42 feet to a 1/2" iron rod with cap marked "LB 6915"; thence run North 16°50'12" West, 1520.28 feet to a 1/2" iron rod with cap marked "LB 6915"; thence continue North 16°50'12" West, 808.08 feet more or less to the centerline of Disston Canal; thence the following two (2) courses along the centerline of said canal: S77°53'03"W, 914.16 feet; thence S58°10'49"W a distance of 16.44 feet to the East line of the East 3/4 of Section 13, Township 24 South, Range 31 East, Orange County, Florida; thence S00°03'15"E along said East line, 4.89 feet to the centerline of said canal; thence the following three (3) courses along said centerline: S71°45'51"W, 58.70 feet; thence S57°53'24"W, 3455.41 feet; thence S57°54'36"W, 251.71 feet to the Easterly right-of-way line of Lake Mary Jane Road; thence S38°49'00"E along said Easterly right-of-way line a distance of 1241.35 feet; thence leaving said Easterly right-of-way line, N59°35'32"E a distance of 733.87 feet; thence S38°48'28"E a distance of 600.00 feet; thence S59°35'32"W a distance of 733.87 feet to aforesaid Easterly right-of-way line of Lake Mary Jane Road and a point of curve concave Westerly having a radius of 623.69 feet and a chord bearing of S06°44'28"E; thence run along said right-of-way line and the arc of said curve through a central angle of 64°08'00" an arc distance of 698.12 feet; thence S25°19'32"W a distance of 830.98 feet to a point of curve concave Easterly having a radius of 1382.70 feet and a chord bearing of S13°22'02"W; thence run along the arc of said curve through a central angle of 23°55'00" an arc distance of 577.17 feet; thence S01°24'32"W a distance of 241.08 feet; thence leaving said right-of-way, N89°59'04"E a distance of 780.24 feet; thence S01°24'32"W a distance of 360.11 feet to the South line of the East 1/2 of Section 24, Township 24 South, Range 31 East, Orange County, Florida; thence N89°59'04"E a distance of 1697.74 feet to the Southeast corner of said East 1/2 of Section 24; thence S00°12'49"E along the West line of Section 30, Township 24 South, Range 32 East, Orange County, Florida, a distance of 2658.18 feet to the West 1/4 corner of said Section 30; thence S00°12'49"E a distance of 2658.18 feet to the Northwest corner of Section 31, Township 24 South, Range 32 East, Orange County, Florida; thence S00°09'36"E a distance of 2671.73 feet to the West 1/4 corner of said Section 31; thence S00°15'37"E a distance of 2841.08 feet to the Southwest corner of said Section 31; thence S89°38'46"E a distance of 2655.16 feet to the South 1/4 corner of said Section 31; thence S89°38'08"E a distance of 2654.78 feet to the Southeast corner of said Section 31; thence S89°38'47"E a distance of 2654.90 feet to the South 1/4 corner of Section 32, Township 24 South, Range 32 East, Orange County, Florida; thence S89°37'50"E a distance of 2654.88 feet to the Southeast corner of said Section 32; thence

N00°21'48"W a distance of 2924.84 feet to the East 1/4 corner of said Section 32; thence N00°21'48"W a distance of 2658.95 feet to the Northeast corner of said Section 32; thence N00°11'51"W a distance of 2658.94 feet to the East 1/4 corner of Section 29, Township 24 South, Range 32 East, Orange County, Florida; thence N00°11'51"W a distance of 2658.94 feet to the Northeast corner of said Section 29; thence S89°59'09"W a distance of 2649.16 feet to the North 1/4 corner of said Section 29; thence S89°59'09"W a distance of 2649.16 feet to the POINT OF BEGINNING;

LESS:

That part of Sections 18 and 19, Township 24 South, Range 32 East, Orange County, Florida, described as City of Cocoa Well Field Sites #31, #32 and #33, recorded in Official Records Book 4874, Page 1504, 1505 and 1506, Public Records of Orange County, Florida, more particularly described as follows:

City of Cocoa Well Field Site #31 is described as follows: Begin at the concrete monument marking the Northwest corner of said Section 19 and run South 00°29'34" West, along the West line of the Northwest 1/4 of said Section 19, a distance of 433.00 feet to an iron rod; thence South 89°30'26" East perpendicular to said West line, a distance of 450.04 feet to an iron rod; thence North 00°29'34" East parallel to said West line of the Northwest 1/4, a distance of 450.00 feet to an iron rod; thence North 89°30'26" West perpendicular to said West line of the Northwest 1/4, a distance of 450.00 feet to an iron rod on the West line of the Southwest 1/4 of aforesaid Section 18; thence South 00°37'50" West, along the West line of said Southwest 1/4, a distance of 17.00 feet to the POINT OF BEGINNING.

AND LESS:

City of Cocoa Well Field Site #32 is described as follows: Commence at a concrete monument marking the Northwest corner of said Section 19, and run South 00°29'34" West, along the West line of the Northwest 1/4 of said Section 19, a distance of 1199.38 feet; thence South 31°55'11" East, a distance of 496.61 feet to an iron rod, the POINT OF BEGINNING; thence North 89°22'50" West, a distance of 100.00 feet to an iron rod; thence South 00°37'10" West, perpendicular to the first course of this description, a distance of 450.00 feet to an iron rod; thence South 89°22'50" East, parallel to the first course of this description, a distance of 450.00 feet to an iron rod; thence North 00°37'10" East perpendicular to the first course of this description, a distance of 450.00 feet to an iron rod; thence North 89°22'50" West parallel to the first course of this description, a distance of 350.00 feet to the POINT OF BEGINNING.

AND LESS:

City of Cocoa Well Field Site #33 is described as follows: Commence at the concrete monument marking the Northwest corner of said Section 19, and run South 00°29'34" West along the West line of the Northwest 1/4 of said Section 19, a distance of 1199.38 feet; thence South 31°55'11" East, a distance of 496.61 feet to a point on the North line of City of Cocoa Well Field Site #32; thence North 89°22'50" West, along said North line a distance of 100.00 feet to the Northwest corner of said Site #32; thence South 00°37'10" West, along the West line of said Site #32 a distance of 450.00 feet to the Southwest corner of said Site #32; thence South 89°22'50" East,

along the South line of said Site #32, a distance of 450.00 feet to the Southeast corner of said Site #32; thence South 00°37'10" West, a distance of 170.52 feet; thence South 44°22'50" East, a distance of 424.26 feet; thence South 00°37'10" West, a distance of 323.73 feet; thence South 44°22'50" East a distance of 432.40 feet to an iron rod, the POINT OF BEGINNING; thence South 89°22'50" East a distance of 450.00 feet to an iron rod; thence South 00°37'10" West, perpendicular to the first course of this description, a distance of 450.00 feet to an iron rod; thence North 89°22'50" West parallel to the first course of this description, a distance of 450.00 feet to an iron rod; thence North 00°37'10" East perpendicular to the first course of this description, a distance of 450.00 feet to the POINT OF BEGINNING.

AND LESS: 76 ACRE SITE

That part of Sections 29 and 30, Township 24 South, Range 32 East, Orange County, Florida, described as follows:

Begin at the Northeast corner of said Section 30; thence N89°59'27"W along the North line of said Section 30 for a distance of 790.24 feet; thence S00°00'33"W, 2273.27 feet; thence S89°59'27"E, 789.46 feet; thence S89°57'05"E, 666.06 feet; thence N00°02'55"E, 2273.27 feet to the North line of the aforesaid Section 29; thence N89°57'05"W along said North line for a distance of 666.85 feet to the POINT OF BEGINNING.

Containing 3076.036 acres more or less and being subject to any rights-of-way, restrictions and easements of record.

THE FOLLOWING RECIPROCAL EASEMENTS ARE SHOWN FOR INFORMATIONAL PURPOSES ONLY AND HAVE NOT BEEN SURVEYED.

TOGETHER WITH EASEMENT RIGHTS GRANTED IN AGREEMENT GRANTING RECIPROCAL EASEMENTS FOR DRAINAGE, UTILITIES, INGRESS, AND EGRESS BY AND BETWEEN CAMINO REALE PROPERTIES, LLC AND FARMLAND RESERVE, INC. RECORDED DECEMBER 23, 2009 IN OFFICIAL RECORDS BOOK 9979, PAGE 8989, PUBLIC RECORDS OF ORANGE COUNTY, FLORIDA.

Exhibit C
PDS Scope of Services
(14 pages)

Sunbridge Parkway Preliminary Design Study
Scope of Services – Expedited Version – Private Ownership of Future Road Corridor
Assumed Project Duration – 12 months

1.0 Administration

1.1 Notice to Proceed Meeting
The Consultant shall attend a Notice to Proceed Meeting with County representatives, where relevant project information will be provided by the County, along with procedures for administering the contract.

1.2 Project Status Meetings
The Consultant shall attend periodic meetings (up to six (6)) with the Orange County Project Manager and staff to discuss project progress and status, upcoming events and activities. The purpose of these meetings is to maintain clear communication between the County and the Project Team. The Consultant shall prepare and distribute meeting minutes following each of these meetings.

1.3 Project Management/Supervision (May or may not be included per Applicant's determination)
The Consultant shall coordinate and manage the efforts of the Consulting Team in throughout the duration of the Preliminary Design Study. Management shall include solicitation of proposals, review of invoices, schedule management and coordination of deliverables.

1.4 PDS Project Schedule
The Consultant shall prepare and submit a detailed project schedule for the project identifying major tasks, their duration and tasks relationships.

1.5 Monthly Invoices (Progress reports)
The Consultant shall provide monthly progress reports to Orange County summarizing the effort expended to date by the Consulting Team.

1.6 Quality Assurance/Quality Control
The Consultant shall implement a Quality Assurance/Quality Control program for review of documents produced by the Consultant and by other Consulting Team members for consistency with this Scope of Services and internal consistency.

1.7 Deliverables
Work to be completed under this section by the Consultant shall require the following items to be delivered and accepted by the County:

- Project Schedule

1.8 Pay Items
Not included

2.0 Public Involvement

The public involvement element of this project is a primary component distinguishing this project from a roadway design project. The purpose of the public involvement element is to get the community involved in the project development and decision-making process, so that the County can develop a project that not only meets the transportation needs of the area, but is also supported by the community it is intended to serve. Therefore, the Consultant shall conduct the following public involvement activities throughout the project.

2.1 Public Involvement Plan

Not included

2.2 Coordination Meetings

The Consultant shall coordinate and conduct one (1) initial meeting or telephone call and one (1) follow-up telephone call with the following local and state organizations to inform them of the project and solicit their input:

- South Florida Water Management District (SFWMD)
- Orange County Utilities Department (OCU)
- Orange County Environmental Protection Department (OCEPD)
- Osceola County Community Development Department (Osceola)
- United States Fish & Wildlife Service (USFWS)
- Army Corps of Engineers, (ACOE)
- Florida Department of Environmental Protection (FDEP)
- Florida Fish & Wildlife Conservation Commission (FFWCC)
- Orange County Public Schools (OCPS)
- Orange County Fire Rescue (OCFR)
- Central Florida Expressway Authority (CFX)
- Florida Department of Transportation (FDOT)
- Florida's Turnpike Enterprise (FTE)
- Orlando Utilities Commission (OUC)
- Florida Gas Transmission (FGT)
- TECO Peoples Gas (TECO)

Consultant shall prepare minutes for each meeting or telephone call and provide copies to Orange County.

2.3 Small Group Meetings (Up to two)

The Consultant shall prepare for and participate in up to two (2) Small Group Meetings, to be conducted on an as needed basis at the discretion of Orange County. County staff shall facilitate any required Small Group Meeting and the Consultant shall prepare the requisite exhibits.

2.4 Updated Mailing List
Orange County shall prepare an initial mailing list and Consultant shall update and maintain the mailing list throughout the project duration based on information received from Orange County.

2.5 Newsletters
Orange County shall provide a newsletter template and Consultant shall update and distribute up to four (4) such newsletters, subject to Orange County approval prior to distribution.

2.6 Website Creation / Maintenance (Orange County)
Orange County shall create and maintain the project website. Consultant shall provide website content as requested by Orange County.

2.7 Advertisements / News Releases
Orange County shall provide templates for all required advertisements and/or news releases and Consultant shall prepare and publish up to three (3) such advertisements and/or news releases, which are subject to Orange County approval prior to publication.

2.8 Public Information Meetings
The Consultant shall prepare for and conduct one (1) public information meeting as described below.

- Recommended Concept Public Meeting - Following identification of a recommended improvement concept, the Consultant shall coordinate and conduct a Recommended Concept Public Meeting. The purpose of this meeting is to present the project team's draft recommended improvement concept to the public for review and comment prior to presenting to the Local Planning Agency (LPA), and the Board of County Commissioners (BCC). County staff shall present the recommended improvement concept to the public in a formal PowerPoint presentation and script prepared by Orange County. Orange County shall distribute a comment form to the meeting participants. The comment form shall be designed to elicit information from the public relevant to the road improvement being considered.

The Consultant shall provide exhibits for display at meetings and shall be mounted on foam board unless otherwise directed by the County. Exhibits shall be plotted in color or black and white as appropriate. Exhibits shall include maps on an aerial photography base and typical sections and detail sketches.

The Consultant shall conduct all preparations for the meetings for the County and shall ensure an adequate number of Consultant personnel are present. Orange County shall make arrangements for the meeting room rental and setup, and ensure that adequate directional signs are placed on the meeting grounds to direct

2.4 Updated Mailing List
Orange County shall prepare an initial mailing list and Consultant shall update and maintain the mailing list throughout the project duration based on information received from Orange County.

2.5 Newsletters
Orange County shall provide a newsletter template and Consultant shall update and distribute up to four (4) such newsletters, subject to Orange County approval prior to distribution.

2.6 Website Creation / Maintenance (Orange County)
Orange County shall create and maintain the project website. Consultant shall provide website content as requested by Orange County.

2.7 Advertisements / News Releases
Orange County shall provide templates for all required advertisements and/or news releases and Consultant shall prepare and publish up to three (3) such advertisements and/or news releases, which are subject to Orange County approval prior to publication.

2.8 Public Information Meetings
The Consultant shall prepare for and conduct one (1) public information meeting as described below.

- Recommended Concept Public Meeting - Following identification of a recommended improvement concept, the Consultant shall coordinate and conduct a Recommended Concept Public Meeting. The purpose of this meeting is to present the project team's draft recommended improvement concept to the public for review and comment prior to presenting to the Local Planning Agency (LPA), and the Board of County Commissioners (BCC). County staff shall present the recommended improvement concept to the public in a formal PowerPoint presentation and script prepared by Orange County. Orange County shall distribute a comment form to the meeting participants. The comment form shall be designed to elicit information from the public relevant to the road improvement being considered.

The Consultant shall provide exhibits for display at meetings and shall be mounted on foam board unless otherwise directed by the County. Exhibits shall be plotted in color or black and white as appropriate. Exhibits shall include maps on an aerial photography base and typical sections and detail sketches.

The Consultant shall conduct all preparations for the meetings for the County and shall ensure an adequate number of Consultant personnel are present. Orange County shall make arrangements for the meeting room rental and setup, and ensure that adequate directional signs are placed on the meeting grounds to direct

participants to the meeting room. Orange County shall have the PowerPoint presentation and all meeting materials in final format ready for review and approval by County staff no later than two weeks prior to the scheduled public meeting. Orange County shall document all comments received and questions addressed at the meetings and shall prepare written responses to all questions not adequately addressed at the meetings.

2.10 Local Planning Agency Work Session and Public Hearing

The Consultant shall provide all support necessary for the County to conduct one (1) work session and one (1) public hearing on the recommended improvement concept. The County shall prepare a PowerPoint presentation and script for the LPA Public Hearing.

2.11 Board of County Commissioners Public Hearing

The Consultant shall provide all support necessary for the County to conduct one (1) Final Public Hearing on the recommended improvement concept. The County shall prepare a PowerPoint presentation and script for the BCC Public Hearing.

2.12 Deliverables

Work to be completed under this section by the Consultant shall require the following items to be delivered and accepted by the County:

- Updated Mailing List
- Newsletters
- Web Page Content
- Advertisements & News Releases
- Public Information Meeting Materials
    - Exhibits
    - PowerPoint Presentations
- Local Planning Agency Work Session Presentation
- Local Planning Agency Public Hearing PowerPoint Presentation
- Board of County Commissioners Public Hearing PowerPoint Presentation

2.13 Pay Items

3.0 Data Collection

Immediately upon receipt of the notice to proceed, the Consulting Team shall begin collecting the engineering, drainage, hydraulic, and environmental data necessary to develop and evaluate a recommended improvement concept. The Consultant shall utilize information gathered in previous engineering reports and/or other existing right-of-way documentation.

3.1 Aerial Photography / Base Maps

The Consultant shall utilize the latest publically available Orange County aerial photography to prepare color 1"=100' and 1"=50' scale base maps. These maps shall be used to present the master drainage basins (1"=100'), the recommended improvement concept (1"=50'), and right-of-way requirements (1"=50').

The Consultant shall prepare color aerial photography on standard 22 x 34 inch sheets with appropriate title blocks, which shall be suitable for public display. Color aerial imaging shall be used to present the overall project concept and the final recommended improvement concept to the public at the various public meetings. The Consultant shall also provide to the County in digital format on CD-ROM.

3.2 Existing Roadway Characteristics
Not included

3.3 Traffic Data
Orange County shall provide to the Consultant existing and projected traffic data from either previously prepared Innovation Way traffic studies or the Orange County Comprehensive Plan. Utilizing the traffic data supplied by the County, the Consultant shall establish the basic design requirements for the roadway typical section, a typical detail for major and minor intersection improvements. The Consultant shall summarize the traffic data and analysis activities in a report to be included in the Preliminary Design Study Report.

3.3.1 Traffic Counts
Not included

3.3.2 Traffic Factors
Not included

3.3.3 Design Traffic Projections (MetroPlan Orlando OUATS Model)
Using the adopted travel forecasts from the Orange County Comprehensive Plan, the Consultant shall prepare opening year and design year travel forecasts for the Sunbridge Parkway study segment for Build conditions.

The design traffic shall be used to establish the basic design requirements for the roadway typical section and each intersection. Using the design traffic, the Consultant shall perform an operational analysis of each of the identified intersections to establish the minimum required lane geometry (including queue lengths) needed to adequately serve the projected turning movements.

3.3.4 Crash Data
Not included

3.3.5 Design Traffic Technical Memorandum
Not included

3.3.6 Design Traffic Engineering Report

The Consultant shall prepare a detailed *Design Traffic Engineering Report* describing the traffic data collection effort, forecasts and analysis. The report shall contain tabulations of all data collected, warrant analyses where appropriate, and recommendations as to traffic control methods and turn lane geometry for specific intersections. The draft *Design Traffic Engineering Report* shall be submitted for review prior to scheduling the Recommended Concept Public Meeting. The final *Design Traffic Engineering Report* shall be summarized in and appended to the Sunbridge Parkway Preliminary Design Study.

3.4 Utilities

The Consultant shall identify any existing and proposed utilities, which may influence location and design consideration, including but not limited to the following:

- Overhead: transmission lines, microwave towers, etc.
- Underground: water, gas, sanitary sewer, force mains, power and telephone cables, as identified by an underground utility locating service.

The Consultant shall coordinate with utilities to:

1) Make them aware of the project at the conceptual level. (All information provided to each utility shall be documented as noted below.)
2) Obtain information on proposed utility construction.

The Consultant shall map and document this information in the Utility Section of the ***Preliminary Design Study Report,*** which shall summarize how the existing utilities shall influence location and design considerations.

3.5 Bridges and Structures

Not included

3.6 Transportation Plans

Not included

3.7 Existing Multimodal Accommodations and Services

Not included

3.8 Soil Survey and Geotechnical Data

The Consultant shall review existing soil maps and available geotechnical information for the study area. Preliminary borings should be conducted along the recommended alignment (20-feet deep approximately every 600 l.f.) to determine seasonal groundwater levels and in areas of the alignment that have a probability of having significant depths of unsuitable materials.

The Consultant shall also perform one soil boring to a depth of 15 feet for each proposed stormwater retention pond site.

The results of the geotechnical data collection activities shall be mapped and documented in a Geotechnical Report, which shall be summarized in and appended to the ***Preliminary Design Study Report***. This section shall document existing data and boring results, and shall contain preliminary recommendations relevant to the project.

3.9 Environmental Site Assessment

The Consultant shall conduct a Contamination Screening Evaluation Report (CSER) for the properties affected by the recommended alignment. The Environmental Site Assessment shall be mapped and documented in a CSER report, which shall be summarized in and appended to the ***Preliminary Design Study Report***.

3.10 Land Use / Development Plans

Orange County shall provide to the Consultant, and the Consultant shall consider in the preparation of the Preliminary Design Study, any Regulating Plan, Land Use Plan, Preliminary Subdivision Plan or Development Plan that could potentially influence the determination of a recommended improvement concept for Sunbridge Parkway.

3.11 Cultural Facilities

Not included

3.12 Archaeological and Historic Features

The Consultant shall review federal, state and local sources to identify recorded historical and archaeological sites within the study area, which shall include the proposed right-of-way, all proposed stormwater facilities and a 100-foot buffer on all sides of the proposed right-of-way and stormwater facilities. Utilizing this information, the Consultant shall map all sites that may influence the location and evaluation of alternative improvement concepts. This information shall be documented in the Cultural Resource Section of the Sunbridge Parkway Preliminary Design Study Report.

3.13 Hydrologic and Natural Features

The Consultant shall review existing information to identify significant hydrologic and natural features found within the study area. The Consultant shall document offsite and bypass drainage features occurring within the study corridor. The Consultant shall supplement documented information with field reviews of the study area. Information to be documented shall, at a minimum, include the following:

- Wetlands
- Conservation Areas
- Mitigation Sites
- Water Quality
- Floodplains and Floodways
- Drainage Outfalls

The Consultant shall also collect corridor-wide permit-related information on environmental resource permits, dredge and fill permits, water quality permits, or stormwater discharge permits. This activity shall include identifying and coordinating with all applicable permitting agencies, as well as identifying all existing permits and their conditions.

3.14 Threatened and Endangered Species

The Consultant shall review existing information to determine the potential presence of threatened or endangered plant and animal species within the study area. The Consultant shall supplement documented information with field reviews of the study area. The Consultant shall document in report and map format, in the ***Preliminary Design Study Report***, all information that may influence the location and evaluation of the recommended improvement concept.

3.15 Deliverables

Work to be completed under this section by the Consultant shall require the following items to be delivered and accepted by the County:

- Color Aerial Base Map
- Design Traffic Engineering Report
- Geotechnical Reports and Maps
- Environmental Site Assessment Report
- Cultural Resource Assessment Survey
- Hydrologic & Natural Features Report
- Threatened & Endangered Species Report
- Maps:
    - Existing and Proposed Utilities
    - Hazardous Materials Areas
    - Land Use & Development Plans
    - Archaeological & Historical Sites
    - Hydrologic & Natural Features
    - Threatened & Endangered Species
    - Critical & Strategic Habitat
    - Wildlife Corridors

3.16 Pay Items

Not included

4.0 Right-of-Way Engineering Projects (Right-of-Way Identification Maps)

4.1 Right-of-Way Mapping

Not Included

4.2 Parcels

4.2.1 Review of Title Work

The Consultant shall obtain and review Ownership and Encumbrance Reports in support of property and right-of-way surveys for each parcel anticipated to be conveyed to Orange County as a road right-of-way parcel or stormwater management parcel and shall show all known encumbrances on the Legal Descriptions and Parcel Sketches.

4.2.2 Legal Descriptions and Parcel Sketches

The Consultant shall prepare for each right-of-way parcel and stormwater management parcel to be conveyed to Orange County via warranty deed a Legal Description and Sketch in accordance with applicable State of Florida Standards of Practice as set forth by the Board of Professional Surveyors and Mappers, Chapter 5J-17.05, Florida Administrative Code, per Section 472.027, Florida Statutes. Such legal descriptions and sketches shall be appropriately tied to existing physical monuments and section corners. Closure reports shall be provided for all legal descriptions.

4.2.3 Parcel Staking for Appraisal

Not included

4.3 Topographic Maps

The Consultant shall utilize the latest publically available Orange County aerial topographic and/or LiDAR surveys, or best available topographic surveys where available, to prepare the required topographic maps, 1" = 100' scale. In addition, the Consultant shall provide elevations along the centerline of the recommended alignment (approximately every 100 feet) to confirm the base topography. The Consultant shall utilize the topographic survey and centerline elevations to evaluate the horizontal alignment of the recommended improvement concept such that it may be developed to its recommended configuration with due consideration to applicable engineering criteria.

4.4 Minimization of Compensable Impacts

Not included

4.5 Changes to Documents during Right-of-Way Acquisition

Not included

4.6 Deliverables

Work to be completed under this section by the Consultant shall require the following items to be delivered and accepted by the County:

- Legal Descriptions and Sketches
- Topographic Maps
- Orange County Field & Computation Books
- Raw Field Data

4.7 Pay Items
Not included

5.0 Corridor Analysis Documentation
Consultant shall prepare a Characteristics of the Study Area report which provides a summary of the data collected for each item in Section 3.0.

5.1 Deliverables
Characteristics of the Study Areas report

5.2 Pay Items
Not included

6.0 Improvement Development
The Consultant shall perform the following tasks to develop and analyze the recommended improvement concept. The Consultant shall document in the **Sunbridge Parkway Preliminary Design Study** the design criteria utilized in the analysis process for roadway and drainage improvement concepts.

6.1 Typical Sections
Based on the **Design Traffic Engineering Report,** drainage considerations and other available information, the Consultant shall consider alternative typical sections and shall evaluate these alternatives using criteria that shall include but not be limited to access management, right-of-way requirements, offsite and bypass drainage systems and traffic volumes. The analysis shall be documented in the **Sunbridge Parkway Preliminary Design Study** and submitted to the County with a recommendation of viable typical sections.

6.2 Access Management Determination
The Consultant shall determine the proper access classification and standard to be applied to the project and coordinated with the County's access management regulations.

6.3 Develop Alignment Improvement Concept
The Consultant shall develop a recommended improvement concept based on review and analysis of collected data related to the project.

6.4 Analyze Improvement Concept
The Consultant shall analyze the benefits and impacts associated with the recommended improvement concept. The results of the analysis of the

recommended improvement concept shall be documented in the Preliminary Design Study Report and shall include:

- Compensable Impacts Analysis
  Not included

- Cost Analysis
  The Consultant shall develop engineering design and construction cost estimates for the recommended improvement concept. The Consultant shall provide the County with a Right-of-Way Impacts Estimation Package Right-of-way cost estimates shall be provided by the County and shall include property values and damages. The cost estimates provided by the County shall be based on the information in the Right-of-Way Impacts Estimation Package.

- Conceptual Drainage Analysis
  The Consultant shall perform a preliminary drainage analysis of the recommended improvement concept to determine the potential outfall locations and preliminary sizes (volume and area) of required detention and/or retention facilities for stormwater treatment or attenuation. This analysis shall also address off-site and bypass systems within the corridor including the sizing of closed systems. Pond locations shall be evaluated for each basin for the recommended improvement concept. Pond site evaluations shall require coordination with the property owner to determine the owner's preferred location within the property. The evaluation shall also consider permitability, avoidance of wetland and floodplain impacts, outfall availability, hydraulics and County standards with regards to the pond slopes and configuration. The findings shall be documented in a Pond Siting Report that shall be appended to the ***Preliminary Design Study Report***.

- Community (social-economic) Impact Analysis
  Not included

- Computer Enhanced Photographs
  Not included

- Wetland Impacts
  The Consultant shall estimate the acres of wetlands impacted by the recommended alignment and identify potential mitigation strategies, including costs.

- Flood Plain Impacts
  The Consultant shall estimate the extent of flood plain encroachment for the recommended improvement concept and identify potential floodplain compensation alternatives and costs.

- Critical and Strategic Habitat Impact
  The Consultant shall evaluate potential impacts to any identified critical and strategic habitat area resulting from the recommended improvement concept. This includes a Conceptual Mitigation Plan, if applicable.

- Wildlife Corridor Impact
  The Consultant shall evaluate potential impacts to any identified wildlife corridors resulting from the recommended improvement concept. This includes recommendations for wildlife crossings, if applicable.

- Threatened & Endangered Species Impacts
  The Consultant shall quantify/qualify the potential impacts to threatened and endangered species and habitats associated with the recommended alignment and shall identify potential mitigation strategies and costs. The Consultant shall coordinate with regulatory agencies to identify permitability of impacts of the recommended alignment to Threatened and Endangered Species.

- Archaeological and Historic Feature Impacts
  The Consultant shall evaluate potential impacts to any identified archaeological or historical features resulting from the recommended improvement concept. This includes a Conceptual Management Plan, if applicable.

- Contaminated Sites Impacted
  The Consultant shall identify the location and known extent of potential contaminated sites for the recommended improvement and shall recommend whether a Phase II Environmental Site Assessment is necessary to determine whether modifications are warranted.

- Geotechnical Analysis
  The Consultant shall evaluate the suitability of the soil underlying the recommended alignment for roadway and pond construction.

6.5 Alternatives Comparison Matrix
Not included

6.6 Deliverables
Work to be completed under this section by the Consultant shall require the following items to be delivered and accepted by the County:

- Typical Sections
- Access Management Map
- Alignment Map
- Cost Analysis of Recommended Improvement Concept
- Conceptual Drainage Analysis and Pond Siting Report
- Wetlands Impact Analysis
- Floodplain Impact Analysis

- Critical and Strategic Habitat Impact Analysis
- Wildlife Corridor Impact Analysis
- Threatened and Endangered Species Impact of Analysis
- Archaeological and Historical Feature Impact Analysis
- Contaminated Site Impact Analysis
- Geotech Impact Analysis

6.7 Pay Items
Not included

7.0 Recommended Improvement Concept Evaluation
The Consultant shall refine the final recommended improvement concept to finalize the major elements of the project. These refinements shall include estimating the final recommended right-of- way limits, pond locations, cost and other major features needed to advance the project to the subsequent design phase. Impacts that are not quantifiable shall be documented in the ***Preliminary Design Study Report.***

7.1 Preliminary Design Study Report
One primary document entitled the ***Sunbridge Parkway Preliminary Design Study Report*** shall be prepared. This document shall record all public involvement activities analysis efforts, and the final recommendation. A report outline shall be submitted to the County for review and approval prior to initiating documentation. It shall contain summaries and recommendations pertaining to the recommended improvement concept and potential impacts associated with it. The Consultant shall prepare the draft ***Preliminary Design Study Report*** documenting all activities leading to and including all comments received from the public to that point, and the selection of the recommended improvement concept. The Consultant shall finalize the ***Preliminary Design Study Report*** .

The ***Preliminary Design Study Report*** shall, at a minimum, contain the following information in the body of the report (including maps as appropriate):

- Public Involvement – Provided by Orange County
- Existing Conditions
- Conformance with Transportation and Long Range Plans
- Geotechnical Considerations
- Environmental Site Assessment Issues
- Hydrologic and Natural Features
- Threatened and Endangered Species
- Recommended Improvement Concept Narrative
- Recommended Improvement Concept Map

In addition, the ***Preliminary Design Study Report*** shall include the following as appendices or as separate volumes of the report:

- Geotechnical Report
- Environmental Site Assessment Report
- Pond Siting Report

7.2 Cost Estimates and Final Design Schedule
Not included

7.3 Final Recommended Improvement Concept Map
The Consultant shall prepare a Recommended Improvement Concept Map that shall graphically depict the location of the roadway alignment and the proposed improvements prior to the Recommended Concept Public Meeting. The map shall be prepared in a strip-map format at a scale of 1" = 50'. The Recommended Improvement Concept Map shall show the location of median openings (identified as to full or directional), lane configurations, pedestrian/bicycle facilities, potential pond/mitigation/flood plain compensation sites, utility strips, privacy walls and any other project elements identified for inclusion in the final design of the roadway. If deviations from the proposed typical sections are proposed in specific areas (such as reductions in lane widths, modification to border areas, etc.), they shall be clearly identified on the Recommended Improvement Concept Map.

The Consultant shall submit a Final Recommended Improvement Concept Map with the Final ***Preliminary Design Study Report.***

The draft and final submittals of the ***Preliminary Design Study Report*** with Executive Summary shall include final Recommended Improvement Concept Maps formatted onto 11-inch X 17-inch sheets at a scale of 1" = 100'.

7.4 Deliverables
Work to be completed under this section by the Consultant shall require the following items to be delivered and accepted by the County:

- Draft, updated draft, and final Preliminary Design Study Report (including 11" X 17" maps)
- Recommended Improvement Concept Map, drafts and final

TABLE OF DELIVERABLES

- Preliminary Design Study Report 4 Copies/1 Disc
- Final Report 4 Copies/1 Disc

7.5 Pay Items
Not included

Exhibit D
Excess Capacity Calculation
(1 page)

Exhibit D - Excess Capacity Calculation

Segment	Adopted LOS	GSV	PHPD Trips			Sunbridge Capacity Consumed	Excess Capacity Available to County
			Project	Non-Project	Total	%	%
Segment 1	E	1,785	1,312	745	2,057	73.5%	26.5%
Segment 2	E	924	914	749	1,663	98.9%	1.1%
Segment 3a	E	924	1,153	1,118	2,271	124.8%	-24.8%
Segment 3b	E	1,640	1,153	1,118	2,271	70.3%	29.7%
Segment 4	E	1,640	1,153	1,118	2,271	70.3%	29.7%

3/17/2017 10:40 AM EDT

Exhibit E
Sunbridge Parkway Segments Map
(1 page)

Exhibit E

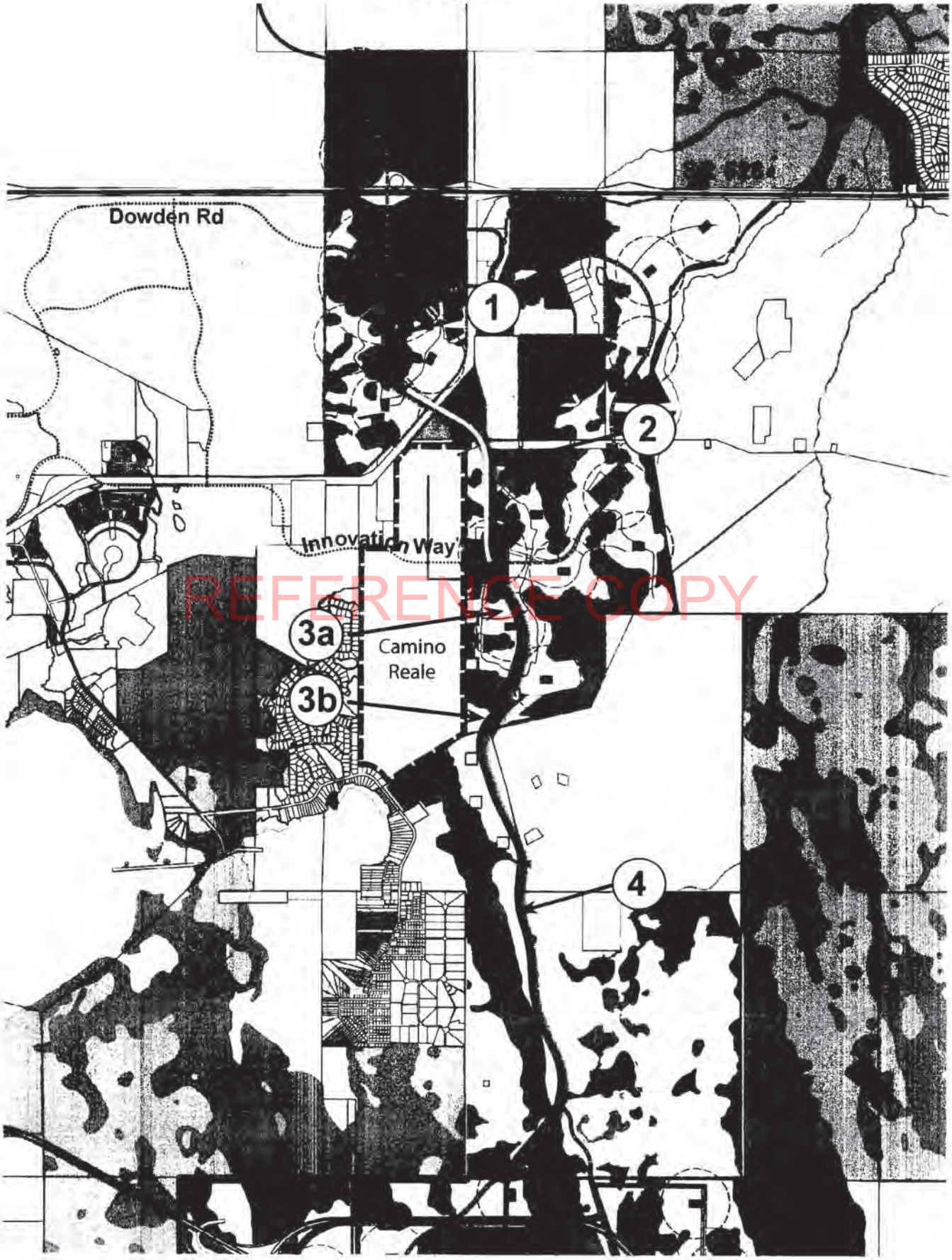


Exhibit F

Four Lane Design Excess Capacity

(1 page)

Exhibit F - Four-Lane Design Excess Capacity

Segment	Length (Feet)	Adopted LOS	GSV	PHPD Trips			Sunbridge Capacity Consumed	Excess Capacity Available to County
				Project	Non-Project	Total	%	%
Segment 2	8,215	E	1,785	914	749	1,663	51.2%	48.8%
Segment 3a	4,954	E	1,785	1,153	1,118	2,271	64.6%	35.4%
Aggregate Total	**13,169**						**56.2%**	**43.8%**

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Exhibit G

DEP Work Scope of Services

(43 pages)

Exhibit G
Project Name
(Project Limits)
(Approximate Length)

Final Engineering Design
Scope of Services

The Consultant shall provide final engineering design and construction plan preparation for the above referenced project. The Consultant shall perform those engineering services required to prepare a complete set of contract documents (plans and specifications) as described elsewhere herein.

The Consultant shall use the design concepts provided in the _____ *Preliminary Design Study* as approved by the Board of County Commissioners. The Consultant shall perform the required engineering services utilizing all the applicable materials and data collected and provided in the _____ Preliminary Design Study process.

The Consultant's Engineer-of-Record shall sign and seal a certification on the plans stating that the design has been prepared in accordance with the State of Florida Manual of Uniform Standards for Design, Construction, and Maintenance for Streets and Highways. Plans shall be accurate, legible and completed in accordance with the Florida Department of Transportation (FDOT) Roadway Plans Preparation Manual and the Florida Department of Transportation Roadway and Traffic Design Standards latest English Units edition, in effect at the time of the Notice to Proceed, as modified herein. The Consultant shall utilize his/her best engineering judgment, practices and principles in performing the work.

The Consultant is to prepare plans for the construction of _____ lanes for _____ from _____ to _____. Special treatment and/or additional lanes at major intersections, and widening of crossroads up to 600 feet in each direction shall be provided as identified in the _____ *Preliminary Design Study*. The Consultant shall also be responsible for proper tie in of all crossroads to the existing condition with respect to grading and drainage.

The lump sum fee and man-hour requirements shall be presented utilizing forms in Exhibit B. A general Project Schedule shall be attached to the fee proposal as Exhibit C.

The tasks included in this Scope of Services can be generally grouped into the following nine primary categories:

1. Administration
2. Public Information
3. Design and Plans Preparation
4. Permitting
5. Right-of-Way Engineering

6. Design Surveys
7. Geotechnical Services
8. Railroad Coordination
9. Post Design Services

This Scope of Services addresses each task within these elements and serves to further define specific requirements. The Consultant shall submit all required deliverables and provide specific services (with the exception of Post Design Services) within ____ days (inclusive of four-week review periods by County for review of progress submittals) upon written authorization from the COUNTY.

1.0 Administration

1.1 Notice to Proceed Meeting

The Consultant will prepare for and attend a Notice to Proceed Meeting with the Orange County Project Manager and staff. At this meeting, Orange County staff and key members of the Consulting team shall set the final parameters for the project and formally initiate final design.

1.2 Project Meetings

The appropriate members of the Consulting team shall attend periodic meetings (up to _____(__)) with the Orange County Project Manager and staff to discuss project progress and status, technical issues, and upcoming events and activities. The purpose of these meetings is to maintain clear communication between the County and the Project Team. The Consultant shall prepare and distribute meeting minutes following each of these meetings.

1.3 Project Management and Supervisions

Project Management and Supervision shall be included as a percentage of manhours for each primary categories listed above except for Administration and Post Design Services

1.4 Final Design Project Schedule

The Consultant shall prepare and submit a detailed project schedule prior to the Notice to Proceed Meeting for completion of final design and plans preparation identifying major tasks, their duration and tasks relationships. All deliverables shall be identified as milestones on the schedule. This schedule will utilize the Orange County Standard Roadway Project Schedule format on MS Project. The Consultant shall submit an updated design project schedule as directed by the Orange County Project Manager.

1.5 Cost Estimates and Construction Schedule

The Consultant shall prepare and submit a detailed engineer's cost estimate for construction of the project at each 60%, 90%, and final submittal. The Consultant shall also provide an estimate of construction time at the 90% and final submittals.

Note: If no bid is within +/- 10 % of the Engineer's estimate, the Consultant will prepare a revised estimate, re-evaluate the construction plans, evaluate the bids and submit

a report that summarizes this information. This report will include recommendations for revisions to the construction documents, if needed. This report shall be prepared at no cost to the County.

1.6 Utility Coordination

The Consultant shall coordinate with all utility providers within the project limits by furnishing plans at the 30%, 60%, 90%, 100% and final review stages to the utilities for review, confirmation of utility location and relocation purposes. The development of the roadway plans shall incorporate and consider the input provided by each utility. The Consultant shall coordinate with all utilities to ensure that the final design considers all existing and proposed utilities. As part of each progress submittal Consultant shall provide a list of all utilities that have been provided copies of the construction plans, and the dates the plans were delivered to each Utility. Consultant shall also provide a summary of the response received from each Utility.

The Consultant shall conduct timely on-going utility coordination efforts to ensure timely receipt of design information from the various utilities. The Consultant shall hold utility coordination meetings at Orange County Public Works at 60%, 90% and at 100% plans as necessary, and shall furnish the most recent project schedule to the utility companies. The Consultant shall prepare and distribute the meeting minutes following each of these meetings.

The Consultant shall prepare a utilities conflict matrix and resolve all utility conflicts prior to submitting final plans. No utilities shall be in conflict with any proposed roadway improvements.

The consultant shall be responsible to coordinate with utility companies to identify any unrecorded or prescriptive easements. Said information shall be communicated to Orange County appraisal/right-of-way acquisition staff.

1.7 Progress Review Meetings

The Consultant shall conduct a progress review meeting at the request of Orange County at the 30%, 60%, 90%, and bid package review stages with Orange County. The purpose of the meetings will be for the Consultant and County's staff to discuss the project design issues such as constructability, utility coordination, right-of-way requirements, and any other applicable issues.

1.8 Coordination with project stakeholders

The Consultant shall coordinate the 30%, 60%, 90%, and 100% plans review submittals and obtain comments directly from the following Orange County Divisions: Engineering, Traffic Engineering, Roads and Drainage, Highway Construction, Stormwater, and any other required coordination with any other Department and/or Division of Orange County. Also, any required coordination related to the design with any other city or county should be handled by the Consultant.

1.9 Quality Assurance/Quality Control

The Consultant shall designate appropriate staff to conduct Quality Assurance/Quality Control (QA/QC) reviews of all work products. These reviews shall be performed for all work products prior to their being submitted to the County for review or use. Work effort for QA/QC reviews shall be addressed as part of the work effort for each Pay Item as identified elsewhere herein.

1.10 Deliverables

Work to be completed under this section by the Consultant shall require the following items to be delivered and accepted by the County:

- Final design project Schedule
- Construction Time Estimate
- Cost Estimate
- Utility Conflict Matrix

1.11 Pay Item

Work to be completed under this section by the Consultant shall be paid for under the following pay items as listed on the Activity and Fee Summary:

- Administration

2.0 Public Information

The purpose of the public information element is to keep the community advised of the project status. Therefore, the Consultant will conduct the following public information activities throughout the project.

2.1 Small Group Meetings

The Consultant shall be available to conduct up to _____ (__) meetings with organizations interested in the final design. These meetings/presentations may be made to informal homeowners groups, formal homeowner associations or other formal organizations. The Consultant will be responsible for all presentation and handout materials, as identified in the Table of Deliverables.

2.2 Newsletters

The Consultant shall prepare and distribute project newsletters at the following three (3) milestones during the design:

1. Within two weeks of the Notice to Proceed
2. At the start of the right-of-way acquisition process
3. When the project is advertised for bids

The newsletters shall be printed in color on 8 ½ inch X 11 inch sheets in a format acceptable to the County. Sufficient copies of each edition shall be printed by the Consultant to provide 110% of the addressees on the mailing list at each mailing. The newsletters will be sent to each entry included in the data base mailing list. Newsletters shall be mailed as First Class mail. Those newsletters not mailed will be distributed as needed through small

group meetings and workshops. The Project Manager, the Chief Engineer of the Engineering Design Section and the Manager of the Transportation Planning Division must approve all final newsletter proofs prior to final printing.

2.3 Web Page Update / Maintenance

The Consultant shall provide updated information for the Orange County website during the design phase of the project. The information shall be provided to Orange County within three (3) weeks of the Notice to Proceed being issued to the Consultant, and shall be installed on the Orange County web page by Orange County staff. The information shall be in Microsoft word of PDF format. The information shall be consistent with the county template.

The Consultant shall provide updated information as necessary throughout the design process, but at a minimum concurrently with the issuance of project newsletters. The web site file shall also be updated to reflect the results of the bid process and at the issuance of the Notice to Proceed to the Contractor.

2.4 Mailing List

The County shall provide the Consultant with the final mailing list that was used for the _____ Preliminary Design Study, and with a current list of property owners and their addresses. The list shall contain all homeowners/property owners located within the study corridor as determined by the County. The Consultant shall review the two lists and shall combine them to create the initial mailing list for the final design process. The County shall provide the Consultant with an updated list of homeowners/property owners prior to the mailing of each newsletter. The Consultant shall update the mailing list with the information provided by the County prior to mailing the newsletters. The Consultant shall also expand the initial mailing list throughout the duration of the project to include any person or institution expressing an interest in the project, potential permitting or review agencies, elected and appointed officials in the area, community leaders, and media representatives.

2.5 Deliverables

Work to be completed under this section by the Consultant shall require the following items to be delivered and accepted by the County:

- Small group meeting presentations materials and handouts
- Newsletters
- Initial web site information and periodic updates

2.6 Pay Item

Work to be completed under this section by the Consultant shall be paid for under the following pay items as listed on the Activity and Fee Summary:

- Public Involvement

3.0 Design and Plans Preparation

The Consultant shall prepare the Final Roadway Plans Package. This work effort includes the roadway design needed to provide complete construction plans and specifications for the project with sufficient information to allow for constructing, permitting and right-of-way acquistions. These plans are for the use of the Contractor to bid and build the project and for Orange County to ensure the project is built as designed and to specifications. The Consultant shall provide 30%, 60%, 90% and 100% progress review submittals, in both full size (22 inches x 34 inches) and half size (11 inches x 17 inches) formats. All text shall be clear and legible on both the full size and half size plans. Full size and half size plans shall identify the scale of the drawing in both numerical and graphic formats. All references to scale hereafter refer to the scale on the full size (22 inches x 34 inches) format. Each submittal shall contain the information items listed in the appropriate Orange County Progress Review Submittal checklist. A copy of the appropriate checklist shall accompany each submittal with a certification signed by the Consultant's Project Manager certifying that the submittal completely addresses the required items as listed on the check list. Each review submittal shall include documentation of the internal Quality Assurance and Quality Control review conducted by the Consultant. The Consultant shall complete designs required for all aspects of the project as specifically described herein.

Final bid documents shall be submitted in both hard copy, as specified elsewhere herein, and electronic format in accordance with the standards established by the Orange County Purchasing and Contracts Division.

3.1 Roadway Design

The Consultant shall complete all design analysis, studies, and geotechnical investigations as required to complete the roadway design of the project. This effort shall include, but not be limited to the following areas.

3.1.1 Design Analysis

The Consultant shall design the geometrics for the project using the design standards that are most appropriate, with the proper consideration given to the design traffic volumes, design speed, capacity and levels of service, functional classification, design consistency and driver expectancy, aesthetics, pedestrian and bicycle concerns, ADA requirements, access management, to be consistent with the alignment and typical sections, the type of construction and other design parameters identified and described in the _____ Preliminary Design Study (PDS). The design elements shall include, but not be limited to, the horizontal and vertical alignments, lane widths, shoulder widths, cross slopes, borders, side slopes and ditches, lane transitions, superelevation, features of intersections and interchanges, and limited access points. The geometric design developed by the Consultant shall be the engineering solution to a given problem and not merely an adherence to minimum County, ASHTO and/or FDOT standards.

Changes to the alignment as shown on the _____ PDS shall be limited to that necessary to address project requirements not previously identified and must be approved by the County.

The Consultant shall prepare a Typical Section Package that shall include information sufficient for the County to approve overall elements of the roadway improvements related to the typical section. Significant variations along a corridor, or multiple affected roadways, may require multiple typical sections. Information to be included in the typical section package shall include the following elements with dimensions as appropriate: lanes, medians, profile grade point(s), cross-slopes (all elements as appropriate), curb type, shoulders, sidewalk placement relative to curb (or edge of pavement), centerline of construction, right of way, easements, clearing and grubbing limits, and side slopes or retaining walls as appropriate. Other elements to be provided in the package include: type of (but not necessarily thickness of) subgrade stabilization, base course, structural course and friction course (for concrete pavement the concrete is shown in lieu of the latter two items); design speed, recommended posted speed, and traffic volumes (opening and design year).

The Consultant shall review the typical sections presented in the _____ Preliminary Design Study and inform the County of any concerns they may have regarding these sections. The Consultant shall then prepare a Typical Section Package addressing the proposed section(s) for the mainline (including bridges if applicable) as well as all side streets. The Consultant shall also prepare a Roadway Design Criteria Package utilizing the basic design parameters recommended in the PDS Report. This criteria package shall address such items as Roadway Classification, Design Vehicle, Design Year, Design Speed, Horizontal Alignment, Vertical Alignment, Cross Section elements, MOT concept etc. The Typical Section and Roadway Design Packages shall be submitted to the County for review and approval prior to commencing any work for the 30% design and plans packages.

The Consultant shall prepare a Pavement Design Package in accordance with FDOT's Flexible Pavement Design Manual. The Consultant shall determine the twenty-year Equivalent Single-Axle Loads based on traffic counts and projections, including truck traffic. The Consultant shall review the traffic data provided by the Preliminary Design Study and shall obtain additional data as necessary to support the pavement design. The Consultant shall also determine the pavement structural number necessary to withstand the projected traffic loads. The pavement design shall include calculation of the thickness of each layer of the pavement structure based on the appropriate layer structural coefficients. The Consultant shall utilize Superpave (SP) Asphalt Concrete or Type S Asphalt Concrete as directed by the County. For designs using Superpave Asphalt Concrete, Consultant shall determine the type of asphalt binder, traffic level, and nominal maximum aggregate size for each pavement layer, and shall show this information on the typical sections. All Superpave Asphalt designs shall specify that fine graded mixes shall be used. Soils and traffic loading data used as input for the design shall be included in the package. The Pavement Design Package shall be submitted to the County for review and approval with the 30% Plans Package.

3.1.2 Roadway Design Documentation and Computation Book

The Consultant shall submit all design notes; design calculations and computations in book form to document the decisions and conclusions reached during the development of the construction plans. The Consultant shall also submit a quantity computation book that provides a breakdown of the quantity calculations and pay items necessary to construct the project.

3.2 Drainage Design

The Consultant shall finalize the design of the drainage and stormwater management systems. The _____ PDS has identified _____ recommended potential stormwater management ponds for the roadway. The Consultant shall verify the number and location of pond sites needed to appropriately meet the needs of the project.

3.2.1 Drainage Analysis

The Consultant shall finalize the drainage design for the project including underdrain as necessary using the design standards that are applicable for the appropriate water management district and County standards. The final stormwater management system shall be consistent with the concepts identified and described in the _____ PDS, unless otherwise approved by the County. The final drainage design shall consider and address property impacts in accordance with section 5.4 of this scope of work.

3.2.2 Design Documentation and Drainage Calculations

The Consultant shall submit a Drainage Design Documentation Report containing all design notes and computations to document the decisions and conclusions reached during the development of the stormwater management systems including geotechnical investigations and reports. The Consultant shall also submit signed and sealed drainage calculations for the project.

3.2.3 Bridge Hydraulics Report (BHR)

The Consultant shall prepare a Bridge Hydraulics Report (BHR) for all bridges crossing over a water body including bridge and box culvert widening and replacement. This report shall address hydrology, Hydraulics, deck drainage and scour. The outcome of the scour analysis shall be reflected in the Bridge Hydraulics Recommendation Sheet discussed in detail under section 3.4.27.3 of this scope.

3.3 Structural Design

3.3.1 Bridge Concept Report (BCR)

The Consultant shall review the recommendations in the PDS Report, and prepare and evaluate design alternatives for all bridge structures. The Consultant shall provide the County with acceptable justification for Consultant's selection of superstructure, substructure and retaining wall types from the list below. Selection of viable alternatives shall be site specific and agreed upon by the County. Consultant shall coordinate with all utilities to ensure alternatives accommodate all affected existing and proposed utilities.

3.3.1.1 Superstructure Alternatives

The Consultant shall evaluate at a minimum two separate superstructure types for possible development during final design. Whenever span configurations allow, a concrete and a steel alternative shall be evaluated. Each superstructure type shall be developed to the point of beam size selection and spacing to allow for a constructability and cost analysis to be performed.

3.3.1.2 Static System Alternatives

The Consultant shall evaluate multiple span arrangements and configurations to determine feasibility of each system with regards to substructure requirements and placement, superstructure depths and profile requirements, and possible right of way and traffic impacts.

3.3.1.3 Substructure Foundation Alternatives

The Consultant shall evaluate at a minimum two separate substructure types for possible development during final design. Whenever soil conditions allow, a shallow and a deep alternative shall be evaluated. Each substructure type shall be developed to the point of pile and/or footing size selection and spacing to allow for constructability and cost analysis to be performed.

3.3.1.4 Retaining Wall Alternatives

The Consultant shall evaluate the potential utilization of conventional (non-proprietary) walls and proprietary wall systems. Cost analysis and recommended foundation designs for the evaluated systems shall be prepared and submitted to the County for review and selection of the wall system(s) to be implemented in the final design.

3.3.2 Bridge Design

3.3.2.1.1 Bridge Geometrics

Bridge geometrics shall be developed in accordance with the roadway design

3.3.2.2 Structure Design Analysis

The bridge design shall include all components of the structure as well as the approach slabs and erosion protection for bridge approaches and embankments. The Consultant shall submit to the County all reports and design calculations prepared during the development of the plans. The design calculations submitted shall adequately address the complete design of all bridge components and retaining walls. These calculations shall be neatly and logically presented on 8-1/2" X 11" paper (where possible) and shall be signed and sealed by a Florida registered professional engineer. A cover sheet indexing the contents of the calculations shall be included and

the engineer shall sign and seal that sheet. These structure design calculations shall include, but not be limited to the following:

Superstructure design, pile capacity computations (vertical and horizontal), end bent design, intermediate bent design, pier design, pre-stressed concrete beam design, steel beam design, geometric data, quantities and tabulation, cost estimates and quantity computation book backup.

3.3.2.3 Load Rating

The Consultant shall complete a bridge load rating for inventory and operating conditions for design and Florida Legal Load configurations.

3.3.2.4 Bridge Number Identification

The Consultant shall complete a Bridge Number Request form and submit it to the FDOT District 5 Structures and Facilities Engineer for processing. The resulting Bridge Identification Number(s) shall be included in the Structures Plan package.

3.3.3 Retaining Wall Design

The Consultant shall provide all necessary design effort required to produce a complete set of construction documents for a conventional retaining wall system. The Consultant shall also determine appropriate Proprietary Wall types from the FDOT proprietary wall standards to the extent necessary to finalize the wall plans as described herein for proprietary wall systems. Retaining walls are anticipated at the following locations:

At the County's option, the Consultant shall obtain project specific retaining wall drawings from proprietary wall companies and incorporate these drawings into the contract document.

[*Add locations here*]

3.3.4 Critical Temporary Retaining Wall Design

A critical temporary retaining wall is defined as a wall required during the construction stage only to protect existing facilities during excavation operations, when other construction methods such as benching or sloping are not practical. These walls may be removed and reused after completion of the work. Such systems as steel sheet pilings, soldier beams and lagging, or other similar systems are commonly used. In such cases, the Consultant is responsible for designing and detailing the wall in the set of contract plans.

Critical temporary retaining walls are anticipated to be required at the following locations:

[*Add locations here*]

3.3.5 Miscellaneous Highway Related Structures

The Consultant shall design miscellaneous Highway Related Structures. This work effort includes the design analysis and associated plan preparation needed to prepare a complete set of contract plans and other necessary documents pursuant to the County criteria and the FDOT Plans Preparation Manuals.

3.3.5.1 Box Culverts – The Consultant shall provide the structural design for all box culverts (new and/or existing). Existing box culverts that are hydraulically adequate shall be structurally evaluated to determine whether it is appropriate to extend or replace the structure. Applicable FDOT Box Culvert standards shall be evaluated and incorporated to the extent possible.

Box culverts are anticipated at the following locations:

[*Add locations here*]

3.3.5.2 Overhead Sign Structures – The Consultant shall provide the design of sign structures for overhead cantilever and overhead truss sign assemblies and the associated foundation design. Applicable FDOT Overhead Sign Structure standards shall be evaluated and incorporated to the extent possible.

Overhead Sign Structures are anticipated at the following locations:

[*Add locations here*]

3.3.5.3 Traffic Mast Arms/Mono Tubes/Trusses – The Consultant shall provide the design of traffic mast arms/mono tube/trusses and the associated foundation design for signalized intersections. Applicable FDOT Standard pole and arm configurations shall be evaluated and incorporated to the extent possible.

Mast Arms/Mono Tube/ Trusses are anticipated at the following locations:

[*Add locations here*]

3.4 Roadway Construction Plans

The Consultant shall prepare final construction plan sheets, notes and details to include, all sheets necessary to convey the intent and scope of the project for the purposes of construction. The plan sheets shall be assembled in the following order:

1. Cover Sheet
2. General Notes

3. Standard Drawings and Details
4. Summary of Pay Items
5. Drainage Map
6. Typical Sections
7. Summary of Quantities
8. Summary of Drainage Structures
9. Survey Control Sheets
10. Plan and Profile Sheets
11. Intersection Details
12. Drainage Structure Cross Section
13. Box Culvert Plans
14. Pond Details and Cross Sections
15. Flood Plain Compensation Area Details
16. Environmental Considerations Plans/Mitigation Plans
17. Geotechnical Soil Survey
18. Cross Sections
19. Erosion Control Plans
20. Miscellaneous Details
21. Screen Wall Plans
22. Maintenance of Traffic Plans
23. Utility Adjustment Plans
24. Signing and Pavement Marking Plans
25. Signalization Plans
26. Landscape Plans
27. Structure Plans

3.4.1 Cover Sheet

The County will provide a standard County cover sheet in AutoCAD format to the Consultant. The Consultant shall complete the cover sheet with the information applicable to the project.

3.4.2 General Notes

The County shall provide a standard general notes sheet in AutoCAD format to the Consultant. The Consultant shall review and modify the general notes as required for this project.

3.4.3 Standard Drawings and Details

The Consultant shall include standard drawings and details as required for this project, including:

1. Supplementary details shall be provided for superelevation transitions. Profiles shall be shown for the profile grade line and the outside edge of each driving lane. Elevations shall be shown at 25 foot intervals, at grade breaks for the profile grade line, each lane profile on the graphical profile and on a superelevation table.
2. Details for all non-standard structures not covered elsewhere.

3. Standard details provided by Orange County, e.g., driveways, man hole rim and cover, etc.

3.4.4 Summary of Pay Items

The Consultant shall include all pay items and quantities that are required for this project. Pay items shall be based on FDOT pay items, but may be amended by the County. The necessary pay items and quantities shall be shown on the summary of pay items sheet. The summary of pay items with quantities shall be submitted no later than the 60% plans

3.4.5 Drainage Map

Drainage maps shall be developed at 1" = _____ (200)' scale on current black and white aerial photography provided by the Consultant for the entire length of the project. Ponds should be shown in their entirety.

3.4.6 Typical Sections

Upon approval of the Typical Section Package, the Consultant shall prepare the typical section sheets including the mainline, bridges (if applicable) and side streets with all applicable details added to the sections. These sheets shall also include other miscellaneous details necessary to construct the project. The details shall include but are not limited to milling and resurfacing, non-standard superelevation transitions, etc.

3.4.7 Summary of Quantities

The Consultant shall prepare a summary of quantities sheet in accordance with FDOT Basis of Estimates Manual showing individual summaries including but not limited to guardrail, fence, turnouts, sodding, ditch pavement, side drains, underdrains, and earthwork.

3.4.8 Summary of Drainage Structures

The Consultant shall prepare a table listing all proposed or modified drainage structures on the project. The structures shall be listed by structure number in numerical order. Cross drains and storm sewer structures shall be tabulated by structure number, providing the station, side (left/right), size, type, length and incidental quantities appropriate for the pipe material contained in the plans.

3.4.9 Survey Control Sheets

See Section 6.3.

3.4.10 Plan and Profile Sheets

The plan and profile sheets shall be developed for (street names) _____, _____, _____, and _____, and conform to the following requirements:

1. Plan and profile sheets shall be prepared at a scale of 1"=20' horizontal and 1"=2' vertical, and oriented such that north is shown to the top or right side of each sheet.
2. All stationing shall be positive and shall proceed from south to north or from west to east.
3. Existing features including existing utilities shall be shown with dashed lines and proposed or design features shall be shown with solid lines. Vertical utility locations verified in the field shall be shown on the profile.
4. Locations, dimensions and types of existing and proposed driveways shall be shown.
5. The plans shall show the names of all intersecting streets and shall identify the station and angle of the intersection of the centerlines.
6. Each plan and profile sheet shall show two readily accessible benchmarks to establish vertical control.
7. Horizontal control points shall be shown at all Points of Curvature, Points of Tangency, and Points of Intersection. Horizontal control points shall also be shown for Points on Curve or Points on Line such that the maximum spacing between control points is 600 feet or less.
8. All property lines and improvements located within 25 feet of the right-of-way or limits of construction, whichever extent is greater, shall be shown on the plan view.
9. Existing and proposed elevations shall be shown on the profile at even hundred foot stations and at all Points of Vertical Intersection on the Profile Grade Line. Proposed elevations shall be shown at 25-foot intervals along vertical curves and at Points of Vertical Curvature and Points of Vertical Tangency.
10. The following information shall be given for each horizontal curve on the centerline of construction and the center line of right-of-way:

    1. Curve Number
    2. P.I. Station
    3. Delta in degrees, minutes and seconds
    4. Degree of Curve
    5. Tangent length
    6. Arc length
    7. Radius
    8. P.C. Station
    9. P.T. Station
    10. Superelevation rate

11. Percent of slope for profile grade lines, ditch flow lines, and all drainage pipes where not shown on the drainage details.
12. Plan and profile sheets shall be provided for all side street improvements extending more than 50 feet from the right-of-way of the main project alignment.

13. Plan and profile sheets shall be provided for all drainage outfalls extending more than 50 feet from the right-of-way of the main project alignment.
14. No separate profile sheets will be allowed unless approved by the County.
15. Driveway horizontal geometry shall conform to County standards. Profiles shall be shown for all driveways.
16. Submittal of 60% construction plans and 90% right-of-way maps shall only show the centerline of construction. Baseline of survey shall not be shown. All locations and offsets shall be based on centerline of construction.

3.4.11 Intersection Details

The Consultant shall prepare intersection detail sheets for the intersections of (street names)_____ and _____, _____, _____, _____. Intersection sheets shall show all necessary details and geometric controls/access management features, including, turn lanes, special drainage and grading. Intersection details shall be drawn at a scale of 1" = 10'. Spot elevations shall be shown along pavement lane lines and curb returns at 10 foot intervals and at all grade breaks. Profiles for all radius returns shall be included with the detail of each intersection.

3.4.12 Drainage Structure Cross Sections

The Consultant shall prepare drainage structure cross sections for all pipes crossing under the roadway. Drainage structure sheets shall show the drainage structures, location, offsets not covered by template/standard index sheets, cross section, flow line elevations of all weirs or slots, top of grates, culverts and top of manhole elevations, pipe slopes, and similar data.

3.4.13 Box Culverts (If Required)

Details shall be provided for box culverts showing all dimensions, critical elevations and all reinforcing steel. Major box culverts may be included in the bridge plans portion of the construction plans.

3.4.14 Pond Details and Cross Sections

Pond detail sheets shall be provided showing a plan view of each pond at a scale acceptable to the County. Typical sections of each pond shall be shown for at least two axes of the pond. Each pond shall have cross sections to accurately depict the pond configuration. Details shall be provided for all control structures. Boring locations shall be shown on the plan view and soil boring logs shall be plotted on the pond cross sections.

3.4.15 Flood Plain Compensation Area Details and Cross Sections

Detail sheets shall be provided showing a plan view of each flood plain compensation area at a scale acceptable to the County. Typical sections of each area shall be shown for at least two axes of the area. Each flood plain compensation

area shall have cross sections to accurately depict the compensation area configuration. Boring locations shall be shown on the plan view and soil boring logs shall be plotted on the cross sections.

3.4.16 Environmental Consideration Plans (Dredge and Fill Sketches)

The consultant shall develop Environmental Consideration Plans, at a scale acceptable to the County, including necessary notes and details, as part of the contract plans necessary to secure applicable permits. The objectives of the plans are to depict wetland and upland buffer locations and impacts. The plans shall provide, at a minimum, wetland and upland buffer locations, impact areas, limits of construction, and limits of the project. The objective of the plans are to provide unencumbered details of wetland and buffer impacts including remaining wetland and upland buffers that would be preserved throughout construction.

3.4.16.1 Mitigation Plans

Once a mitigation plan has been reviewed and approved by the County, the Consultant shall be responsible for coordinating the proposed mitigation plan with the environmental agencies and for preparing the wetland mitigation plan to be included as a part of the Environmental Resource Permit application and to be included in the final construction documents.

Wetland mitigation area detail sheets shall be provided showing a plan view of each mitigation area at a scale acceptable to the County. Typical sections of each mitigation area shall be shown for at least two axes of each mitigation area. Planting zones shall be shown and dimensioned on the plan view with elevations shown on both the plan view and the cross sections. Each wetland mitigation area shall have cross sections to accurately depict the configuration of the mitigation area suitable for construction purposes. Plantings shall be listed in a table giving the common and scientific name of each species, the size of the plantings, and the number of each size of each species to be planted in each zone. Planting details, as necessary, shall also be provided. Soil boring locations shall be plotted on the plan views. Soil boring logs shall be plotted on mitigation area cross-sections or other acceptable location.

3.4.17 Geotechnical Soil Survey

The Consultant shall prepare soil survey sheets, which depicts the various types of soils encountered within the project limits, classification, mechanical properties, and recommended usage of those soils. The soil survey sheets shall include the following information at a minimum:

- Narrative description of each soil type with its engineering characteristics
- Supplemental soils investigations, such as muck probes

3.4.18 Cross Sections

Cross sections sheets shall include the following information at a minimum for roadways, lateral ditches, ponds, flood compensation areas and mitigation areas.

1. Unless otherwise approved by the County, the horizontal scale shall be 1" = 10' and the vertical scale shall be 1" = 5'.
2. The elevation grid shall be labeled on both left and right sides of each section.
3. The station shall be shown to the right each section.
4. Existing ground, structures, drainage conduits and utilities shall be shown as dashed lines and designed or proposed features shall be shown as solid lines.
5. End areas in square feet for earthwork cut and fill shall be shown. End areas for unsuitable materials shall be identified.
6. Existing ground shall be shown at least 25 feet outside the proposed rights-of-way lines, easements or limits of construction, whichever is further.
7. Existing buildings, structures, or drainage facilities shall be shown within the limits of the cross section as described in Item 6 above.
8. Section stationing shall increase from the bottom of the sheet to the top. When more than one row of sections are placed on a sheet, the stationing shall increase from bottom to top and from left to right.
9. The existing ground elevation at the centerline, design profiles and ditches shall be shown on each section.
10. Cross sections shall be shown at intervals not exceeding 50 feet. Additional intermediate cross sections shall be shown as necessary to provide supplementary information at bridges, box culverts, intersections, side streets, railroads, etc. Additional cross sections as negotiated on a project-by-project basis may be necessary to support right-of-way acquisition basis.
11. Cross section sheets shall be provided for all side street improvements extending more than 50 feet from the right-of-way line of the main project alignment.
12. Soil boring information, including encountered and estimated seasonal high groundwater levels shall be shown on all applicable cross sections.
13. Horizontal and vertical location of unsuitable soils.
14. The Consultant shall prepare driveway profiles for each driveway within the limits of construction, including side streets. Driveway profiles shall be drawn on the cross section sheets at the stations where they occur. These profiles shall show existing and proposed grade lines. Grades of proposed driveways shall conform to Orange County policies and procedures and Florida Department of Transportation Standard Indexes.

3.4.19 Erosion Control Plans

The Consultant shall develop Erosion Control details, at a scale acceptable to the County, including necessary notes and details, as part of the contract plans necessary to secure applicable permits. The objectives of the erosion control plans are to prevent erosion where construction activities are occurring, prevent pollutants from mixing with storm water and prevent pollutants from being discharged by trapping them on-site. The construction documents shall provide stormwater pollution prevention plans (SWPPP) to be paid for as a lump sum item.

3.4.20 Miscellaneous Details
Any details not included elsewhere in the plan set shall be shown here.

3.4.21 Screen Wall Plans
The Consultant shall evaluate the project relative to screen wall placement and/or replacement and make recommendations in accordance with the County's "Screen Wall Policy."

Areas that may require new walls include the following locations:

(List potential locations)
Any other locations identified in the Preliminary Design Study

The County will make the final determination if new walls will be included in the project. All new walls shall be placed within the public right-of-way, unless otherwise directed by the County.

Existing walls along the corridor which may require adjustment or replacement due to project impacts include the following:

(List potential locations)
Any other locations identified in the Preliminary Design Study

The County shall provide an electronic copy of its standard wall detail sheet to the Consultant. The Consultant shall review, modify and supplement the County's standard wall detail sheet as necessary to provide all necessary plans and details for all screen walls (new or adjusted) along the corridor. Consultant shall determine that the detail sheet and any necessary modifications meet all current standards and the requirements of the project. The consultant shall sign and seal the detail sheet. Plans shall include depiction of walls on plan and profile sheets and cross section sheets; notes on plan and profile sheets, general construction and foundation notes, structural details and wall finishing notes and details.

3.4.22 Maintenance of Traffic Plans
The Consultant shall prepare plan sheets, notes and details to move vehicular and pedestrian traffic during all phases of construction. The maintenance of traffic plans shall include construction phasing of _____ (including side streets), ingress and egress to existing properties, temporary signing and pavement markings, temporary signals, and detour routes. Additional sheets such as cross sections, profiles, drainage structures, retaining wall details and sheet piling may be necessary to ensure implementation of the maintenance of traffic plan and will be provided by the Consultant. The plan sheets will be developed at 1" = ___' scale. The construction documents shall provide for Maintenance of Traffic to be paid for as a lump sum item.

3.4.23 Utility Adjustment Plans/Roadway Lighting Coordination

The Consultant shall prepare separate plan and profile sheets showing proposed new or relocated facilities by others. These plans shall be prepared based on information provided by the utility companies.

Consultant shall coordinate with the applicable power companies to arrange for a lighting design to be prepared in accordance with agreements between the County and the power companies. Consultant shall coordinate the design of the lighting (performed by the power company) with the design of the roadway improvements and landscaping. Consultant shall show the location of the street lights provided by the power company on the Utility Adjustment Plans.

3.4.24 Signing and Pavement Marking Plans

The Consultant shall prepare plan sheets at a scale of 1"=___' for the entire length of the project, including side streets, showing pavement markings and signage to be installed on the project. Pavement markings and signs shall conform to the *Manual on Uniform Traffic Control Devices*. Signing and Marking Plans shall include, but not be limited to, the following: General Note sheet(s), summary of Pay Items sheets, Plan sheet(s), and Special Marking Detail sheet(s), as needed.

3.4.25 Signalization Plans

The Consultant shall prepare plan sheets, notes and details to include, but not be limited to, the following: Intersection Signalization Plan sheets at 1" = 20' scale, General Note sheet(s), Summary of Pay Items sheet(s), Pole Mast Arm Detail sheet(s), Foundation Details sheet(s) and special detail sheet(s) and soil boring data, as needed. The signalization plans will include overhead and pole mounted lighted street signs and signal support structures and required foundations. Florida Department of Transportation standard foundation designs shall be used where applicable. The sign support structures will be aesthetically compatible with the County's current lighted sign standards. This project will involve _____ signals at _____, _____, _____ and _____, which shall be interconnected, with _____ to the (provide compass direction) and _____ to the (provide compass direction). The County will provide all available traffic data. The Consultant shall provide additional traffic data as necessary for these intersections. Span wire signal designs are not acceptable. All signals shall be mast arm/mono tube/truss design as appropriate and approved by the County.

3.4.26 Landscape Plans

Consultant shall provide landscape plans prepared by a registered Landscape Architect. The plans shall identify the location and type of plant materials to be installed. Unless otherwise directed by the County, plantings shall be limited to trees of a species that will not require irrigation after maturity. Species and location shall be coordinated with clear zone requirements, sight distance requirements, proposed signage, ground conditions, streetlight locations, billboard locations, and utility conflicts and clearance. The location of the streetlights shall also be shown

on the landscaping plans to ensure there are no conflicts between the streetlights and existing trees to remain or proposed trees. The landscape plans shall also include General Notes and Details and a summary of Pay Items sheet (s).

Design shall be based on a landscaping construction budget not to exceed $75,000 per mile of total project length.

3.4.27 Structural Plans

The Consultant shall prepare plan sheets, notes and details to include all drawings referenced in the submittal checklist.

3.4.27.1 Bridge Structure Plans Package

Upon approval of the BCR, the Consultant shall prepare a Structure Plans Package for each bridge structure included in the project. This work includes the effort needed to prepare a complete set of Structure Plans pursuant to all applicable County criteria and the FDOT Plans Preparation Manuals. The structural concept shall represent the recommended structure type presented in the BCR as approved by the County.

3.4.27.2 Wall Control Drawings

3.4.27.2.1 The Consultant shall prepare control drawings for all permanent walls required. These drawings shall provide vertical and horizontal alignments, wall lengths, and details for any special features that need to be provided. Barriers, architectural treatments, etc., are considered to be special features.

3.4.27.2. 2 For conventional wall designs, the Consultant shall prepare drawings and specifications needed to supplement the control drawings. Appropriate FDOT standard drawings may be used if applicable.

3.4.27.3 Bridge Hydraulic Recommendation Sheet

The Consultant shall furnish and complete the Bridge Hydraulics Recommendation Sheet for all bridges over water and applicable box culvert systems. For information on the preparation of this sheet, see the FDOT Drainage Manual, (March 2010). The Consultant is responsible for the design of erosion protection for bridge approaches and embankments.

3.4.27.4 Retaining Wall Plans

This task includes the effort necessary for the preparation of a complete set of Retaining Wall Drawings to include Plan and Elevation, Reinforcement Details (if required) and Special Details. The Plans shall be prepared pursuant to the County standards and the FDOT Plans Preparation Manuals.

3.4.27.5 Critical Temporary Retaining Wall Plans

This task includes the effort necessary for the preparation of a complete set of Critical Temporary Retaining Wall Drawings to include Plan and Elevation, Reinforcement Details (if required) and Special Details. The Plans shall be prepared pursuant to the County standards and the FDOT Plans Preparation Manuals.

3.4.27.6 Miscellaneous Highway Related Structures

This task includes the effort necessary for the preparation of a complete set of Drawings to include Plan and Elevation, Reinforcement Details (if required) and Special Details for any miscellaneous highway related structures not covered elsewhere herein, including box culverts, overhead sign structures traffic signal mast arms, mono tubes and trusses. The Plans shall be prepared pursuant to the County standards and the FDOT Plans Preparation Manuals.

3.5 Progress Review Submittals

All submittals shall be accompanied by documentation of the Quality Assurance/Quality Control reviews in accordance with Section 1.7 herein. Submittals shall conform to the requirements outlined in the Orange County Progress Review Submittal checklist incorporated herein by reference. A copy of the checklist certified by the Consultant's Project Manager in accordance with Section 1.7 herein. Submittals shall conform to the requirements outlined in the Orange County Progress Submittal checklist. A copy of the checklist certified by the Consultant's Project Manager in accordance with Section 3.0 herein shall accompany each submittal.

The Consultant shall submit construction plans to the County for review at the 30%, 60%, 90%, 100% and final completion stages. The 30% roadway plans and the 30% bridge plans shall be separate submittals. A 60% bridge plan submittal is not required.

All County comments or questions on previous submittals, and any additional direction received from County must be addressed. Responses to the comments submitted by the reviewers should be addressed in writing and distributed to all reviewers. Cost estimates are required per section 1.5.

3.6 Specifications

The Consultant shall provide a complete bid package that includes: Schedule of Prices and complete set of Technical Provisions and Special Provisions for the project. The Schedule of Prices, Technical and Special Provisions shall be provided in MS Word format, which meet County requirements, as well as in any other electronic format required in accordance with the standards established by the Orange County Purchasing and Contracts Division. The Special Provisions shall clearly identify the responsible entity for each permit condition in each regulatory permit.

3.7 Electronic Design and Topography

The Consultant shall provide electronic Design and Topography files to the County in Microstation DGN format and Autodesk DWG file format at each review submittal and as requested by the County. Orange County recommends using the Microstation SAVE AS

command available in Microstation V8 software when converting DGN files to DWG file format.

3.8 Bid Package

The Consultant will prepare a draft and a final bid packages for construction. Orange County will provide the Consultant with a master reference document. The bid package shall include, but are not limited to the following documents:

- Project Information Sheet
- Location Map
- Scope of Work
- Engineer's Estimate
- Index of Plan Sheets
- Part D Schedule of prices (In Word Format)
- Part G Special provisions
- Index of Technical Provisions
- Part H Technical Provisions
- Permits
- Construction Plans
- Bid Check List

3.9 Deliverables

Work to be completed under this section by the Consultant shall require the following items to be delivered and accepted by the County:

- Drainage Design Documentation Report
- Roadway Design Criteria Package
- Typical Section Package
- Pavement Design Package
- Bridge Hydraulics Report (BHR)
- 30% Bridge Plans
- 30%, 60%, 90%, and 100% Construction Plans and Engineer's Cost Estimate
- Bridge Concept Report
- Final Construction Plans and Engineer's Cost Estimate
- Roadway Design Documents and Computation Book
- Quantity Computation Book
- Draft Schedule of Prices Technical and Special Provisions
- Final Schedule of Prices Technical and Special Provisions
- Final Electronic Design and Topography Files
- Electronic Bid Document Package
- Load Rating (Form or Report)
- Environmental Consideration Plans
- Mitigation Plans

- Alum Treatment Facility Plans
- Draft Bid Package
- Final Bid Package
- Subcontracting Opportunities per Contract Section IV G-2.
- Direct Purchases per Contract Section IV G-3.

3.10 Pay Items

Work to be completed under this section by the Consultant shall be paid for under the following pay items as listed on the Activity and Fee Summary.

- Drainage Design Documentation Report
- Bridge Hydraulics Report (BHR)
- 30% Bridge Plans
- Roadway Design Criteria, Typical Section and Pavement Design Packages
- 30%, 60%, 90%, 100% Construction Plans
- Bridge Concept Report
- Final Construction Plans
- Design Notes and Computations Book
- Quantity Computation Book
- Draft Technical and Special Provisions
- Final Technical and Special Provisions
- 30%, 60%, 90%, 100% and Final Engineer's Cost Estimate
- Electronic Bid Document Package
- Final Electronic Design and Topography Files
- Load Rating (Form or Report)
- Environmental Consideration Plans
- Mitigation Plans
- Alum Treatment Facility Plans
- Draft Bid Package
- Final Bid Package

4.0 Permitting

The Consultant will prepare all applications and other submittals and provide all environmental services necessary to obtain all permits including Environmental Resource Permits, Army Corps of Engineers Permits, FDOT connection permits, N.P.D.E.S. permit package, Florida Fish and Wildlife Conservation Commission, dewatering permits, and any other permits that may be necessary for the construction of the proposed improvements. The Consultant will pay for all permit application fees from out of pocket expenses. The construction plans package shall not be considered complete until all required permits have been received.

4.1 Environmental Permitting

4.1.1 Agency Coordination

The Consultant shall coordinate the environmental permitting effort with the Orange County Project Manager and Public Works Environmental Project

Manager. The Consultant shall notify the County Project Manager and Orange County Public Works Environmental Project Manager of all meetings with regulatory agencies to coordinate attendance by County staff. The Consultant shall submit meeting minutes and provide copies of all permit-related correspondence. In addition, the Consultant shall coordinate with County staff for any information, which may be relevant to the project design. This coordination shall take place prior to any regulatory meetings.

4.1.2 Wetland Delineation and Agency Field Review

The Consultant shall conduct identify and wetlands in accordance with all applicable State and Federal Regulations. The Consultant shall conduct and coordinate field investigations as necessary with County staff and with the appropriate regulatory agencies. The consultant shall provide meeting minutes and field notes to County Environmental Project Manager.

4.1.3 Wetland Mitigation (Limiting Amount)

If wetland impacts cannot be avoided, the Consultant shall coordinate with the County and investigate mitigation alternatives including the following, as appropriate:

- Payment to DEP/WMD per acre of wetlands impacted as defined in CH 373.4137 FS
- Monetary participation in regional offsite mitigation area (ROMA) and/or a permitted mitigation bank
- Creation/restoration/preservation on private or County owned lands

The Consultant shall coordinate with County personnel prior to approaching any environmental permitting or review agency. In the event that physical creation, restoration or preservation is the only feasible alternative to offset wetland impacts, the Consultant shall collect all of the data and information necessary to prepare alternative mitigation concepts. The alternative mitigation concepts may be presented to the permitting agencies and commenting agencies that are processing or reviewing a permit application for this project.

Prior to selection of a final mitigation site, the Consultant will provide as necessary and evaluate the following, in the development of alternative mitigation concepts:

- Wetland jurisdictional determination for each proposed site
- Preliminary geotechnical and survey data to substantiate each design alternative
- Construction and ROW cost estimations for each proposed site
- Contamination Screening Evaluation for each site
- Coordination of alternative sites with the County and affected environmental agencies

The Consultant shall prepare and submit a written Alternative Wetland Mitigation Concepts Report, listing potential sites with justifications for those recommended and non-recommended. The County shall review this report and make the final determination as to the recommended mitigation alternative.

4.1.4 Threatened and Endangered Species (Limiting Amount)

The Consultant shall review the PDS to familiarize himself with the location and extent of any protected species (plant and animal species listed by state and federal agencies as threatened, endangered or species of special concern) identified by the PDS.

The Consultant shall also:

- Review occurrence records, GIS Data Bases, and other records from the U.S. Fish and Wildlife Service (USFWS), Florida Fish and Wildlife Conservation Commission (FFWCC) and any other generally accepted source for the potential presence of protected species.
- Conduct qualitative site reviews of the project area to verify the presence of protected species and/or critical habitats.
- Conduct quantitative population surveys for those protected species confirmed within the project area following methodologies approved by the USFWS, FFWCC, or other regulatory agencies having jurisdiction.
- Prepare a Protected Species Management Alternatives Report which shall discuss the results of preliminary species evaluations and population surveys, regulations affecting each species, potential effect of the project upon each species, potential impacts to the project and a discussion of available and acceptable management alternatives.
- Prepare a final Protected Species Management Plan, which shall be suitable for submittal to the appropriate State and Federal review agencies. This shall address specific Management approaches to be used to address unavoidable impacts. It shall include all additional investigations, maps or other documentation needed to support permitting of the unavoidable impacts.
- Update the Threatened and Endangered Species Survey and Management Plan which shall be performed 90 days prior to the start of construction.
- Gopher Tortoise Live Capture and Off-Site Relocation
    - The Consultant shall provide a Registered Gopher Tortoise agent certified to survey, permit, and relocate by both mechanical and bucket trapping.
    - The Consultant shall perform the following:
    - Coordination with the FFWCC, backhoe operator, recipient site representative, and the County to schedule excavation, relocation of gopher tortoises.
    - Provide personnel and equipment (including a hydraulic backhoe and operator) necessary to excavate gopher tortoises burrows and

live capture gopher tortoises from the area proposed for development.
- Transport the gopher tortoises to an approved long-term protected, off-site location (recipient site) for release. Payment of the recipient site fees will be responsibility of the County.
- Prepare and submit to the FFWCC an Off-Site Gopher Tortoise Relocation After Action Report.

4.2 Other Permitting Agencies

The Consultant shall be responsible for obtaining all other permits required to construct the proposed improvements. These permits may include FDOT, CFX, SHPPO, FAA, GOAA, FDEP, FFWCC, FWS, dewatering permits, etc. The Consultant is responsible for coordination with these agencies early on to confirm the permitting process and the agency's criteria. This shall also include preparation of all necessary documents to secure the permit.

4.3 Preparation and Submittal

The Consultant shall prepare and submit all necessary permits. All permit packages shall be provided to the County for review and comment prior to submittal. It is anticipated that permit preparation shall include one or more Requests for Additional Information (RAI) from the permitting agencies. In addition, the Consultant shall prepare a N.P.D.E.S. Stormwater Pollution Prevention Plan, which will satisfy the requirements, at the time the permit application is submitted, of the FDEP. The Stormwater Pollution Prevention Plan shall be included in the Technical Provisions.

4.4 Renewals and Extensions

Permit fee renewals and extensions, as necessary, shall be paid for under Post Design Services.

4.5 Additional Permit Requirements (Limiting Amount)

Consultant shall conduct surveys and prepare legal descriptions and sketches and survey drawings as necessary to address permit conditions. These shall include the following as necessary:

- Conservation/mitigation easements
- Sovereign/submerged lands leases/easements

4.6 Deliverables

Work to be completed under this section by the Consultant shall require the following items to be delivered and accepted by the County:

- Water Management District/ACOE Permit Package
- Alternative Wetland Mitigation Concepts Report
- FDOT Permit Application Package(s)
- N.P.D.E.S. Stormwater Pollution Prevention Plan Package
- Special Permit Documents (Surveys)

- Threatened and Endangered Species Reports and After Action Report (if applicable)
- Site Evaluation Report and FDEP Contaminated Groundwater Permit (if applicable)

4.7 Pay Items

Work to be completed under this section by the Consultant shall be paid for under the following pay items as listed on the Activity and Fee Summary:

- Water Management District/ACOE Permit Package
- Alternative Wetland Mitigation Concepts Report (if applicable)
- FDOT Permit Application Package(s)
- N.P.D.E.S. Stormwater Pollution Prevention Plan Package
- Permit(s) Issuance
- Special Permit Documents (Survey) Limiting Amount
- Threatened and Endangered Species Reports and After Action Report (if applicable)
- Site Evaluation Report and FDEP Contaminated Groundwater Permit (if applicable)

5.0 Right-of-Way Engineering for Survey Projects

Right-of-Way Engineering services shall begin immediately upon issuance of the Notice to Proceed by the County, and shall be conducted on an expedited schedule. The County will provide the Consultant with title searches on each parcel identified on the Parcel Identification Map as furnished by the County. The title work will be provided to the Consultant at the Notice to Proceed meeting. All survey work shall meet the requirements of Chapter 472, Florida Statutes and Chapter 5J-17, Florida Administrative Code.

The Consultant shall not deviate from the alignment and right-of-way limits per from the Scope of Services as provided by the County. Any deviations must be justified by the Consultant and approved by the Project Manager.

5.1 Right-of-Way Mapping

Consultant shall prepare right-of-way maps/miscellaneous surveys for the entire project area at a scale of 1" = 40' on half size (11 inches x 17 inches) or at a scale approved by the Project Manager. Right-of-way mapping services shall conform to the most current version (at the time of the Notice to Proceed) of the Orange County Procedures for Right-of-Way Engineering, a copy of which will be provided to the Consultant. The Consultant shall analyze each proposed acquisition to identify the appropriate property interest to be acquired (fee simple right-of-way, drainage easement, fill slope easement, temporary construction easement, temporary demolition easement, etc.). The Consultant shall submit 30%, 60%, 90% and 100% progress review submittals of the right-of-way maps in 11 inches x 17 inches formats, as well as electronic copies in AutoCAD and PDF format as requested by the County.

Each submittal of right-of-way maps/miscellaneous surveys, legal descriptions and parcel sketches shall implement the information items listed in the appropriate Orange County Procedures for Right-of-Way Engineering checklist. A copy of the appropriate checklist shall accompany each submittal with a certification signed by the Consultant's Project Manager and the Surveyor of

Record certifying that the submittal completely addresses the required items as listed on the checklist.

Prior to submittal of the 60% right-of-way maps, the baseline of survey and/or the centerline of construction shall be the same line and approved by the Project Manager. From that time on, only the centerline of construction shall be shown on the right-of-way maps/miscellaneous surveys and construction plans, if required.

Consultant shall update and modify legal descriptions and parcel sketches, right-of-way maps/miscellaneous surveys and construction plans in a timely manner to reflect changes in proposed acquisitions resulting from right-of-way acquisitions, negotiations and litigation. After approval of the 100% right-of-way maps/miscellaneous surveys modifications shall be addressed in accordance with Section 5.5.

5.2 Parcels

5.2.1 Review of Title Work

The Consultant shall review the title work provided by the County, supplemental surveys and investigations performed by the Consultant and/or other record information. The size, location, and dimensions of each parent tract, parcel and property interest and encumbrances (easements, leases, etc.) shall be determined by the Consultant from this review. This information shall be shown on the right-of-way maps/miscellaneous surveys and parcel sketches, as appropriate. Recorded and Unrecorded easements shall be shown to the extent they can be identified and located on the right-of-way maps/miscellaneous surveys and parcel sketches.

5.2.2 Legal Descriptions and Parcel Sketches

Consultant shall have a licensed Professional Surveyor and Mapper prepare legal descriptions and parcel sketches for each parcel as necessary in accordance with the previously described Orange County Procedures for Right-of-Way Engineering. A draft of each legal description and parcel sketch for every parcel shall be submitted prior to the 90% right-of-way maps, if required. If any parcels are added or modified prior to the 100% right-of-way map submittal, the Consultant shall submit the legal descriptions and sketches of the modified parcels with revisions to the right-of-way maps showing the modifications. The signed and sealed final Parcel Sketches and Legal Descriptions shall be submitted upon request by the County for use in parcel acquisitions, but not later than with the submittal of the 100% Right-of-Way Map.

5.2.3 Parcel Staking for Appraisal (If Required)

The Consultant shall have a licensed Professional Surveyor and Mapper stake the limits of acquisition on each parcel in preparation for appraisals. The timing and method of marking the acquisition limits shall be as directed by the Project Manager.

5.3 Right-of-Way Surveys, Alignment and Monumentation

The Consultant shall have a licensed Professional Surveyor and Mapper conduct field surveys to supplement the field survey data obtained during the Preliminary Design Study (PDS) and provided to the Consultant. All survey information shall conform to the most current version of the Orange County Procedures for Right-of-Way Engineering, and shall be recorded in a cross section field book that has 10 columns by 10 rows per inch on both pages supplied by the Consultant. The field book remains the property of the County, and must be submitted with the Final Right-of-Way Map/miscellaneous surveys and be Signed and Sealed. When a data collector is used, the

Consultant shall submit a paper copy of the raw data files and coordinate data files bound in a book, together with the electronic copy on a disk. All Right-of-Way computations shall be documented in a Right-of-Way Computation Book, which shall be submitted to the Project Manager with the Survey Field Notes, State Plane Coordinate file, adjusted bench run and Final Right-of-Way Maps/miscellaneous surveys.

Consultant shall have a licensed Professional Surveyor and Mapper monument the center line of construction at stations that are not more than 600 feet apart and at all P.C.'s, P.T.'s, side street intersections, and changes in direction. Stationing shall be marked in the field. Similar monumentation and markings shall be provided at all side streets to 150 feet beyond the limits of the topographic survey or at other locations as approved by the Project Manager. The centerlines of construction shall be referenced to permanent monumentation located outside the limits of construction at the beginning and end of project, all P.C.'s and P.T.'s, all changes in direction, and intermediate points such that referenced points are spaced not more than 600 feet apart. Horizontal control, as stated above shall be tied to the Florida State Plane Coordinate System, North American Datum of 1983/1990 Adjustment East Zone and shall be shown on the final right-of-way maps/miscellaneous surveys.

5.4 Minimization of Compensable Impacts (If Required)

The Consultant shall coordinate with Orange County Right of Way Acquisition Section as early as possible in the design phase of the project to review the design corridor and make the necessary revisions to the design to minimize compensable impacts to private properties. The Consultant shall also identify and evaluate alternatives to right-of-way acquisition (e.g., retaining walls instead of fill slope easements, closed drainage system instead of ditch systems, etc.) to determine the most cost effective way to meet the project needs.

The Consultant shall perform the following services during this phase:

- Meet as necessary with the Orange County Right of Way Acquisition Section and property owners.
- Perform site inspections of properties together with the Orange County Right of Way Acquisition Section as may be necessary to evaluate the potential for minimization of compensable impacts. Coordinate with the Orange County Right of Way Acquisition Section to identify compensable impacts and evaluate cost effective ways to reduce compensable impacts to the greatest extent possible.
- Consult with the Orange County Right of Way Acquisition Section during the design process and fully address any right-of-way review comments provided.

During this phase the Consultant and the County shall inspect affected properties in the field to determine the extent of compensable impacts on each parcel, and whether such impacts can be reduced in a cost-effective manner. The Consultant shall at a minimum consider site access, onsite drainage, onsite parking, onsite utilities, including septic systems, and any other existing facilities impacted by the proposed improvements. This effort shall include meetings with property owners to obtain their input on the configuration of the proposed improvements in those cases where various options exist. The Consultant shall modify the design, where possible, to minimize the number and extent of such compensable impacts, and to accommodate the property owner preferences where appropriate.

The Consultant shall document the above-described investigations and their findings and recommendations. This work should occur early in the design process and prior to completion of 60% plans.

Consultant shall meet with all property owners where the proposed right-of-way exceeds the limits shown on the Right-of-Way Identification Maps prepared during Phase I.

5.5 Changes to Documents during Right-of-Way Acquisition

There shall be a limiting amount in this contract to cover work required due to right-of-way acquisition or other developments. This work shall include, but not limited to changes to construction plans (beyond the normal design process as agreed to by the County), right-of-way maps, legal descriptions and parcel sketches. It will also include staking parcels at the County's request (in addition to the parcel staking for appraisals), attendance at Order of Taking Hearings , Mediations and Settlement Conferences, and responding to questions posed by the County from property owners and property owners' representatives and experts. This work may be required at any time during the contract at the request of the County. It will be billed on an hourly basis, as approved by the Project Manager. The limiting amount shall include hourly rates for the consultant and all applicable sub-consultants including, but not limited to, surveyor, drainage engineer and environmental staff.

5.6 Deliverables

Work to be completed under this section shall require the following items to be delivered and accepted by the County:

- Right-of-Way Maps (30%,60%, 90%, 100%, and Final)/miscellaneous surveys
- Parcel Legal Descriptions and Sketches (Draft and Final) (If Required)
- Right-of-Way Survey Field Books and electronic AutoCAD and PDF files.
- Right-of-Way Computation Book (Raw Data Files, Coordinate data files, Benchmarks, etc.)
- Parcels staked for appraisal
- Updated/Modified documents during right-of-way acquisition
- Book and Page number where the final Right-of-Way Maps were recorded in the Orange County Comptroller Office Public Records (Required, to be Recorded and paid by Consultant)
- All of the above items must be in an acceptable Orange County format approved by the Project Manager. Hardcopies and electronic submittals will be certified where required and approved by the Project Manager.

5.7 Pay Items

Work to be completed under this section by the Consultant shall be paid for under the following pay items as listed on the Activity and Fee Summary:

- Right-of-Way Maps (30%, 60%, 90%, 100%, and Final)/miscellaneous surveys.
- Parcel Legal Descriptions and Sketches (Draft and Final) (If Required).
- Right-of-Way Survey Field Books and electronic AutoCAD files.
- Right-of-Way Computation Book (Raw Data Files, Coordinate Data Files, benchmarks, Etc.)
- Parcels staked for appraisal
- Changes to documents during right-of-way acquisition (Limiting Amount)
- Subsurface Utility Locations
- Boring Locations
- Recordation of Right-of-Way Maps with the Orange County Comptroller Office (Required, to be Recorded and paid by Consultant)

6.0 Design Survey Services for Major Survey Projects

The Consultant shall have a licensed Professional Surveyor and Mapper conduct field surveys as necessary to support the design of the project. These surveys shall include, but not be limited to, horizontal and vertical control surveys and topographic surveys of the roadway alignment and adjacent areas and retention ponds, mitigation areas, wetland, jurisdictional limits, environmentally sensitive areas, flood plain compensation areas, or other areas where information is needed to support the design and permitting of the project.

Controlled aerial photography or other data collection methods may be used to collect topographic information as approved by the Project Manager. When aerial photography is used the Consultant shall provide all necessary control and shall document the setting of targets and collection of other control information as required above.

All such survey information will be recorded in a cross section field book that has 10 columns by 10 rows per inch on both pages supplied by the Consultant. The field book remains the property of the County, and must be submitted with the Final Construction Plans, if required. When a data collector is used, the Consultant shall submit a paper copy of the raw data files and coordinate data files bound in a book, together with an electronic copy on a disk.

All survey work shall meet the requirements of Chapter 472, Florida Statutes, and Chapter 5J-17, Florida Administrative Code, and shall provide sufficiently detailed information to meet the design requirements of the project. Survey data shall be sufficient to establish drainage basins, address localized drainage issues within and adjacent to the project limits, and include all areas as necessary to address project design considerations.

6.1 Horizontal Control and Monumentation

Consultant shall monument the center line of construction at each 600-foot station and at all P.C.'s, P.T.'s, side street intersections, and changes in direction. Stationing shall be marked in the field. Similar monumentation and markings shall be provided at all side streets to one hundred fifty (150) feet beyond the limits of the topographic survey. The center line of construction shall be referenced to permanent monumentation located outside the limits of construction at the beginning and end of project, all P.C.'s and P.T.'s, all changes in direction, and intermediate points such that referenced points are spaced not more than six hundred (600) feet apart. Horizontal control shall be tied to the Florida State Plane Coordinate System, North American Datum of 1983/1990 Adjustment East Zone and either shown graphically or in tabulation format on the Right of Way Maps/miscellaneous surveys and Survey Control Sheet(s).

6.2 Vertical Control and Monumentation

All vertical control shall be based on NAVD 1988 datum, and shall be established from at least two (2) Orange County benchmarks. Permanent benchmarks shall be set outside the limits of construction. The location of benchmarks shall be approximately 600 feet apart and coordinated with the design such that a minimum of two benchmarks are identified on each sheet of the construction plans. Features that may be moved/adjusted in the future (e.g., utility poles, fire hydrants, etc.) shall not be used for benchmarks. Preferred locations include, but not limited to concrete drop inlets, concrete curb inlets, concrete headwalls, etc. or other permanent structures as approved by the County Surveyor or his/her agent.

6.3 Survey Control Sheet(s)

Consultant shall prepare Survey Control Sheet(s) for inclusion in the Construction plans. The survey control sheet(s) shall identify and show the location and type of all horizontal control points, reference points (three (3) outside of proposed right-of-way limits) and benchmarks. Details shall be included as necessary to clarify the relationship of monumentation and project control lines. The survey control sheet(s) shall be signed and sealed by a Professional Surveyor and Mapper registered in the State of Florida, and shall conform to the requirements of Chapter 5J-17 of the Florida Administrative Code. The Survey Control Sheet(s) shall also include, but not limited to the following:

- The complete centerline alignment data, including beginning of survey station, all curve data, P.C.'s, P.T.'s, side street intersections, changes of directions, all intermediate control point stations, and end of survey station must be shown. All control points must be identified as to type of material set and/or found at each respective point.
- All section lines, all quarter section lines, (and all quarter-quarter section lines when pertinent) must be shown with the station where their intersection with the centerline or baseline of survey occurs, a distance from the nearest corner to the centerline, and bearings and distances to all corners. The type of corner, found or set, shall be spelled out or identified by a legend.
- Centerline data will be referenced to State Plane Coordinate System, and labeled on the Survey Control Sheet(s) using North American Datum of 1983/1990 adjustment (NAD83/90) East Zone and shown on the Survey Control Sheet(s) either in tabular format or placed on the survey alignment.
- All Centerline Control points shall have a minimum of 3 reference points outside the limits of construction and shall be shown on the Survey Control Sheet(s).
- All Benchmarks shall be shown both in graphic and note form on the Survey Control Sheet(s).

6.4 Vertical Data

Vertical data shall be of sufficient accuracy to support the development of profiles and/or cross sections at intervals not exceeding 50 feet, including, but not limited to the main line roadway, side streets, drainage ways, retention ponds, etc. Check cross sections shall be measured at appropriate intervals, but no less than every 1,000 feet.

6.5 Pay Items

- Design Survey
- Design Survey Field Books and/or raw data files hard copies and electronic copies
- Design survey Computation Book
- Subsurface utility locations
- Boring locations

6.6 Deliverables

- Design Survey
- Design Survey Field Books and/or raw data files hard copies and electronic copies
- Design Survey Computation Book

- Subsurface utility locations
- Boring locations

7.0 Geotechnical Services

The Consultant shall be responsible for a complete geotechnical investigation. All work performed by the Consultant shall be in general accordance with the Florida Department of Transportation Soils and Foundation Handbook and other applicable standards, or as otherwise described in this scope of services. Any changes regarding geotechnical standards, policies and procedures shall be discussed on a project-by-project basis. The Consultant shall be responsible for obtaining any permits needed to perform the work. The County will assist in obtaining property owner permission to perform the necessary geotechnical fieldwork.

7.1 Data Collection

The Consultant shall review printed literature including topographic maps, county agricultural maps, aerial photographs (including historic photos), ground water resources, geology bulletins, potentiometric maps, pile driving records, historic construction records and other geotechnical related resources. Prior to field investigations, the Consultant shall review U.S.G.S., S.C.S and potentiometric maps to identify areas with problematic soil and groundwater conditions.

7.2 Roadway

The Consultant shall be responsible for coordination of all geotechnical related fieldwork activities. The Consultant shall retain all samples until Final Plans are submitted.

7.2.1 A preliminary roadway exploration shall be performed before the 30% plans submittal. The preliminary roadway exploration will be performed and results provided to assist in setting roadway grades and locating potential problem areas. Boring frequency shall be one every ____ feet. Borings shall be of sufficient depth to determine seasonal high water elevation and other critical geotechnical features. The preliminary auger borings shall be surveyed for use in the final design.

Pavement cores shall be obtained in areas to be milled and resurfaced, and specifically at the following locations:

•

7.2.2 The final roadway exploration shall include one auger boring every 200 feet to a depth of 5 feet. The borings shall be extended to 20 feet every 600 feet along the roadway. Boring depths shall be adjusted to accommodate roadway cuts and utility excavations. Additional _____ borings or muck probes shall be performed in suspected muck areas to evaluate the extent of organic soils.

Standard Penetration Test (SPT) borings shall be performed every 400 feet in high fill embankment areas (i.e., fill greater than about 10 feet). SPT boring depths shall be to 1.5 times the fill height. Undisturbed samples of

compressible materials such as muck, peat, clay or silt shall be obtained for use in consolidation testing for settlement analysis.

Routine soil classification shall be performed on representative samples obtained from the borings. These tests typically include grain size analysis, percent fines, Atterberg limits, organic content and moisture content. Additional bulk samples of representative soils encountered along the alignment shall be collected for Limerock Bearing Ratio (LBR) and corrosion testing. All laboratory testing and classification shall be performed in accordance with applicable AASHTO or ASTM standards.

7.3 Stormwater Systems

The Consultant shall evaluate subsurface conditions in proposed stormwater systems. For stormwater ponds, two auger borings to a depth of 20 feet below the bottom of the proposed pond elevation shall be performed per acre of pond. One field permeability test per acre of pond shall also be provided. One auger boring to a depth of 20 feet shall be performed every 500 feet for exfiltration trenches and treatment swales. One field permeability test or Double Ring Infiltrometer (DRI) test shall be performed every 500 feet.

Two auger borings per acre shall be performed in proposed floodplain compensation areas and mitigation areas to a depth below the proposed lowest elevation in those areas.

The Consultant shall provide an analysis of stormwater volume recovery through infiltration or background see page analysis as required.

7.4 Structures

SPT borings shall be performed at bridge structures to evaluate foundation alternatives. Borings shall be performed at end bent and intermediate bent locations. Borings for intermediate bents shall be no further apart than one every ___ feet. Borings shall be of sufficient depth to determine a bearing layer for pile foundations and are expected to be ___ feet deep. SPT borings shall be sampled on two-foot centers to 10 feet and at five-foot centers thereafter to the termination depth.

7.5 Special Geotechnical Investigations

This shall include box culverts, signals, overhead signs and retaining walls. A minimum of two SPT borings shall be performed to a depth of 30 feet at each box culvert location. Box culverts are anticipated at the locations listed in Section 3.3.5.1.

Borings shall also be drilled to a depth of 30 feet at the mast arm pole locations listed in Section 3.3.5.3.

SPT borings shall be performed 40 feet deep at each overhead cantilever or truss sign location. Overhead signs are anticipated at the locations listed in Section 3.3.5.2.

SPT borings shall be performed every 200 feet along retaining wall alignments to a depth equal to 2 times the wall height. The borings shall be sampled on two-foot centers to ten

feet and at five-foot centers thereafter to the termination depth. Retaining walls are anticipated at the locations listed in Section 3.3.3 and 3.3.4.

7.6 Contamination Evaluation

The Consultant shall determine the location and extent of soil and groundwater contamination within the project limits, and shall avoid or minimize impacts to contaminated areas to the extent possible.

7.6.1 Contamination Screening Evaluation Report (CSER)

The Contamination Screening Evaluation Report prepared during the Preliminary Design Study shall be updated as requested by the County. The update is intended to obtain and review the most current information about potential contamination impact sites identified in the PDS and to identify any new sites not identified in the original report. The methodology to be used to update the report shall be compatible to that used in the Preliminary Design Study.

7.6.2 Preliminary Contamination Assessment (PCA)

The Consultant shall perform Preliminary Contamination Assessment on sites identified in the Contamination Screening Report as MEDIUM or HIGH risk for contamination impacts. Soil and groundwater samples shall be obtained from those sites and tested for the presence of contaminant of concern as identified in the report. Based on thePDS, the following sites shall be investigated:

-

The Preliminary Contamination Assessment investigations shall be performed in such a manner as to detect the contaminants of concern identified in the Contamination Screening Evaluation Report. For petroleum-impacted sites, auger borings with Organic Vapor Analyzer soil screening shall be performed at locations where contamination is most likely. A laboratory shall test soil samples with high Organic Vapor Analyzer readings. Groundwater samples shall be obtained and analyzed for the contaminants of concern using testing protocols approved by the Florida Department of Environmental Protection. If appropriate, geophysical methods such as Ground Penetrating Radar or Magnetometer surveys shall be performed to look for unknown buried fuel storage tanks or other buried objects of concern such as sumps, pits, etc. All field and sampling activities shall conform to Florida Department of Environmental Protection requirements. A Florida Department of Health approved laboratory shall perform all laboratory analyses. Prior to drilling any borings or installing/obtaining groundwater samples, the location of underground utilities shall be determined and sampling locations cleared in accordance with local regulations.

The County shall assist the Consultant in obtaining access onto private property as necessary to conduct the Preliminary Contamination Assessments.

The approximate area of potential construction contamination impacts shall be crosshatched on the plan view of the roadway and labeled as "Approximate Limits of Potential Contamination Area." The following issues shall be addressed in the plans, details and/or specifications:

- Type of contamination.
- Specific Contractor responsibilities (dewatering, disposal of contaminated soils, etc).
- Special permitting requirements and constraints.

7.7 Geotechnical Reports

7.7.1 Roadway Soil Survey Report

The Consultant shall submit a preliminary Roadway Soil Survey Report with the 60% plans and a final report with the 90% plans. The preliminary and final Roadway Soil Survey Reports shall include the following:

- Copies of U.S.C.G.S and S.C.S. maps with project limits shown.
- A report of tests sheet (i.e. Roadway Soil Survey sheet) that summarizes the laboratory test results, the soil stratification (i.e., soils grouped into layers of similar materials) and construction recommendations relative to FDOT Standard Indices 500 and 505.
- Data interpretation and analysis including a Design LBR, seasonal high groundwater levels for roadway base clearance, aquifer parameters for stormwater systems and volume recovery analysis, limits of unsuitable material and removal recommendations, magnitude and time rate of embankment settlement, calculation of factor of safety for embankment slope stability, and embankment construction recommendations.
- Determination of seasonal high water shall consider proposed improvements impacting existing hydrological features, and identifying impacts to adjacent properties, including existing septic systems.
- An Appendix that contains stratified soil boring profiles, laboratory test data sheets, sample embankment settlement and stability calculations, design LBR calculation/graphs, and other pertinent calculations.

7.7.2 Bridge Foundation Report

The Consultant shall submit preliminary and final Bridge Foundation Reports. The preliminary Bridge Foundation Report shall include the following:

- Copies of the U.S.G.S. and S.C.S. maps with project limits shown.
- Summary of structure background data, U.S.G.S., S.C.S., geologic and potentiometric data.

- Data interpretation and analysis including soil and rock classification, design groundwater level for structures, evaluation and selection of foundation alternatives such as spread footings, pre-stressed concrete piling, steel H and pipe piles and drilled shafts.
- Soil D_{50} values for scour calculations.
- Soil and/or water corrosion data for substructure environmental classification.
- An Appendix which includes SPT boring profiles, data from any specialized field tests, engineering analysis, notes/sample calculations, sheets showing ultimate bearing capacity curves versus elevation for piles and drilled shafts, a complete FHWA check list, pile driving records (if available) and any other pertinent information.

The detailed analysis and basis for the selected foundation alternative shall include the following:

- For pile and drilled shaft foundations, provide graphs of ultimate acial soil resistance versus tip elevations. Scour resistance and/or downdrag (negative skin friction) shall be calculated, if applicable.
- Provide the design soil profile(s), including the soil model/type of each layer and all soil-engineering properties required to run the FBPier computer program. Review lateral analysis of the selected foundation for geotechnical compatibility.
- Bearing capacity for shallow foundations (including soil bearing capacity, minimum footing width, and minimum embedment depth) shall be given.
- The maximum driving resistance anticipated for pile foundations shall be estimated.
- Settlement analysis of foundation systems shall be provided.

In addition to the information included in the preliminary Bridge Foundation Report, the final Bridge Foundation Report shall include the following:

- A detailed analysis of the foundation system selected in the BCR, including test pile lengths, scour resistance, downdrag, minimum tip elevation, etc.
- Recommendations for foundation installation, or other site preparation soils-related construction considerations.
- Special provisions required for construction that are not addressed in the FDOT Standard Specifications.

7.7.3 Miscellaneous Structure Foundation Report

The Consultant shall prepare a Miscellaneous Structure Foundation Report to cover traffic signal and sign supports, box culverts and walls. The report shall include the following:

- Copies of U.S.C.G.S. and S.C.S maps with project limits shown.
- A summary of structure background data, U.S.G.S., S.C.S, geologic and potentiometric data.
- Data interpretation and analysis including design soil profiles(s) that include the soil model/type of each layer and all soil properties required for foundation design, lateral earth pressure coefficients, estimated differential and total (long term and short term) settlements, wing wall stability evaluation, external stability of conventional and retained earth wall systems, soil parameters used in analysis for retained earth wall systems and minimum soil reinforcement lengths versus wall heights, sheet pile wall analysis, and a review of the design for geotechnical compatibility and constructability.
- Recommendations for foundation installation, or other site preparation soils related construction considerations.
- An Appendix which includes SPT boring profiles, data from any specialized field tests, engineering analysis, notes/sample calculations, sheets showing ultimate bearing capacity curves versus elevation for piles and drilled shafts, and any other pertinent information.

7.7.4 Contamination Screening Report

The updated Contamination Screening Report shall identify all potential contamination impact sites and shall rank them with their risk potential. A discussion of the available information about the contamination issues at each site shall be provided. Recommendations for further Preliminary Contamination Assessment evaluation shall be made. The report shall follow the format outlined in Chapter 22 of the FDOT Preliminary Design and Environment Manual.

7.7.5 Preliminary Contamination Assessment Report

The Preliminary Contamination Assessment Report shall fully describe the contamination concerns at each site, and shall discuss the sampling and testing methodologies used and the findings. The following information shall be presented in the report:

- Site location map on an aerial photo background
- Background information relative to known or suspect contamination issues (e.g., plume maps, groundwater flow direction maps, etc.)
- Sampling and testing locations map
- Sampling and testing results
- Conclusions relative to contamination impacts affecting the project, including potential costs during construction

7.8 Deliverables

- Roadway Soil Survey Report (Preliminary and Final)

- Bridge Foundation Report (Preliminary and Final)
- Miscellaneous Structures Foundation Report
- Updated Contamination Screening Evaluation Report
- Preliminary Contamination Assessment Report

7.9 Pay Items

- Fieldwork, lab analysis and engineering
- Roadway Soil Survey Report (Preliminary and Final)
- Bridge Foundation Report (Preliminary and Final)
- Miscellaneous Structures Foundations Report
- Updated Contamination Screening Evaluation Report
- Preliminary Contamination Assessment Report

8.0 Railroad Coordination

This project includes (expansion of an existing at-grade railroad crossing **or** (grade separated railroad crossing) **or** (a new railroad crossing) with the _____Railroad. The Consultant will be responsible for all coordination with the _____Railroad, including preparation of all documentation as necessary to secure the FDOT railroad crossing permit and/or Railroad agreements. The following activities may be necessary:

- Confirmation of railroad criteria as may affect the project.
- Coordinate signal interconnects with Railroad.
- Meetings and miscellaneous coordination with the _____Railroad and existing utilities within the railroad right-of-way.
- Preparation of studies as may be necessary to support the project design (at-grade crossing versus grade-separated, reference Florida Administrative Code Section 14-57).
- FDOT permit application preparation and follow-up as necessary where applicable.
- Inclusion of agreement conditions into plans, specifications and/or technical provisions.
- Pipeline and/or wireline crossing agreements.

Orange County shall execute permits and agreements and shall pay any fees associated therewith. It is anticipated the _____Railroad will prepare the design of all facilities to be owned by the Railroad.

8.1 Deliverables

- FDOT permit application.

8.2 Pay Items

- FDOT permit application.
- Railroad coordination.

9.0 Post Design Services

- **Shop Drawing Review**

The Consultant shall provide engineering services to complete a shop drawing review for bridge and structural component submittals.

- **Construction Administration**

The Consultant shall provide engineering services during the construction of the project as requested by the County. The Consultant may be required to attend a Pre-Bid Construction Meeting and the Pre-Construction Conference.

- **Modification of Final Construction Plans**

Consultant shall update and modify the final Construction Plans as may be necessary to reflect changes in proposed improvements identified after submittal of the 100% plans. The consultant shall provide signed and sealed copies of the updated final construction plans. Additional signed and sealed copies of the final construction plans, or portions thereof, shall be provided during the completion of the right-of-way acquisition process, as requested by the County. Plans may require revisions until the completion of the right-of-way acquisition process.

- **Permit Renewals and Extensions**

Consultant will be responsible for renewals and extensions of the permits as requested by the County.

- **Pay Items**
  - Post Design Services

TABLE OF DELIVERABLES

1.0 Administration

Final Design Project Schedule – Paper, Digital File & pdf File	*3/1/1 Copies*
Construction Time Estimate – Paper, Digital File & pdf File	*3/1/1 Copies*
Workshop Review Meeting Minutes Paper & pdf file	*1/1 Copies*

2.0 Public Involvement

Public Involvement Plan – Paper, Digital File & pdf File	*3/1/1 Copies*
Small Group Meeting Materials	*As required*

3.0 Design and Plans Preparation

Preliminary Drainage Calculations – Paper & Digital pdf File	*3/1 Copies*
Final Drainage Calculations (Signed & Sealed & pdf File)	*3/1 Copies*
Roadway Design Criteria Package (Paper & pdf File)	*3/1 Copies*
Typical Section Package (Paper & pdf File)	*3/1 Copies*
Pavement Design Package (Paper & pdf File)	*3/1 Copies*
30%, 60%, 90% & 100% Cost/Engineers Estimate – Paper Copies	*3*
Final Cost/Engineers Estimate – Paper, Digital File & pdf File)	*3/1/1 Copies*
Design Notes and Computation Book	*3 Copies*
Quantity Computation Book	*3 Copies*
Draft Schedule of Prices and Technical and Special Provisions – Paper & MS Word File	*3/1 Copies*
Final Schedule of Prices Technical and Special Provisions – Paper & MS Word File	*3/1 Copies*
Electronic Bid Document Package	*1 Copy*
Final Electronic Design and Topography files (ACAD 2010 & Microstation)	*1 Copy*
Environmental Consideration Plans-Paper, Digital File & pdf File	*3/1/1 Copies*
Draft Bid Package – Paper, Digital file	*3/1 Copies*
Final Bid Package – Paper, Digital File, pdf File	*3/1/1 Copies*

3.0 A - Construction Plans

30% Submittal – Paper, Half Sized	*1/10 Copies*
60% Submittal – Paper, Half Sized	*4/19 Copies*
90% Submittal – Paper, Half Sized	*4/18 Copies*
100% Submittal – Paper, Half Sized	*4/18 Copies*

3.0 B - Final Construction Plans

Hard Copy – Paper, Half Sized	*25 Copies*
Hard Copy – Paper, Half Sized (Signed and Sealed)	*3 Copies*

Digital Files – AutoCAD 2010, Microstation & pdf Files	*1 Copy each*

4.0 Permitting

Water Management District/ACOE Permit Package (Paper & pdf File)	*1 Copy*
Alternatives Wetland Mitigation Concepts Report (Paper & pdf File)	*1/1 Copy*
RCID Permit Application Package(s) (Paper & pdf File)	*1 Copy*
N.P.D.E.S. Pollution Prevention Plan (Paper & pdf Files)	*3/1 Copies*
Special Permit Documents (signed and scaled surveys). If required	*3 Copies*
Site Evaluation Report (Paper & pdf File)	*1/1 Copy*

5.0 Right-of-Way Engineering

Sample Format (with list of parcels for each)	*1 Copy/Format*
Draft Sketches and Legal Descriptions	*3 Copies*
Final Sketches and Legal Descriptions (Signed and Sealed) (Hard copy, Digital)	*7 Copies/Parcel*
Right-of-Way Survey Field Books	*Original Books*
Raw Data Files – Paper & Digital File	*3/1 Copies*
Right-of-Way Computation Book	*1 Copies*
Parcels Staked in Field for Appraisal	*2 Time/Parcel*
Minimization Of Compensable Impacts Report (Paper & pdf File)	*3/1 Copies*
Updated/Modified Sketches and Legal Descriptions	*7 Copies/Parcel*

5.0 A - Preliminary Right-of-Way Maps

30% Submittal – Paper, 11" X 17" Sized	*1/3 Copies*
60% Submittal – Paper, 11" X 17" Sized	*1/3 Copies*
90% Submittal – Paper, 11" X 17" Sized	*1/3 Copies*
100% Submittal – Paper, 11" X 17" Sized	*1/3 Copies*

5.0 B - Final Right-of-Way Maps

Hard Copy – Paper, 11" X 17" Sized (Signed and Sealed)	*3 Copies*
Digital Files – AutoCAD 2016 & pdf Files	*1 Copy each*

5.0 - Updated/Modified Right-of-Way Maps (Each Modification Cycle)

Hard Copy – Paper, 11" X 17" Sized	*3 Copies*
Hard Copy – Paper, 11" X 17" Sized (Signed & Sealed)	*3 Copies*

6.0 Design Survey Services

Design Survey Field Books (Signed and Sealed)	*All*
Books	

Original Books	
Raw Data Files – Paper & Digital File	***1/1 Copy***
Design Survey Computation Book	***1 Copy***

7.0 Geotechnical Services

Final Preliminary Roadway Soil Survey Report (including ponds and swales)	***3 Copies***
Roadway Soil Survey Report (including ponds and swales)(S & S)	***3 Copies***
Miscellaneous Structure Foundation Report	***3 Copies***
Updates Contamination Screening Report	***3 Copies***
Preliminary Contamination Assessment Report	***3 Copies***
Box Culvert Report (If Required) (Signed & Sealed)	***3 Copies***
Mast Arm Signal Pole Report (Signed & Sealed)	***3 Copies***
Retaining Walls Report (Signed & Sealed)	***3 Copies***

Exhibit H

Biennial Monitoring Process for External Trips

(1 page)

Exhibit H – Biennial Monitoring Process

A. Developer will commence biennial monitoring of the gross daily trip-end generation potential for all approved building permits five years following the effective date of the Sunbridge PD-RP. The gross trip-end generation calculations shall be based upon the then current Trip Generation Manual as published by the Institute of Transportation Engineers and presented in a ledger format, clearly indicating the gross trip end generation potential for all approved building permits, to the County. In the event the biennial reporting ledger indicates more than 70,673 gross daily trip ends are being generated by development within the Sunbridge PD-RP, the Owners shall prepare a monitoring study to refine site-specific trip end generation potential and internalization rates of the development. The scope of the monitoring study shall: 1) quantify total daily and peak hour traffic volumes entering and departing Sunbridge PD; 2) quantify the proportion of peak hour traffic using roadways with access to Sunbridge PD; and 3) quantify internal and external trip end generation of the occupied development. The methodology for the monitoring shall be approved in advance by the County Transportation Planning Division, and the results of the monitoring shall be provided to the County.

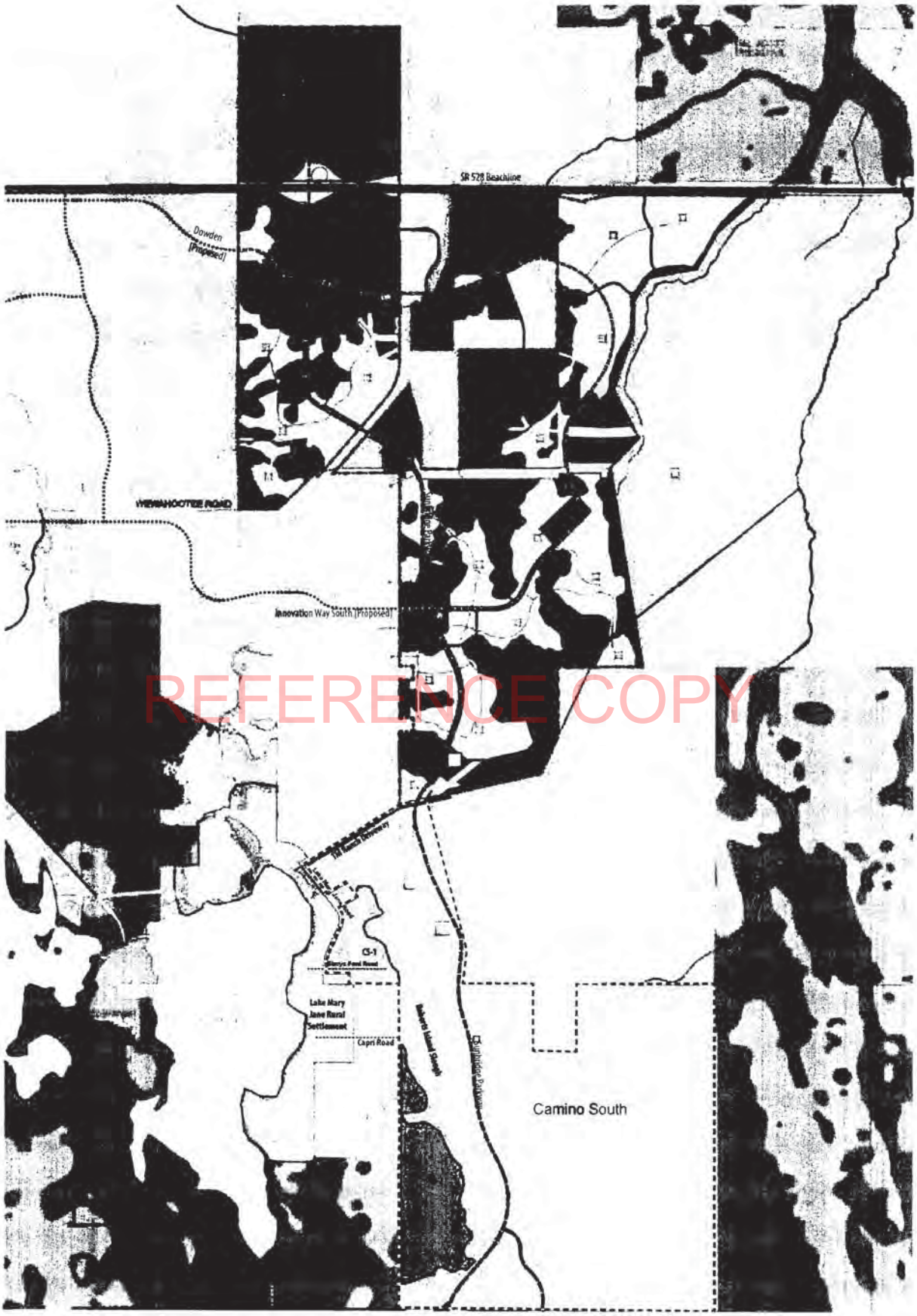
B. In the event the monitoring study indicates fewer than 63,606 (90% of 70,673) annual average daily next external vehicle trips are being generated by development within the Sunbridge PD-RP, exclusive of other development within the geographic area encompassed by the Sunbridge PD-RP, the Owners and the County shall agree to the time period or development threshold at which another monitoring study shall be completed.

C. In the event annual monitoring indicates that more than 63,606 annual average daily net external vehicle trips are being generated by development within the Sunbridge PD-RP, exclusive of other development within the geographic area encompassed by the Sunbridge PD-RP, the Owners shall commence negotiations with the County and thereafter enter into a concurrency agreement with the County to mitigate the impacts of development of the Sunbridge PD-RP beyond the vested 70,673 net external trips on the external roadway network.

Exhibit I

Lake Mary Jane Road Exhibit

(1 page)



Sunbridge

EXHIBIT I

March 17, 2017

TAVISTOCK

COMMUNITY SOLUTIONS GROUP

Exhibit J

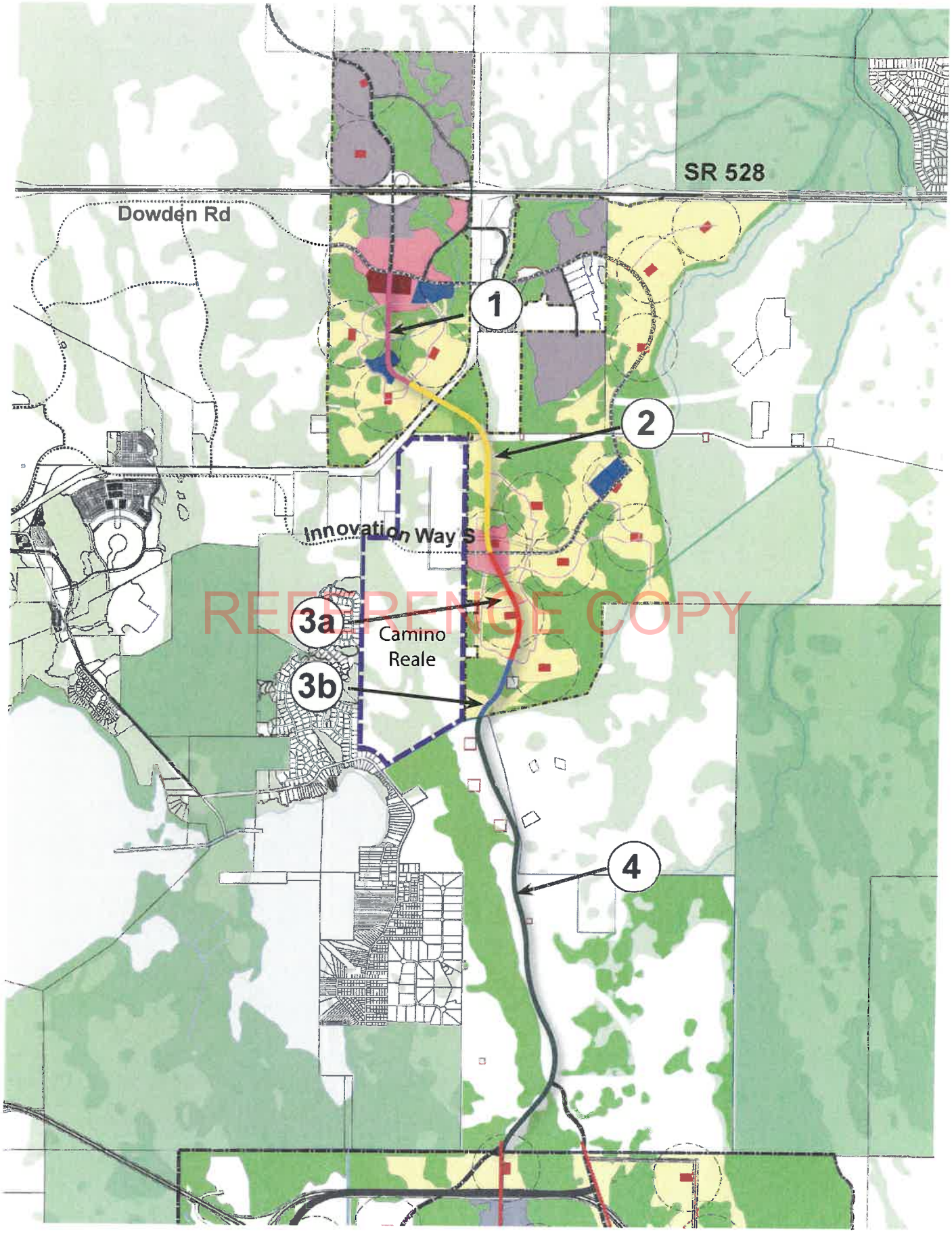
Development Thresholds

(1 page)

Exhibit J - Development Thresholds

Needed Improvement	Approximate Percentage of Buildout Development Program	Annual Average Daily Net External Vehicle Trip Ends Generated
Sunbridge Parkway to Innovation Way South (Segments 1 and 2)	25%	25,498
Sunbridge Parkway from Innovation Way South to Osceola County (Segments 3a, 3b, and 4)	31%	32,474
Widen Sunbridge Parkway Segment 1 from 2LU to 4LU	40%	40,800

Exhibit E



Attachment A-6
Cyrils Drive Information

Osceola Parkway Extension

Lake Ajay

Cyrils Dr

Sunbridge Pkwy

Fells Cove

Zuni Rd

Lake Hendon

McMichael Rd

Lake Myrtle

Lake Preston

East Lake Tohopekaliga

Jack Brack Rd

Bullock Lake

Northeast Connector

Lake Joel

Jones Rd

Narcoossee Rd

Center Lake

Nova Rd

Rummell Rd

Coon Lake

Trout Lake

Runnymede Lake

US 192

LEGEND

* Interchange moved by Osceola Pkwy Ext. PD&E

Narcoossee Community

Northeast District

Existing Roads

Proposed Roads

Proposed Interchange

Kimley»Horn

Expect More. Experience Better.

Osceola County TEU - Year 2025 Roadway Network Capacity

ROADWAY	FROM	TO	# of Lanes (2 way)	Adjusted Service Volumes				Model Vol	Model AADT	Peak Hour				
				B	C	D	E			K-Factor	D-Factor	Pk Hr Pk Dir Vol	LOS	V/C Ratio
Griffen Rd	US 192	World Dr	2	460	740	790	790	12,909	12,700	0.09	0.52	590	C	0.75
Florida's Turnpike	Indian River County	Kissimmee Park Rd	4	2100	2880	3400	3600	44,490	43,600	0.09	0.52	2,040	B	0.60
Florida's Turnpike	Kissimmee Park Rd	US 192/441	4	2200	3020	3720	4020	65,071	63,800	0.09	0.52	2,990	C	0.80
Florida's Turnpike	US 192/441	Osceola Pky	4	2200	3020	3720	4020	75,953	74,400	0.09	0.52	3,480	D	0.94
Florida's Turnpike	Osceola Pky	Orange County Line	4	2200	3020	3720	4020	75,483	74,000	0.09	0.52	3,460	D	0.93
Interstate 4	Osceola Polk Line Rd (CR 532)	SR 429	6	3300	4580	5580	6200	98,989	97,000	0.07	0.56	3,940	C	0.71
Interstate 4	SR 429	World Dr	6	3300	4580	5580	6200	98,310	96,300	0.07	0.62	4,460	C	0.80
Interstate 4	World Dr	US 192	6	3300	4580	5580	6200	79,537	77,900	0.08	0.54	3,230	B	0.58
Interstate 4	US 192	Orange County Line	6	3300	4580	5580	6200	97,509	95,600	0.08	0.58	4,290	C	0.77
SR 417	Orange County Line	Osceola Pky	4	2200	3020	3720	4020	51,286	50,300	0.09	0.52	2,350	C	0.63
SR 417	Osceola Pky	Celebration Ave	4	2200	3020	3720	4020	62,477	61,200	0.09	0.52	2,860	C	0.77
SR 417	Celebration Ave	I-4	4	2200	3020	3720	4020	48,702	47,700	0.09	0.52	2,230	C	0.60
SR 429 (Western Beltway)	I-4	Sinclair Rd	4	2200	3020	3720	4020	51,892	50,900	0.09	0.52	2,380	C	0.64
SR 429 (Western Beltway)	Sinclair Rd	US 192	4	2200	3020	3720	4020	55,265	54,200	0.09	0.52	2,540	C	0.68
SR 535 (Vineland Rd)	US 192	Poinciana Blvd	4	0	1330	1770	1870	68,558	67,200	0.08	0.60	3,290	F	1.86
SR 60	Indian River County Line	Polk County Line	2	240	430	740	1480	10,423	10,200	0.08	0.52	400	C	0.54
US 192	Lake County Line	SR 429 (Western Beltway)	4	1560	1890	1960	1960	49,106	48,100	0.08	0.61	2,350	F	1.20
US 192	World Dr	I-4	6	3300	4580	5580	6200	102,319	100,300	0.07	0.53	3,660	C	0.66
US 192	I-4	Parkway Blvd	6	0	2080	2680	2830	77,634	76,100	0.08	0.54	3,210	F	1.20
US 192	Polynesian Isle Blvd	Vineland Rd (SR 535)	6	2400	2860	2940	2940	71,153	69,700	0.12	0.64	5,240	F	1.78
US 192	Thacker Ave	Main St (US 441)	6	0	2080	2680	2830	55,530	54,400	0.08	0.53	2,220	D	0.83
US 192-441	Main St (US 441)	Michigan Ave	6	2400	2860	2940	2940	61,648	60,400	0.11	0.63	4,140	F	1.41
US 192-441	Commerce Center Dr	Columbia Ave	4	0	1330	1770	1870	67,664	66,300	0.08	0.55	2,810	F	1.59
US 192-441	Columbia Ave	Mississippi Ave	6	0	2080	2680	2830	61,457	60,200	0.12	0.65	4,630	F	1.73
US 192-441	Narcoossee Rd (CR 15)	Nova Rd (CR 532)	4	1770	2560	3320	3760	31,491	30,900	0.09	0.58	1,580	B	0.48
US 192-441	Old Melbourne Hwy	SR 15/Holopaw Rd	4	1670	2420	3130	3550	43,285	42,400	0.11	0.66	3,200	E	1.02
US 192	SR 15/Holopaw Rd	Brevard County Line	4	1410	2210	2800	3180	36,238	35,500	0.08	0.55	1,590	C	0.57
US 441/SR 15	SR 60	Canoe Creek Rd/CR 523	2	240	430	740	1480	20,972	20,600	0.09	0.51	950	E	1.28
US 441/SR 15	Canoe Creek Rd/CR 523	US 192	2	240	430	740	1480	20,855	20,400	0.09	0.51	930	E	1.26
US 17/92 (S Orange Blossom Tr)	Polk County Line	Osceola Polk Line Rd (CR 532)	2	510	820	880	880	31,640	31,000	0.12	0.68	2,590	F	2.94
US 17/92	Penfield St	Emmett St	4	1560	1890	1960	1960	40,989	40,200	0.08	0.55	1,730	C	0.88
US 17/92 (N Orange Blossom Tr)	Donegan Ave	Carroll St	6	2400	2860	2940	2940	52,743	51,700	0.08	0.62	2,720	C	0.93
Absher Road	Jack Brack Rd	Cyrils Dr	2	340	540	580	580	NA	NA	NA	NA	NA	NA	NA
Bass Highway	Pine Grove Rd	End	2	270	430	460	460	NA	NA	NA	NA	NA	NA	NA
Bass Road	Yowell Rd	US 192	2	460	740	790	790	14,347	14,100	0.07	0.57	590	C	0.75
Bill Beck Blvd	US 192-441	Boggy Creek Rd	4	1400	1700	1760	1760	37,641	36,900	0.11	0.62	2,490	F	1.41
Boggy Creek Rd	Boggy Creek Rd (East)	Osceola Pkwy	4	1400	1700	1760	1760	68,012	66,700	0.07	0.60	2,700	F	1.53
Boggy Creek Rd	Osceola Pky	Buenaventura Blvd	4	1400	1700	1760	1760	69,347	68,000	0.07	0.51	2,520	F	1.43
Boggy Creek Rd	Buenaventura Blvd	Simpson Rd	4	1400	1700	1760	1760	76,570	75,000	0.08	0.51	3,000	F	1.70
Boggy Creek Rd	Simpson Rd	U.S. 192-441	4	0	1200	1590	1680	35,053	34,400	0.08	0.61	1,680	D	1.06
Boggy Creek Rd (East)	Narcoossee Rd (CR 15)	Austin Tyndell Park	2	400	800	1140	1440	14,687	14,400	0.08	0.55	620	C	0.54
Boggy Creek Rd (East)	Austin Tyndell Park	Boggy Creek Rd (West)	2	460	740	790	790	17,422	17,100	0.07	0.52	610	C	0.77
Brown Chapel Rd	13th ST (US 192-441)	Lakeshore Blvd	2	460	740	790	790	34,697	34,000	0.09	0.51	1,550	F	1.96
Buenaventura Blvd	Boggy Creek Rd	Florida Pky	4	0	1200	1590	1680	49,886	48,900	0.08	0.57	2,270	F	1.43
Buenaventura Blvd	Florida Pky	Osceola Pkwy	4	1400	1700	1760	1760	42,366	41,500	0.08	0.64	2,190	F	1.24
Buenaventura Blvd	Osceola Pkwy	Orange County Line	6	2160	2570	2650	2650	98,618	96,600	0.09	0.60	5,010	F	1.89
Canoe Creek Rd (CR 523)	US 441	Sullivan Dr	2	240	430	740	1480	13,598	13,300	0.08	0.55	600	D	0.81
Canoe Creek Rd (CR 523)	Sullivan Dr	Deer Run Rd	2	420	800	1120	1420	14,284	14,000	0.08	0.51	570	C	0.51
Canoe Creek Rd (CR 523)	Deer Run Rd	Old Canoe Creek Rd	4	1330	1620	1680	1680	31,282	30,700	0.09	0.62	1,650	C	0.98
Canoe Creek Rd (CR 523)	Old Canoe Creek Rd	New Nolte Rd	2	460	740	790	790	17,245	16,900	0.09	0.53	840	D	1.06
Canoe Creek Rd (CR 523)	New Nolte Rd	US 192-441	4	1330	1620	1680	1680	33,149	32,500	0.08	0.54	1,440	B	0.86
Carroll St	Columbia Ave	Dyer Blvd	4	1330	1620	1680	1680	54,621	53,500	0.09	0.54	2,540	F	1.51
Carroll St	Dyer Blvd	Thacker Ave	4	1330	1620	1680	1680	59,176	58,000	0.09	0.53	2,720	F	1.62
Carroll St	Thacker Ave	John Young Pky	6	2160	2570	2650	2650	75,956	74,400	0.09	0.51	3,300	F	1.25
Carroll St	John Young Pky	Main St (US 441)	4	1400	1700	1760	1760	48,028	47,100	0.09	0.59	2,480	F	1.41
Carroll St	Main St (US 441)	Old Dixie Hwy	4	1400	1700	1760	1760	41,514	40,700	0.09	0.57	2,080	F	1.18
Carroll St	Old Dixie Hwy	Michigan Ave	4	1330	1620	1680	1680	39,705	38,900	0.09	0.60	2,140	F	1.27
Celebration Ave	US 192	Celebration Blvd	4	0	600	1350	1530	22,572	22,100	0.06	0.69	970	D	0.72
Celebration Blvd	Celebration Pl	World Dr	4	1400	1700	1760	1760	NA	NA	NA	NA	NA	NA	NA
Championsgate Blvd	Polk County Line	I-4	4	0	1200	1590	1680	32,319	31,700	0.08	0.57	1,520	D	0.96
Clay St/Penfield St	Randolph Ave	Thacker Ave	2	370	590	630	630	11,592	11,400	0.11	0.47	560	C	0.89
Clay St	Thacker Ave	Pleasant Hilll Rd	2	460	740	790	790	23,678	23,200	0.09	0.63	1,290	F	1.63
Creek Woods Dr	Canoe Creek Rd	Michigan Ave	2	460	740	790	790	15,717	15,400	0.09	0.54	760	C	0.96
Cypress Pky	Marigold Ave	Pleasant Hilll Rd	6	2160	2570	2650	2650	63,337	62,100	0.07	0.56	2,420	C	0.91
Cyrils Dr	Narcoossee Rd (CR 15)	Absher Road	4	970	1150	1220	1220	49,208	48,200	0.09	0.67	2,960	F	2.43
Deer Park Rd (CR 419)	US 192	Nova Rd (CR 532)	2	240	430	740	1480	20,463	20,100	0.10	0.50	1,040	E	1.41
Deer Run Rd	Canoe Creek Rd (CR 523)	Hickory Tree Rd	2	400	800	1140	1440	14,258	14,000	0.09	0.67	810	D	0.71
Donegan Ave	John Young Pky	US 17/92	4	1400	1700	1760	1760	38,383	37,600	0.08	0.50	1,560	C	0.89
Donegan Ave	US 17/92	Michigan Ave	2	480	770	830	830	17,382	17,000	0.08	0.55	780	C	0.94
Doverplum Ave	Old Pleasant Hill Rd	Cypress Pky	2	460	740	790	790	12,335	12,100	0.07	0.50	440	B	0.56
Doverplum Ave	Cypress Pky	Koa St	2	460	740	790	790	11,312	11,100	0.08	0.61	520	C	0.66
Eden Dr	Nova Rd (CR 532)	End	2	270	430	460	460	9,042	8,900	0.09	0.72	550	C	1.20
Enterprise Dr/Mercantile Ln	Poinciana Blvd	Ham Brown Rd	2	370	590	630	630	NA	NA	NA	NA	NA	NA	NA
Fifth St (St Cloud)	Vermont Ave	US 192-441	2	270	430	460	460	13,551	13,300	0.10	0.57	770	C	1.67
Florence Villa Grove Rd	Polk County Line	Westside Blvd	2	460	740	790	790	22,028	21,600	0.90	0.52	10,110	F	12.80
Florida Pky	Osceola Pky	Buenaventura Blvd	2	330	530	570	570	14,266	14,000	0.10	0.54	760	C	1.33
Formosa Gardens Blvd	Sinclair Rd	Funie Steed Rd	2	400	800	1140	1440	12,242	12,000	0.08	0.53	480	C	0.42
Formosa Gardens Blvd	Funie Steed Rd	US 192	4	1400	1700	1760	1760	17,228	16,900	0.08	0.61	800	B	0.45
Fortune Rd	Boggy Creek Rd	Lakeshore Blvd	2	400	800	1140	1440	24,078	23,600	0.09	0.64	1,300	E	1.14
Friars Cove Rd	Florida's Turnpike	Canoe Creek Rd (CR 523)	2	270	430	460	460	20,587	20,200	0.09	0.67	1,190	F	2.59
Funie Steed Rd	Westside Blvd	Formosa Gardens Blvd	2	400	800	1140	1440	13,395	13,100	0.07	0.52	480	C	0.42
Funie Steed Rd	Formosa Gardens Blvd	Old Lake Wilson Rd	2	330	530	570	570	8,729	8,600	0.09	0.66	530	C	0.93
Goodman Rd	Tri-County Rd	Westside Blvd	2	330	530	570	570	9,101	8,900	0.14	0.62	790	C	1.39
Ham Brown Rd	Reaves Rd	Cattle Drive Ln	2	400	800	1140	1440	6,654	6,500	0.10	0.55	340	B	0.30
Ham Brown Rd	Cattle Drive Ln	US 17/92	4	1680	2430	3150	3570	15,664	15,400	0.09	0.51	700	B	0.22
Henry Partin Rd	Kings Hwy	Neptune Rd	2	330	530	570	570	23,332	22,900	0.10	0.68	1,590	F	2.79
Hickory Tree Rd	Deer Run Rd	Bullis Rd (S)	2	400	800	1140	1440	15,443	15,100	0.10	0.56	860	D	0.75
Hickory Tree Rd	Bullis Rd (S)	US 192 (West)	2	460	740	790	790	19,385	19,000	0.09	0.56	960	F	1.22
Hickory Tree Rd	US 192 (East)	Deer Run Rd	2	420	800	1120	1420	19,521	19,100	0.09	0.52	850	D	0.76
Hoagland Blvd	CSX/Clay St	Suhl's Ln	4	1330	1620	1680	1680	42,670	41,800	0.08	0.66	2,150	F	1.28
International Drive South	US 192	Orange County Line	6	2160	2570	2650	2650	44,451	43,600	0.07	0.59	1,890	B	0.71
Jack Brack Rd	Narcoossee Rd (CR 15)	Absher Road	2	340	540	580	580	13,597	13,300	0.08	1.33	1,420	F	2.45
John Young Pky	US 192	Columbia Ave	6	2160	2570	2650	2650	47,627	46,700	0.07	0.53	1,760	B	0.66
John Young Pky	Columbia Ave	Carroll St	6	2160	2570	2650	2650	57,381	56,200	0.08	0.52	2,210	B	0.83
John Young Pky	Carroll St	Orange County Line	6	2160	2570	2650	2650	80,613	79,000	0.07	0.59	3,200	F	1.21
Jones Rd	Narcoossee Rd	Gerry Ct	2	270	430	460	460	13,411	13,100	0.09	0.64	730	C	1.59
Kings Hwy	Pine Island Rd	Neptune Rd	2	400	800	1140	1440	25,424	24,900	0.09	0.66	1,430	E	1.25
Kissimmee Park Rd	Old Canoe Creek Rd	Lake Tohopekaliga	2	420	800	1120	1420	29,902	29,300	0.08	0.61	1,480	F	1.32

Table A-10

County Reconstruction Improvements – IDEAL System

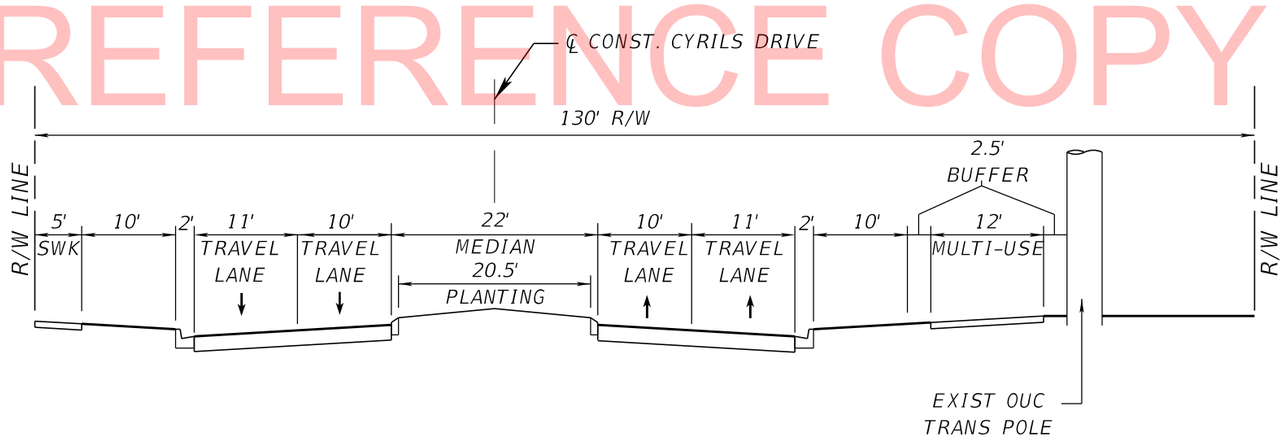
ID	Description	Funding Time Period	Existing Lanes	Future Lanes	Lanes Added	Length (Miles)	Total Lane Miles	Area Zones[1]
20	Funie Steed Rd	2025	0	2	2	3.83	7.65	
21	n/a	2040	0	2	2	3.37	6.73	St Cloud
22	n/a	2040	0	2	2	3.20	6.40	St Cloud
23	I Drive	2025	0	2	2	1.07	2.14	
24	n/a	2040	0	2	2	3.35	6.69	St Cloud
26	Laurel Ave	2040	0	2	2	1.57	3.14	
30	n/a	2040	0	2	2	1.30	2.60	St Cloud
46	n/a	2040	0	2	2	0.60	1.19	St Cloud
48	n/a	2040	0	2	2	0.82	1.64	St Cloud
55	n/a	2040	0	2	2	2.63	5.26	St Cloud
122	n/a	2040	0	2	2	1.37	2.73	St Cloud
165	n/a	2040	0	2	2	2.44	4.88	St Cloud
166	n/a	2040	0	2	2	3.06	6.12	St Cloud
167	n/a	2040	0	2	2	1.55	3.10	St Cloud
182	n/a	2040	0	2	2	0.01	0.01	St Cloud
199	n/a	2040	0	2	2	2.09	4.18	St Cloud
200	n/a	2040	0	2	2	1.34	2.67	St Cloud
201	n/a	2040	0	2	2	0.51	1.02	St Cloud
208	n/a	2040	0	2	2	0.01	0.01	St Cloud
234	N Goodman Rd	2040	0	2	2	5.31	10.62	
251	Bass Hwy	2040	0	2	2	2.08	4.16	
257	Nova Rd	2040	0	2	2	7.97	15.94	
272	Co Rd 531	2040	0	2	2	7.94	15.88	
274	Reaves Rd	2025	0	2	2	1.83	3.65	
530	n/a	2040	0	2	2	1.62	3.23	St Cloud
532	Cyrils Drive	2040	0	2	2	1.05	2.10	
555	Poinciana Blvd/Pleasant Hill Rd	2040	0	2	2	0.53	1.06	
614	n/a	2040	0	2	2	0.25	0.50	St Cloud
645	Zuni Rd	2025	0	2	2	0.90	1.81	
Totals						**Total:**	**127.13**	
						Reconstruction (2025):	**15.25**	
						Reconstruction (2040):	**111.88**	

Source: Osceola County Transportation Planning Division, Community Development Department

Note 1: Area Zones can be observed in Map A-3

PROJECT IDENTIFICATION

FINANCIAL PROJECT ID: N/A
FEDERAL AID PROJECT NO.: N/A
COUNTY NAME: OSCEOLA
SECTION NO.: N/A
ROAD DESIGNATION: CYRILS DRIVE
LIMITS/MILEPOST: N/A
PROJECT DESCRIPTION: RECONSTRUCTION OF CYRILS DRIVE.

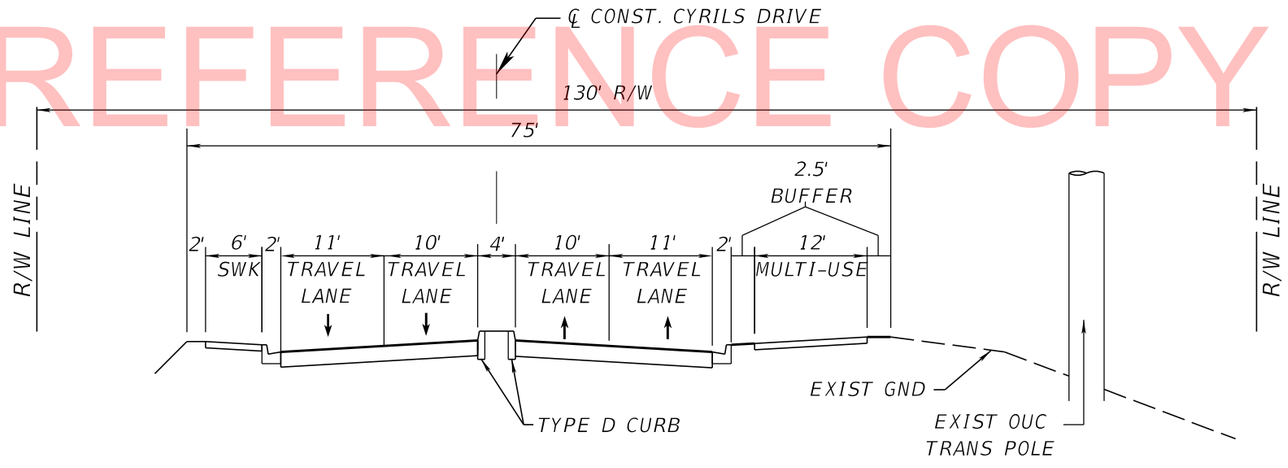


PROPOSED CYRILS DRIVE TYPICAL SECTION
FROM NARCOOSSEE ROAD TO BRIDGE

SHEET NO. 1

PROJECT IDENTIFICATION

FINANCIAL PROJECT ID: N/A
FEDERAL AID PROJECT NO.: N/A
COUNTY NAME: OSCEOLA
SECTION NO.: N/A
ROAD DESIGNATION: CYRILS DRIVE
LIMITS/MILEPOST: N/A
PROJECT DESCRIPTION: RECONSTRUCTION OF CYRILS DRIVE.



PROPOSED CYRILS DRIVE REDUCED TYPICAL SECTION

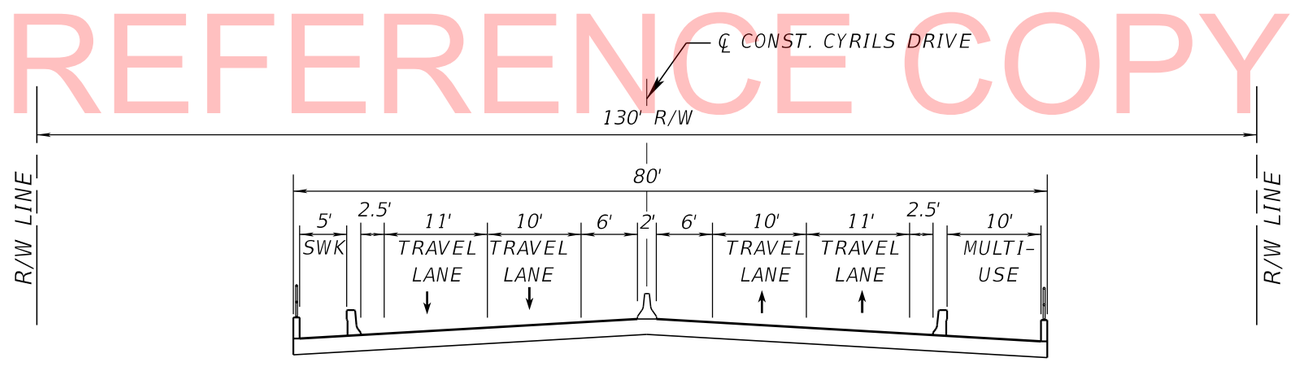
SHEET NO. 7

$USER$ $DATE$ $TIME$ $FILE$

FINANCIAL PROJECT ID N/A FEDERAL AID PROJECT NO. N/A COUNTY NAME OSCEOLA

SECTION NO. N/A ROAD DESIGNATION CYRILS DRIVE LIMITS/MILEPOST N/A

PROJECT DESCRIPTION RECONSTRUCTION OF CYRILS DRIVE.

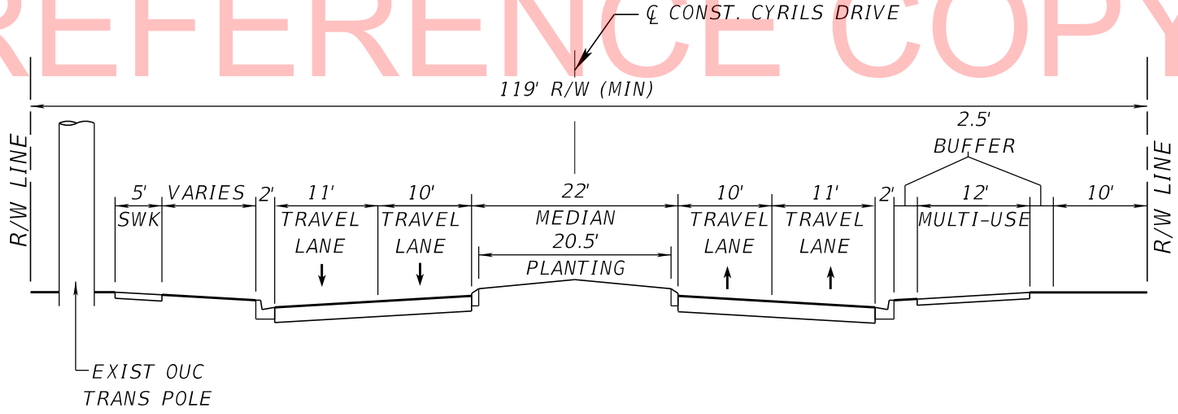


PROPOSED BRIDGE TYPICAL SECTION

SHEET NO. 2

PROJECT IDENTIFICATION

FINANCIAL PROJECT ID: N/A
FEDERAL AID PROJECT NO.: N/A
COUNTY NAME: OSCEOLA
SECTION NO.: N/A
ROAD DESIGNATION: CYRILS DRIVE
LIMITS/MILEPOST: N/A
PROJECT DESCRIPTION: RECONSTRUCTION OF CYRILS DRIVE.

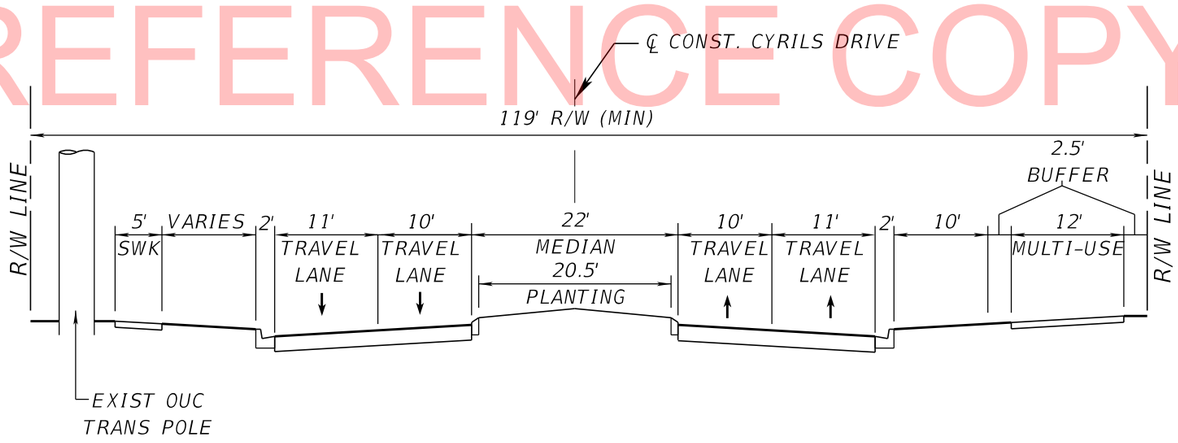


PROPOSED CYRILS DRIVE TRANSITION TYPICAL SECTION

SHEET NO. 3

PROJECT IDENTIFICATION

FINANCIAL PROJECT ID: N/A
FEDERAL AID PROJECT NO.: N/A
COUNTY NAME: OSCEOLA
SECTION NO.: N/A
ROAD DESIGNATION: CYRILS DRIVE
LIMITS/MILEPOST: N/A
PROJECT DESCRIPTION: RECONSTRUCTION OF CYRILS DRIVE.

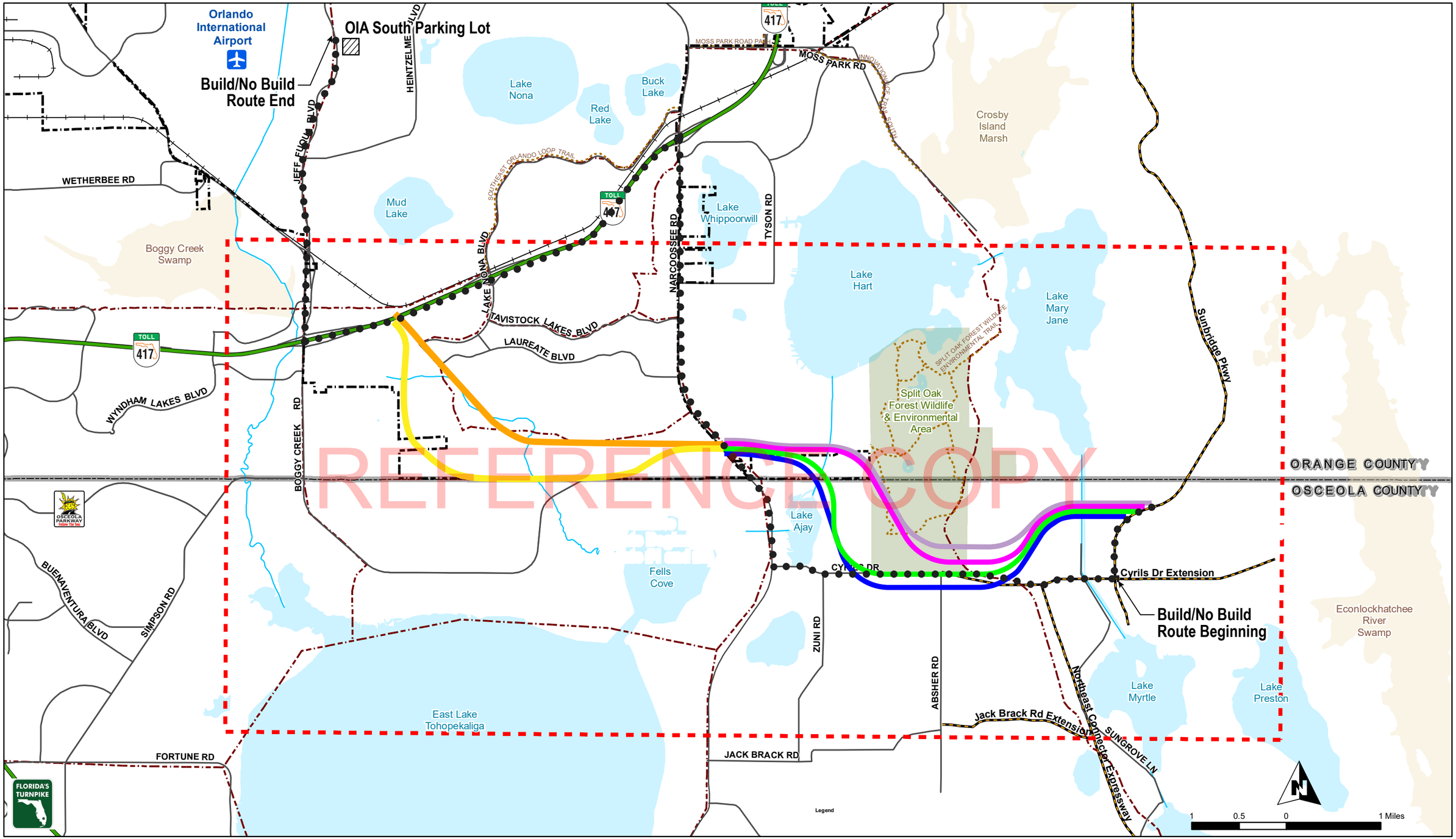


PROPOSED CYRILS DRIVE TYPICAL SECTION
FROM TRANSITION SEGMENT TO NED

SHEET NO. 4

Attachment B
Level of Service Analyses and Socioeconomic Data

Attachment B-1
Build and No-Build Routes



Legend

- Study Area
- County Boundary
- Orlando City Limits
- RailRoad
- Existing Trails
- Planned Florida Greenways & Trails
- Planned Roads
- West 1B
- West 2
- East 4A
- East 4C
- East 5
- East 6
- Build/No Build Route

Build and No Build Routes

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180219
BaseMap
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, CH2M, ESRI, Orange and Osceola County, Central Florida Geographic Information DRI Interactive Mapping, FDEP, National Hydrography Data (NHD))</ITA>

Attachment B-2
Travel Demand Model 2015 Base Year Analysis and Socioeconomic Data Forecast Analysis

Central Florida Expressway Travel Demand Model 2015 Base Year Analysis and Socioeconomic Data Forecast Analysis (2025, 2035 and 2045) for Osceola County Expressway Authority Master Plan Projects

August 23, 2017

Prepared for

Central Florida Expressway Authority

Prepared by

Fishkind & Associates, Inc.
12051 Corporate Blvd.
Orlando, Florida 32817
407-382-3256

Table of Contents

Tables

Figures-Maps

APPENDICES

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1.0 Introduction

1.1 Background

CDM Smith ("Client") is working for the Central Florida Expressway Authority (CFX) to conduct an independent evaluation of growth and development throughout Osceola County and southeastern Orange County. The CFX is in the process of bringing the Osceola County Expressway Authority (OCX) under CFX jurisdiction and funding. The OCX Master Plan includes the following projects: Osceola Parkway Extension, Poinciana Parkway I-4 Connector, Southport Connector and Northeast Connector. The Client has asked Fishkind and Associates, Inc. ("FKA") to provide the socioeconomic data for the 2015 base year and the 2025, 2035 and 2045 forecast years for the pertinent traffic analysis zones (TAZs) in Osceola County and the southeastern portion of Orange County.

1.2 Organization

The report that follows includes seven (7) sections:

1. Section 1.0 includes this Introduction.
2. Section 2.0 provides data, analysis and discussion regarding the development of the 2015 baseline socioeconomic data.
3. Section 3.0 provides the methodology and discussion in the development of the socioeconomic population control total datasets.
4. Section 4.0 provides the methodology and discussion in the development of the socioeconomic employment control total datasets.
5. Section 5.0 provides a summary regarding FKA's DRI analysis.
6. Section 6.0 provides data, analysis and discussion regarding the development of the forecast data for years 2025, 2035 and 2045.
7. Section 7.0 provides a sensitivity analysis, providing a high and a low forecast which provides additional socioeconomic datasets which bracket the development potential for the study area.

FKA developed socioeconomic estimates for the following component of the TAZ datasets submitted to the Client for the development of their traffic and revenue study:

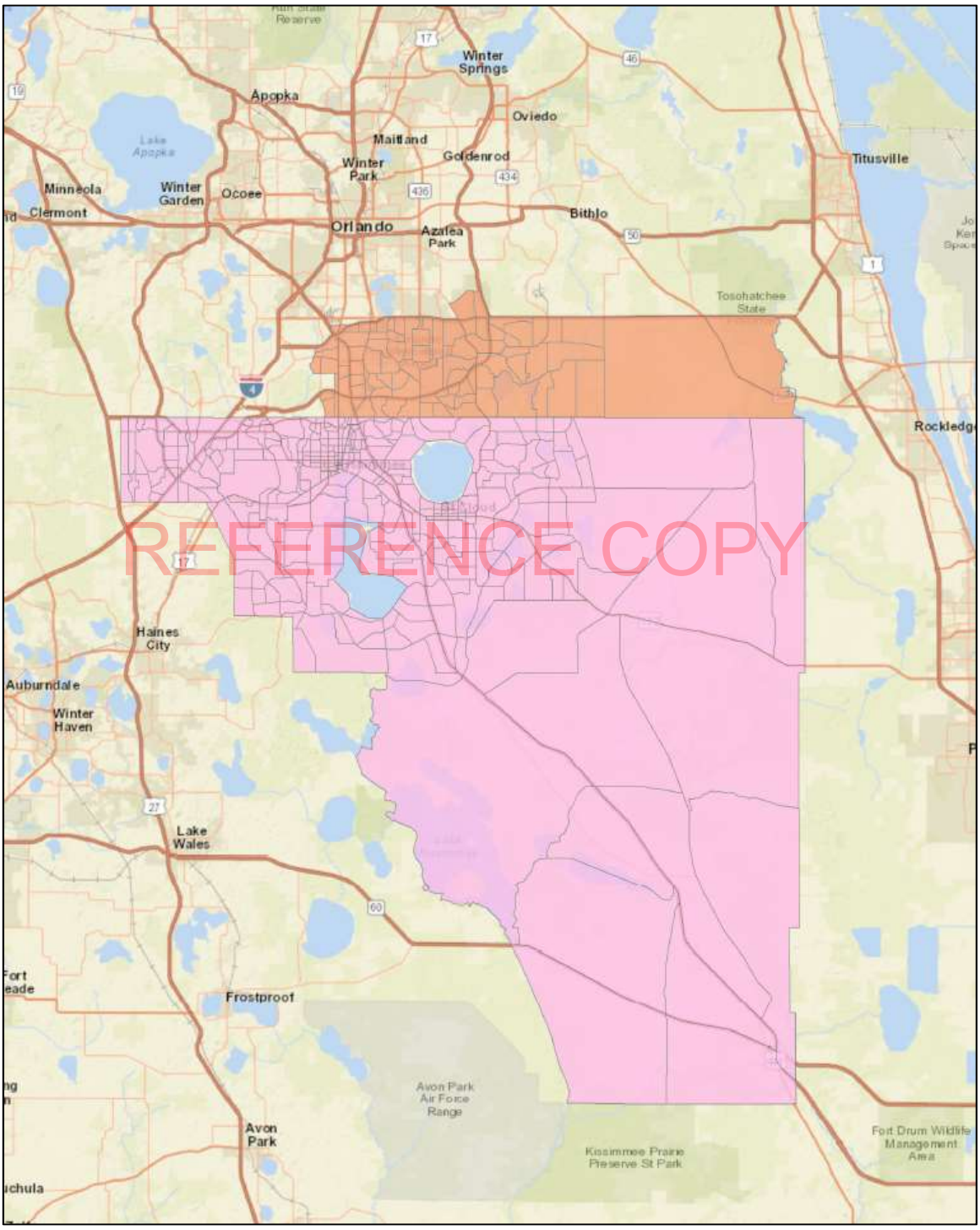
1. Population and Dwelling Units
    a. Single Family Dwelling Units and Population
    b. Multi-Family Dwelling Units and Population
2. Employment
    a. Industrial
    b. Commercial
    c. Service
3. Hotel/Motel Units (includes Timeshare) and Hotel/Motel occupants
4. Student Enrollment

In addition to the analysis and socioeconomic data herein, FKA conducted an analysis of developments of regional impact (DRIs) which impacts development patterns and the allocation of population and employment throughout the Study Area.

1.3 Study Area Identification - Definition

The Project Study Area is defined as Osceola County, Florida and southeastern Orange County, Florida. Map 1 provides the study area and TAZ boundaries provided by the Client.

Map 1. Project Study Area



Source: Fishkind and Associates, Inc. and CDM Smith

2.0 2015 Baseline Analysis for Study Area

As part of the development of the baseline socioeconomic analysis for the CFX Toll and Revenue Study, the Client provided FKA 2005 Traffic Analysis Zone (TAZ) shapes via Geographic Information System (GIS) shape files for Orange and Osceola Counties. FKA intersected these TAZ shapes with each of the county's GIS parcel shape files. The county shape files for each county property appraiser's data are dated as follows:

- Orange County (2016)
- Osceola County (2016)

This intersection allows FKA to identify the Year 2015 existing land use attributes associated with each parcel and associated TAZ within the defined within the Study Area. With respect to the creation of the 2015 base year dataset, FKA used county-specific property appraiser data to identify dwelling units (single family, condominium, and mobile home). FKA used the Florida Department of Business and Professional Regulation (FL DBPR) licensure data to identify the location and number of apartment units and hotel rooms (inclusive of condo-hotels and timeshares). Lastly, FKA used Florida Department of Education (FLDOE) and GIS school location data provided by local public county school districts to identify the location and number of students within public schools. Private school locations and enrollments were provided by the National Center for Education Statistics (NCES). College/University student enrollments were provided by the FLDOE and the specific college/university source.

FKA contracted with DataStory, a third-party data service, which used ESRI-based data to obtain 2010, 2016 and 2021 TAZ-level socioeconomic data estimates. The data service used the TAZ shape file and intersected it with the ESRI data to obtain the following socioeconomic variables by TAZ for the years shown in parentheses:

- Population (2010, 2016 and 2021)
- Households and Housing Units (2010, 2016 and 2021)
- Employment by Category (2015)

The ESRI methodology is a census based-block group data set which is then adjusted using a variety of data sources to estimate growth in non-decennial census years. It uses a range of data sources including, but not limited to: the Internal Revenue Service (IRS), United States Postal Service (USPS) and the American Community Survey (ACS). The ACS is an ongoing statistical survey by the U.S. Census Bureau which is sent to approximately 295,000 addresses monthly (or 3.5 million per year); it is the largest survey (after the decennial census) that the Census Bureau administers. Appendix 1 provides more detailed information regarding the ESRI methodologies and source data. FKA analyzed the DataStory employment data in conjunction with Woods & Poole Economics (W&P) data to generate employment control totals for the counties and Study Area.

2.1 Population and Dwelling Unit Analysis and Control Total Development

The development of the 2015 baseline population and dwelling unit data involved the following steps:

1. Identify the population control total for each county and Study Area
2. Analyze property appraiser and FL DBPR data for the location of single family, condominium, apartment and mobile home units in each county
3. Allocate population via persons per single family and persons per multi-family dwelling unit at the TAZ level (per the 2015 CFRPM V6 data)
4. Provide summation of single family and multi-family dwelling units and population by TAZ

Population

FKA reviewed population estimates via the following data sources: University of Florida Bureau of Economics and Business Research (BEBR), Woods & Poole (W&P), ESRI and Datastory to generate its own forecast for the Study Area. The county-level data is provided so that County level comparisons can be made to validate and reconcile the aggregate TAZ level data within the Study Area with County level data for control totals. The Study Area TAZs for Orange County (as provided by Client) do not comprise the entire county, while the TAZs within Osceola County include the entire county. Table 1 summarizes the 2015 base-year population sources analyzed and FKA's base year population estimates for the Study Area. The population control total for each county within the Study Area is shown with the Orange County Study Area estimated at 106,795 and Osceola County estimated at 323,993.

Table 1. 2015 Population County-level Data and FKA's Base Year Study Area Estimates

	Countywide (2015)				Study Area (2015)	
County	W&P	BEBR	FKA	ESRI	DataStory	Final - FKA
Orange	1,272,090	1,252,396	1,288,130	1,258,251	104,318*	106,795*
Osceola	317,680	308,327	323,993	305,855	301,498	323,993
Orange - Study Area*					8.3%	

*Orange Study Area – not entire County

Source: W&P: Woods & Poole 2016

Source: BEBR: University of Florida, BEBR Medium (Volume 49, Bulletin 174, January 2016)

Source: FKA: Fishkind and Associates, Inc.

Source: ESRI: ESRI BAO 2017

Source: DataStory: DataStory (ESRI TAZ Data) *partial county

Dwelling Units

The travel demand model allocates the population between single family and multi-family units. FKA identified dwelling units via each county's property appraiser and the FL DBPR. FKA used the following standardized property appraiser land use categories when identifying residential units in each of the counties:

- 100 – Single Family
- 200 – Mobile Home
- 400 – Condominium

In some counties' property appraiser data, there are various sub-categories of units of these standard categories (e.g. 130 – single family lake front). In this case, this unit would be classified as a single family unit and included in the 100, single family unit category. With respect to this analysis, single family dwelling units include both single family homes and mobile homes.

Multi-family units include both apartments and condominiums. Condominium unit counts were developed via property appraiser files along with FL DBPR data which detail condominium units. These units were then subtotaled at the TAZ level. FKA gathered FL DBPR licensure data for apartments which includes address and unit counts. This data was geocoded and mapped within the TAZ shapes provided by the Client. The FL DBPR apartments include both transient and non-transient definitions, which are representative of units available for permanent and vacation stays. The ZDATA provided includes both permanent apartments and vacation apartments. The total multi-family units in any TAZ include the sum of apartments and condominiums.

Using the 2015 CFRPM V6 data, FKA calculated TAZ-specific population per single family dwelling unit (PPSFDU) and population per multi-family dwelling unit (PPMFDU). Based on the total dwelling units identified via the property appraiser and FL DBPR data, FKA adjusted the PPSFDU and PPMFDU factors equally to allocate the control total population estimates for each county within the Study Area. Table 2 provides a sample of the TAZ-specific PPSFDU and PPMFDU factors used within each TAZ in each county within the Study Area.

Table 2. Sample of PPSFDU and PPMFDU Factors for Study Area TAZs

County	TAZ	PPSFDU	PPMFDU
Orange	953	2.91	2.55
Orange	954	2.93	1.87
Orange	956	2.85	2.30
Orange	983	2.88	2.21
Orange	984	2.36	2.31
Orange	1035	2.24	2.37
Orange	1039	2.75	1.24
Orange	1100	2.24	2.36
Orange	3645	3.00	2.51
Osceola	1101	2.64	2.01
Osceola	1131	2.75	2.50
Osceola	1132	3.16	2.47
Osceola	1133	2.74	2.50
Osceola	1139	2.46	2.08
Osceola	1145	3.10	1.63
Osceola	1146	3.10	1.64
Osceola	1150	3.37	2.22
Osceola	1151	3.33	2.29

Source: CFRPM V6 2015 ZDATA1 and Fishkind and Associates, Inc.

In providing its estimate of population and dwelling unit by TAZ, the Consultant also took time to review aerial photographs of TAZs in the counties as a way to ground truth the finding via the GIS analysis. Appendix 2 contains some examples of aerial photographs used by the Consultant as a quality control check for the 2013 baseline socioeconomic dwelling unit and population data by TAZ.

Using these steps, the Consultant generated the population and dwelling unit data associated with the 2015 ZDATA1 dataset provided. Table 3 provides a summary of the population and dwelling unit findings for the Study Area.

Table 3. Study Area TAZ Dwelling Unit and Population Summary (2015)

ZDATA1	Orange - Study Area	Osceola	Total
Single Family Dwelling Units	30,978	96,912	127,890
Single Family Population	83,525	257,167	340,692
Multi-Family Dwelling Units	10,938	30,698	41,636
Multi-Family Population	23,271	66,826	90,097
Total Dwelling Units	41,916	127,610	169,526
Total Population	106,796	323,993	430,789

Source: Fishkind and Associates, Inc.

2.2 Hotel and Hotel Population (2015)

The development of the 2015 baseline hotel units and hotel population datasets for the two counties within the Study Area involved the following steps:

1. Map the location of hotels, motels, condo-hotel and timeshare units in each county via data provided by the FL DBPR
2. Calculate the number of units within each TAZ
3. Estimate hotel/motel occupants

Table 4 analyzed the 2015 ZDATA via the CFRPM V6 model. FKA estimated the hotel/motel population per unit in each county within the Study Area via the 2015 ZDATA1 data with respect to hotel/motel units and hotel/motel population (e.g. HMPOP / HMUNITS). With respect to hotel occupancy rate data, FKA defaults to the CFRPM V6 occupancy rate data for the TAZs within the Study Area.

Table 4. County/Study Area Hotel Unit and Population Data

	2015 CFRPM V6		
	HMUNITS	HMPOP	POP/HMUNIT
Orange Study Area	5,050	10,589	2.10
Osceola	41,823	90,266	2.16

Source: 2015 CFRPM V6

2.3 Employment (2015 Industrial, Retail-Commercial, Service)

The development of the 2015 baseline employment data for the two counties consisted of the following steps:

1. **Establish FKA's employment control total for each county's Study Area**

   FKA estimated the 2015 employment control totals for each county within the Study Area. Table 4 summarizes the 2015 employment control totals.

Table 5. 2015 Employment County-Level Control Totals

County	2015
Orange – Study Area	74,407
Osceola	115,035

Source: Fishkind and Associates, Inc.

2. **Allocate FKA's Woods & Poole (W&P) based employment control total across the three employment categories (industrial, commercial/retail and service)**

   W&P is a third party database of economic data which includes county-level employment estimates for the entire in the United States. The 2015 W&P employment data is the basis of FKA's 2015 employment estimates for the two-county Study Area. FKA reduced the 23 employment categories as provided in the W&P employment data to the three categories: (1) industrial, (2) retail/commercial and (3) service.

   Table 6 summarizes W&P's 23 employment categories. The categories highlighted in red being associated with commercial/retail, blue as service, and green as industrial employment. FKA allocated the 2015 W&P countywide employment according to the three socioeconomic employment categories (industrial, commercial/retail and service).

   Because the Study Area for Orange is a small subset of Orange County, the W&P allocation was then compared against the DataStory employment totals and mix. Table 7 summarizes the comparison of the W&P employment totals, DataStory's employment totals for the Study Area TAZs and FKA's guiding control total employment estimates for the Study Area by employment category.

   The DataStory employment mix suggests that the southeastern Orange County has a mix more heavily weighted towards industrial activity compared to the overall Orange County. This is fundamentally a function of the TAZ subset includes activities in and around the Orlando International Airport. Taking this information into account, FKA used the Datastory employment mix for each County within the Study Area as a guide for its control totals. The employment control total for each county within the Study Area is shown with the Orange County Study Area estimated at 74,407 and Osceola County estimated at 115,034.

Table 6. Employment Categories (Woods & Poole)

Year	Industry Title	W&P Cat
2015	Total, All Industries	32
2015	Farm Employment	33
2015	Forestry, Fishing & Other	34
2015	Mining	35
2015	Utilities	36
2015	Construction	37
2015	Manufacturing	38
2015	Wholesale Trade	39
2015	Retail Trade	40
2015	Transportation & Warehousing	41
2015	Information	42
2015	Finance & Insurance	43
2015	Real Estate, Rental and Lease	44
2015	Professional & Tech Services	45
2015	Management & Enterprises	46
2015	Administration and Waste Services	47
2015	Educational Services	48
2015	Health Care & Social Assistance	49
2015	Arts, Entertainment and Recreation	50
2015	Accomodation & Food Service	51
2015	Other Services	52
2015	Federal Civilial Govt	53
2015	Federal Military Govt	54
2015	State and Local Govt	55

Source: Woods & Poole (2016) and Fishkind and Associates, Inc.
*green = industrial, red = retail and blue = service

Table 7. 2015 Baseline County and Study Area Employment Estimates by TAZ Category

W&P - 2015 (county)	Industrial	Commercial	Service	TOTAL
Orange	142,080	217,700	601,420	961,200
Osceola	14,540	31,420	66,280	112,240
ESRI - 2015 (Study Area)	Industrial	Commercial	Service	Total
Orange	25,101	12,443	21,957	59,501
Osceola	11,912	30,853	59,423	102,188
FKA - 2015 (Study Area)	Industrial	Commercial	Service	Total
Orange	30,954	15,344	28,109	74,407
Osceola	14,902	32,202	67,930	115,034

W&P - 2015 (county)	Industrial	Commercial	Service	TOTAL
Orange	14.8%	22.6%	62.6%	100.0%
Osceola	13.0%	28.0%	59.1%	100.0%
ESRI - 2015 (Study Area)	Industrial	Commercial	Service	Total
Orange	42.2%	20.9%	36.9%	100.0%
Osceola	11.7%	30.2%	58.2%	100.0%
FKA - 2015 (Study Area)	Industrial	Commercial	Service	Total
Orange	41.6%	20.6%	37.8%	100.0%
Osceola	13.0%	28.0%	59.1%	100.0%

Source: Woods & Poole (2016) and Fishkind and Associates, Inc.

3. Calculated employment by TAZ as a percentage of total employment by category

FKA calculated the percentage of each of the three employment categories per TAZ as a share of the total employment for that category within each county in the Study Area via the Datastory employment mix. Table 8 provides a sample of the employment percentage allocation of TAZs in the Orange County Study Area. For each category, the category percentages total 100%.

Table 8. Sample of Orange County TAZs
Employment Allocation at TAZ Level

TAZ	County	% INDUSTRIAL	% COMMERCIAL	% SERVICE
883	Orange	0.22%	2.85%	1.38%
884	Orange	0.03%	0.39%	0.19%
948	Orange	1.28%	2.26%	1.84%
949	Orange	2.53%	4.63%	3.87%
952	Orange	0.13%	2.76%	1.07%
953	Orange	0.03%	1.04%	0.26%
954	Orange	0.11%	1.82%	0.84%
956	Orange	0.94%	0.28%	0.33%
957	Orange	10.52%	3.11%	3.68%
958	Orange	4.14%	8.26%	4.30%
…				
Total	-	100.00%	100.00%	100.00%

Source: DataStory (ESRI TAZ Data) and Fishkind and Associates, Inc.

4. Calculate employment by category at the TAZ level

To obtain the TAZ-level employment by category, FKA multiplied the 2015 category-level employment control totals provided in Table 7 to the corresponding employment percentages illustrated in Table 8. Appendix 3 contains a summary of the final set of socioeconomic data, which includes the 2015 employment data by category at the TAZ level.

2.4 Schools - Pre-Kindergarten to 12th Grade Enrollment (2015)

FKA estimated the 2015 base year Pre-Kindergarten to 12th Grade (PK-12) school enrollments in the study area. The information was obtained from 2015 public school and private school enrollment data. These data sources identify both the number of students per school, as well as the geographic locations of the schools within the two-county Study Area. Additionally, FKA gathered data on student-age children from age 4 to 17 via ESRI. Table 9 provides a sample of the detailed-age profile for Osceola County. The development of the 2015 baseline PK-12 school enrollment data for the two counties within the Study Area involved the following steps:

1. Identify the existing location and 2015 enrollments for the Orange and Osceola County public schools within the Study Area as provided by each county public school district
2. Identify the existing location and 2015 enrollments for the Orange and Osceola County private schools within the Study Area as provided by the NCES
3. FKA geo-located each school to properly identify which TAZ to allocate students

Table 9. Detailed-Age Profile Summary (4 to 17 - Osceola County)

esri

Detailed Age Profile

Osceola County, FL
Osceola County, FL (12097)
Geography: County

Prepared by Esri

Summary	Census 2010	2016	2021	2016-2021 Change	2016-2021 Annual Rate
Population	268,685	313,124	359,273	46,149	2.79%
Households	90,603	104,170	118,748	14,578	2.65%
Average Household	2.93	2.97	3.00	0.03	0.20%

	Census 2010		2016		2021	
Total Population by Detailed Age	Number	Percent	Number	Percent	Number	Percent
Total	268,685	100.0%	313,124	100.0%	359,273	100.0%
<1	3,339	1.2%	3,938	1.3%	4,494	1.3%
1	3,464	1.3%	3,952	1.3%	4,541	1.3%
2	3,686	1.4%	4,141	1.3%	4,795	1.3%
3	3,683	1.4%	4,026	1.3%	4,674	1.3%
4	3,624	1.3%	4,056	1.3%	4,710	1.3%
5	3,685	1.4%	4,028	1.3%	4,660	1.3%
6	3,627	1.3%	3,939	1.3%	4,556	1.3%
7	3,678	1.4%	4,017	1.3%	4,640	1.3%
8	3,793	1.4%	3,973	1.3%	4,579	1.3%
9	4,032	1.5%	4,216	1.3%	4,857	1.4%
10	4,046	1.5%	4,270	1.4%	4,881	1.4%
11	3,983	1.5%	4,200	1.3%	4,791	1.3%
12	4,006	1.5%	4,220	1.3%	4,799	1.3%
13	4,213	1.6%	4,334	1.4%	4,883	1.4%
14	4,324	1.6%	4,380	1.4%	4,891	1.4%
15	4,330	1.6%	4,293	1.4%	4,707	1.3%
16	4,397	1.6%	4,390	1.4%	4,770	1.3%
17	4,506	1.7%	4,411	1.4%	4,767	1.3%

Source: ESRI (2017)

2.5 College & University Student Enrollment Estimates (2015)

FKA produced 2015 estimates of college/university enrollment for the two county study area. The development of these 2015 baseline estimates involved the following two steps:

1. Identify the existing location and 2015 enrollments for the Orange and Osceola County colleges and universities within the Study Area
2. FKA geo-located each college/university to the appropriate TAZ

FKA gathered the college and university enrollment for colleges throughout both counties within the Study Area for 2015. Table 10 summarizes the Study Area 2015 control totals for the colleges and universities identified. This data will be included with the student enrollment in the ZDATA2 dataset (Table 11).

Table 10. 2015 Base Year College Enrollment by TAZ

College/University	County	TAZ	Number of Students
Valencia – Lake Nona	Orange	1093	2,452
Valencia – Osceola	Osceola	1346	12,896
Florida Christian College	Osceola	1378	256
		Total of Enrollment	15,604

Source: Fishkind and Associates, Inc.

Table 11. 2015 Study Area Student Enrollment

2015	Students*
Orange – Study Area	26,240
Osceola	78,547
Total	104,787

Source: ESRI (2015) and Fishkind and Associates, Inc.
*includes college/university enrollment from Table 10

2.6 Summary of 2015 Baseline Socioeconomic Data

FKA combined the data derived via the methodologies discussed in Section 2.1 through Section 2.5 to estimate the full socioeconomic dataset for the 2015 base year. Table 12 provides the summary of the 2015 socioeconomic data for each county within the Study Area. Appendix 3 contains 2015 TAZ-level socioeconomic data for all the variables shown in Table 12.

Table 12. 2015 Study Area SE Data Summary

ZDATA1	Orange - Study Area	Osceola	Total
Single Family Dwelling Units	30,978	96,912	127,890
Single Family Population	83,525	257,167	340,692
Multi-Family Dwelling Units	10,938	30,698	41,636
Multi-Family Population	23,271	66,826	90,097
Hotel/Motel Units	4,060	44,992	49,052
Hotel/Motel Population	8,513	97,101	105,614
ZDATA2	Orange – Study Area	Osceola	Total
Industrial Employment	30,954	14,902	45,856
Commercial Employment	15,344	32,198	47,542
Service Employment	28,105	67,933	96,038
Total Employment	74,403	115,033	189,436
School Enrollment	26,240	78,547	104,787

Source: Fishkind and Associates, Inc.

3.0 Future-Year Population Control Totals

3.1 Historic Population Growth Within Study Area

FKA generated population and employment control total forecasts at the county level for Orange and Osceola Counties. A control total represents the upper limit of population within each County and Study Area analyzed. Prior to establishing future-year control totals, FKA analyzed the historic population growth in the two-county Study Area. The Study Area market includes Orange County, Florida and Osceola County, Florida. Orange County and specifically the City of Orlando currently represents the major population and employment center for the study area market. Orange County has added an estimated 390,000 in population from 2000 through 2015. Osceola County represents the tenth fastest growing county in Florida from 2000 through 2015. From 2000 through 2015, Osceola County has added an estimated 150,000 in population.

The base year for the purposes of this analysis is 2015. The 2010 population data is benchmarked to the US Census Bureau 2010 county level population estimates. Table 13 shows the populations of Orange and Osceola Counties from 1990 through 2015 from various sources.

Table 13. Historical Population Levels and Growth

W&P	County	1990	2000	2010	2015
	Orange	685,770	903,020	1,148,950	1,272,090
	Osceola	110,320	174,150	296,810	317,680
BEBR	County	1990	2000	2010	2015
	Orange	677,491	896,344	1,145,956	1,252,396
	Osceola	107,728	172,493	268,685	308,327
FKA	County	1990	2000	2010	2015
	Orange	677,491	896,344	1,145,956	1,288,130
	Osceola	107,728	172,493	268,685	323,993
ESRI	County		2000	2010	2015
	Orange			1,145,956	1,258,251
	Osceola			268,685	305,855
DataStory	Study Area		2000	2010	2015
	Orange - Study Area*			89,797	104,318
	Osceola			268,685	301,498
	Study Area % of Org			7.8%	8.3%

*partial county

Source: Woods & Poole 2016

Source: University of Florida, BEBR Medium (Volume 49, Bulleton 174, January 2016)

Source: Fishkind and Associates, Inc.

Source: ESRI BAO 2017

Source: DataStory (ESRI TAZ Data) *partial county

3.2 Population Forecast Methodology and Forecast

The University of Florida's Bureau of Economic and Business Research (BEBR) produces historical population estimates and future population projections for all Florida counties. Woods & Poole Economics (W&P) also generates population forecasts for all Florida counties. FKA reviewed the BEBR medium and W&P county-level population forecasts as it developed its future population control totals.

Table 14 provides the summary of FKA's initial 2015 base year population and population forecast by county for the select forecast years of 2025, 2035 and 2045. Also included are the BEBR medium series and W&P population forecasts over those same years. The FKA data reflect the county level data which represents the starting point for development of the Study Area control totals for each county.

Table 14. Comparison of Population Forecast by County

	County	2015	2025	2035	2045
W&P	Orange	1,272,090	1,488,110	1,724,150	1,963,435
	Osceola	317,680	405,340	514,260	638,550
Source: Woods & Poole 2016					
	County	2015	2025	2035	2045
BEBR	Orange	1,252,396	1,551,400	1,799,100	2,004,000
	Osceola	308,327	427,900	525,700	605,800
Source: University of Florida, BEBR Medium (Volume 49, Bulletin 174, January 2016)					
	County	2015	2025	2035	2045
FKA	Orange	1,288,130	1,591,844	1,839,786	2,034,767
	Osceola	323,993	436,348	537,245	634,366
Source: Fishkind and Associates, Inc.					

The TAZs for Orange County (as provided by the Client) only include southeastern Orange County and do not comprise the entire county; FKA estimated the percentage of Orange County population located within the TAZs compared to Orange County using data and analysis via Environmental Systems Research Institute (ESRI) which is a third-party data service. Using this data, FKA estimated the population of Orange County located within the Study Area. As Table 15 and Table 16 show, an estimated 7.8% of population is located within the study area in 2010, 8.3% in 2015 and an estimated 8.8% is forecast for 2020. Based on this finding, FKA forecast that the Orange County Study Area would continue to grow its overall share of Orange County population by 0.5% every five years through 2045.

Table 15. ESRI Population Forecast – Orange and Osceola County

	County	2010	2015	2020**
ESRI	Orange	1,145,956	1,258,251	1,385,665
	Osceola	268,865	305,855	353,038

Source: ESRI, **forecast estimates via ESRI

Table 16. Study Area TAZs (DataStory) Population Forecast by County

	County	2010	2015	2020
Datastory	Orange – Study Area	89,797	104,318	123,544
	Osceola*	268,685	301,498	352,817
	Orange Study Area % of County	7.8%	8.3%	8.8%

Source: DataStory (ESRI TAZ Data) *partial county
*Osceola County differs slightly from independent ESRI estimates

Table 17 summarizes the control total forecast estimates for each county within the Study Area. Table 18 summarizes the compound average annual growth rate (CAAGR) calculations for the historic and forecast population levels through 2045.

Table 17. Population Forecast by County (for Study Area)

		2015	2025	2035	2045
FKA	Orange - Study Area	106,795	151,181	193,563	234,908
	Osceola	323,993	436,348	537,245	634,366
	Total	430,788	587,529	730,808	869,274

Source: Fishkind and Associates, Inc.

Table 18. CAAGR – Compound Average Annual Growth Rate for Population by County (for Study Area)

CAAGR	2015-2025	2025-2035	2035-2045
Orange – Study Area	3.54%	2.50%	1.95%
Osceola	3.02%	2.10%	1.68%

Source: Fishkind and Associates, Inc.

4.0 Future-Year Employment Control Totals

4.1 Employment Forecast Methodology and Forecast

FKA analyzed the historic employment growth in the two-county Study Area. These two counties are linked via the following major roadways: I-4, the Florida Turnpike and SR 429. Orange County has significant East/West connectivity via SR 408, SR 528 (Beach Line) and SR 417. The major roadways will continue to link both counties' economies. The continued growth of both Orange and Osceola Counties is likely to result in increased traffic throughout the Study Area. The W&P employment data is the basis for FKA's employment forecast. Table 19 provides the county-level W&P employment data for each county.

Table 19. County-Level Woods & Poole Employment Estimates

County	1990	2000	2010	2015	2025	2035	2045
Orange	516,940	737,820	819,610	961,200	1,173,890	1,394,735	1,618,825
Osceola	43,170	63,940	93,180	112,240	145,110	184,260	229,040

Source: Woods & Poole Economics (2016)

The number of jobs estimated in W&P employment data is higher than other data sources as it takes into account a broader employment base with respect to sole proprietors and those having more than one job. W&P data are used in preference over Total Non-Agricultural Employment as published by the Bureau of Labor Statistics. This is because W&P employment data incorporate full-time and part-time workers by place of work as well as proprietors, private household employees, military and miscellaneous workers employment. This is a more comprehensive employment measure than either BLS or Census and more representative of total employment within each county.

FKA analyzed the W&P Employment/Population (E/P) ratio data. The E/P ratio is the ratio of total county employment divided by the total county population. Historically, the E/P ratios vary over time. These ratios are a function of the economic linkages from community to community and the pace at which economic development occurs. The data in Table 20 summarize the W&P E/P ratios.

Table 20. County-Level Woods & Poole E/P Ratios

County	1990	2000	2010	2015	2025	2035	2045
Orange	75.4%	81.7%	71.3%	75.6%	78.9%	80.9%	82.4%
Osceola	39.1%	36.7%	31.4%	35.3%	35.8%	35.8%	35.9%

Source: Woods & Poole Economics (2016)

Not surprisingly, Orange County has E/P ratio that has ranged between 70% and 82%. The 71.3% is historically low as a result of the Great Recession. Osceola County functions as a bedroom community and its E/P ratio of 35.3% is consistent with that type of economic construct. Because the Orange County Study Area is only a fraction of the overall Orange County, FKA reviewed and analyzed 2015 E/P ratios from various sources to best determine reasonable E/P ratios as part of its forecast. Table 21 summarizes its E/P ratio findings for 2015.

Table 21. County and Study Area E/P Ratio Comparison (2015)

	County			Study Area		Study Area
	W&P	ESRI	ZDATA	DataStory	ZDATA	FKA
Orange	75.6%	62.2%	83.5%	57.0%	77.1%	68.7%
Osceola	35.3%	33.6%	34.2%	33.9%	34.2%	35.2%
Total	67.5%	56.6%	71.2%	39.8%	43.0%	63.1%

Source: Woods & Poole Economics (2016)

Source: ESRI 2017

Source: DataStory

Based on an analysis of multiple sources, FKA estimates that the Orange County Study Area E/P ratio is 68.7% which is less than Orange County. FKA is comfortable with this finding given the more residential nature of southeastern Orange County Study Area. This development pattern is likely to remain consistent given that E/P ratios for developed market economics generally remain steady given the inherent economic base and development patterns. Other than major economic shocks such as the Great Recession, the E/P ratio is forecast to remain consistent with the 2015 findings. Table 22 summarizes FKA's E/P ratios used as its employment guide for the forecast years through 2045.

Table 22. Study Area Employment to Population Ratios: 2015-2045

County	2015	2025	2035	2045
Orange – Study Area	68.7%	67.9%	66.9%	65.9%
Osceola	35.5%	35.8%	35.8%	35.9%

Source: Fishkind and Associates, Inc.

FKA estimated the percentage of Orange County Study Area employment located within the TAZs compared to Orange County using data and analysis via ESRI. Using this data, FKA estimated the employment of Orange County located within the subset of TAZs within the Study Area. As Table 23 and Table 24 show, an estimated 97.7% of Mobile County's employment base is located within the subset of TAZs within Mobile County.

Table 23. Employment Estimate by County (2015)

	County	2015
ESRI	Orange	782,270
	Osceola	102,616

Source: ESRI 2015

Table 24. Employment Estimate for Study Area (2015)

	County	2015
DataStory	Orange*	59,501
	Osceola	102,616
	% of Orange County	7.6%

Source: DataStory (ESRI TAZ Data) *partial county

The result of the two analyses of adjusting the Study Area E/P ratios and applying the 7.6% to the adjusted employment levels for the Orange County Study Area resulted in FKA's employment control totals for the Study Area. Table 25 summarizes FKA's employment control total forecast for the Study Area counties. Table 26 summarizes the CAAGR calculations for the historic and forecast employment levels through 2045.

Table 25. Employment Forecast by County (for Study Area)

County	2015	2025	2035	2045
Orange – Study Area	74,403	102,576	129,397	154,687
Osceola	115,035	156,213	192,114	227,612

Source: Fishkind and Associates, Inc.

Table 26. CAAGR – Compound Average Annual Growth Rate for Employment by County (for Study Area)

CAGR	2015-2025	2025-2035	2035-2045
Orange – Study Area	3.26%	2.35%	1.80%
Osceola	3.11%	2.09%	1.71%

Source: Fishkind and Associates, Inc.

5.0 CFX-OCX Master Plan SE Forecast 2025, 2035 and 2045

Methodology

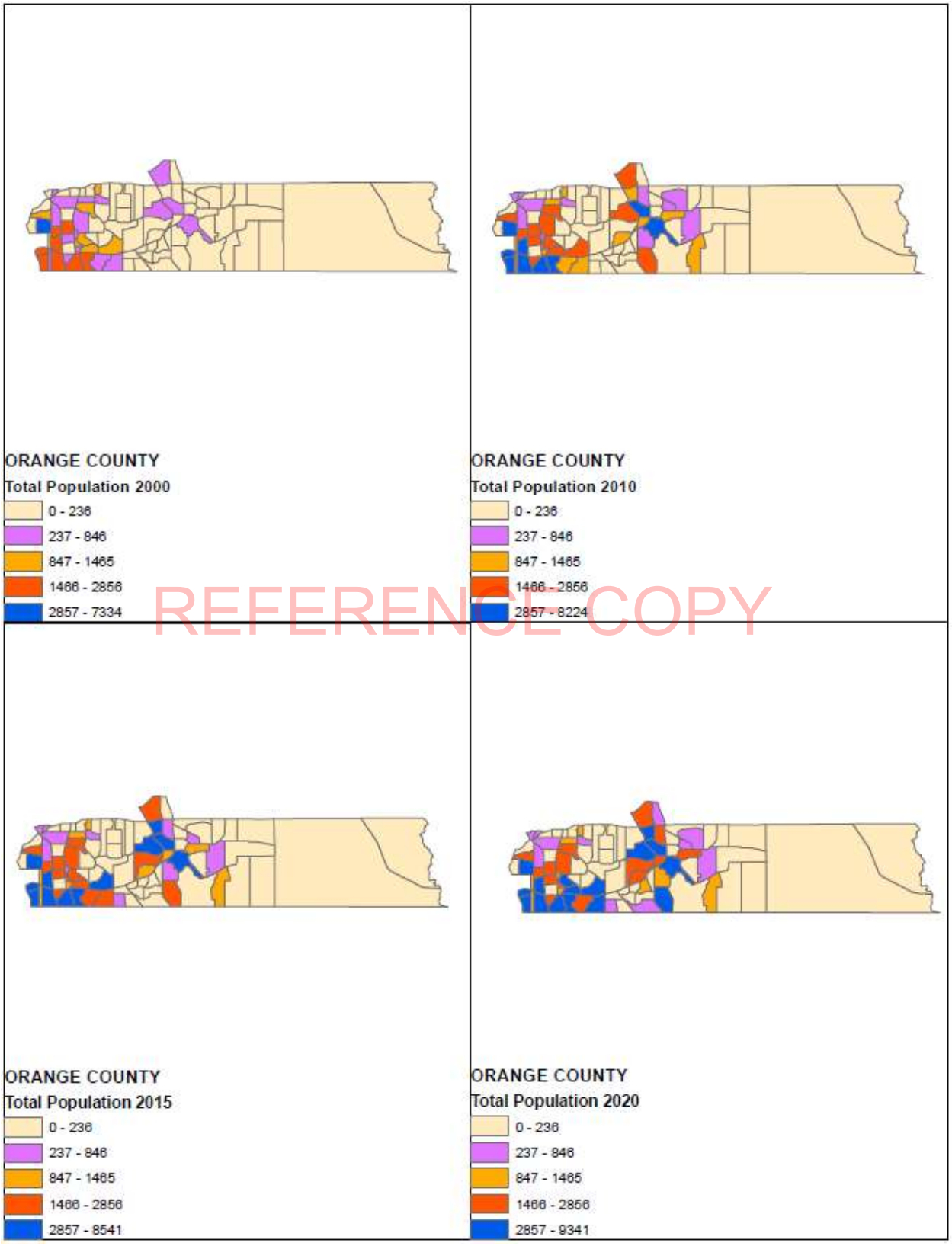
As part of the development of the forecast analysis, FKA estimated the holding capacity of vacant lands within the Study Area. FKA used the Client-provided Traffic Analysis Zones (TAZs) boundaries and intersected them with each county's GIS parcel shape file. FKA then intersected these parcel shape files with the U.S. Fish and Wildlife National Wetlands Inventory layer and removed all sensitive wetlands from the Study Area. By doing this, FKA was then able to estimate developable land in each TAZ within the Study Area.

To estimate holding capacities of residential and commercial uses, FKA calculated the existing density of development within each TAZ on a population per acre basis and an employee per acre basis. While it is understood that past development densities do not necessarily represent future densities, without municipal planning guidance, FKA believes this a reasonable methodology in estimating the holding capacity of residential and commercial development within the Study Area.

FKA identified the vacant developable acres within each county in the Study Area. FKA calculated the TAZ specific population capacity based in the existing population per acre within the TAZ. Similarly, FKA calculated the TAZ specific employment capacity based on the existing employee per acre basis. This data was supplemented with data regarding Developments of Regional Impact (DRIs) which influence holding capacity of acreage within a specific TAZ.

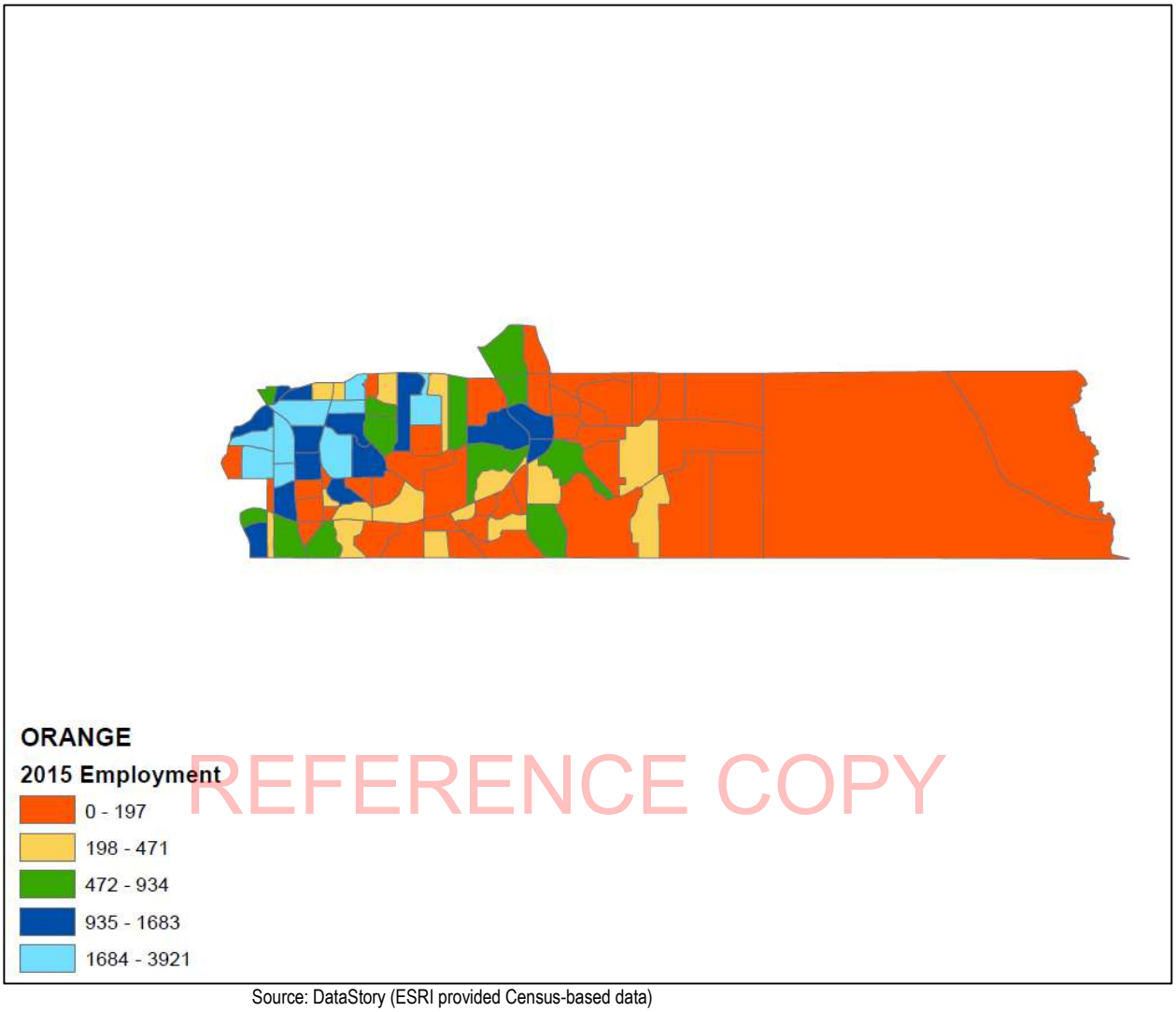
FKA met local developers and municipal planning personnel within the Study Area to gain a better understanding of future development patterns. FKA also reviewed historic and forecasted population growth maps at the TAZ level via DataStory (Map 2 and Map 4) as well as existing clusters of employment at the TAZ level as provided by DataStory (Map 3 and Map 5).

Map 2. Orange County Study Area TAZ Population Concentrations (2000, 2010, 2015 and 2020)



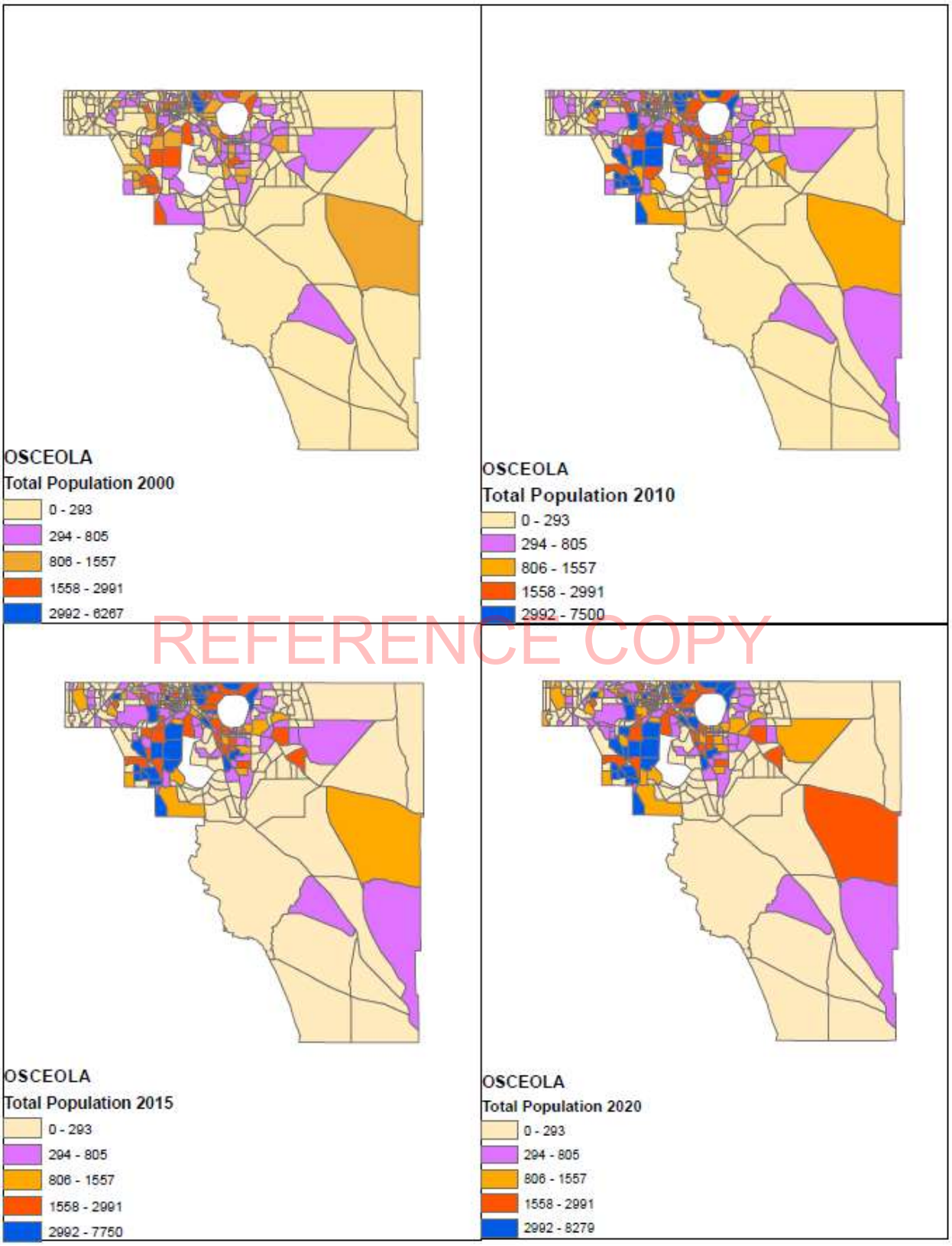
Source: DataStory (ESRI provided Census-based data)

Map 3. Orange County Study Area TAZ Employment Concentrations (2015)



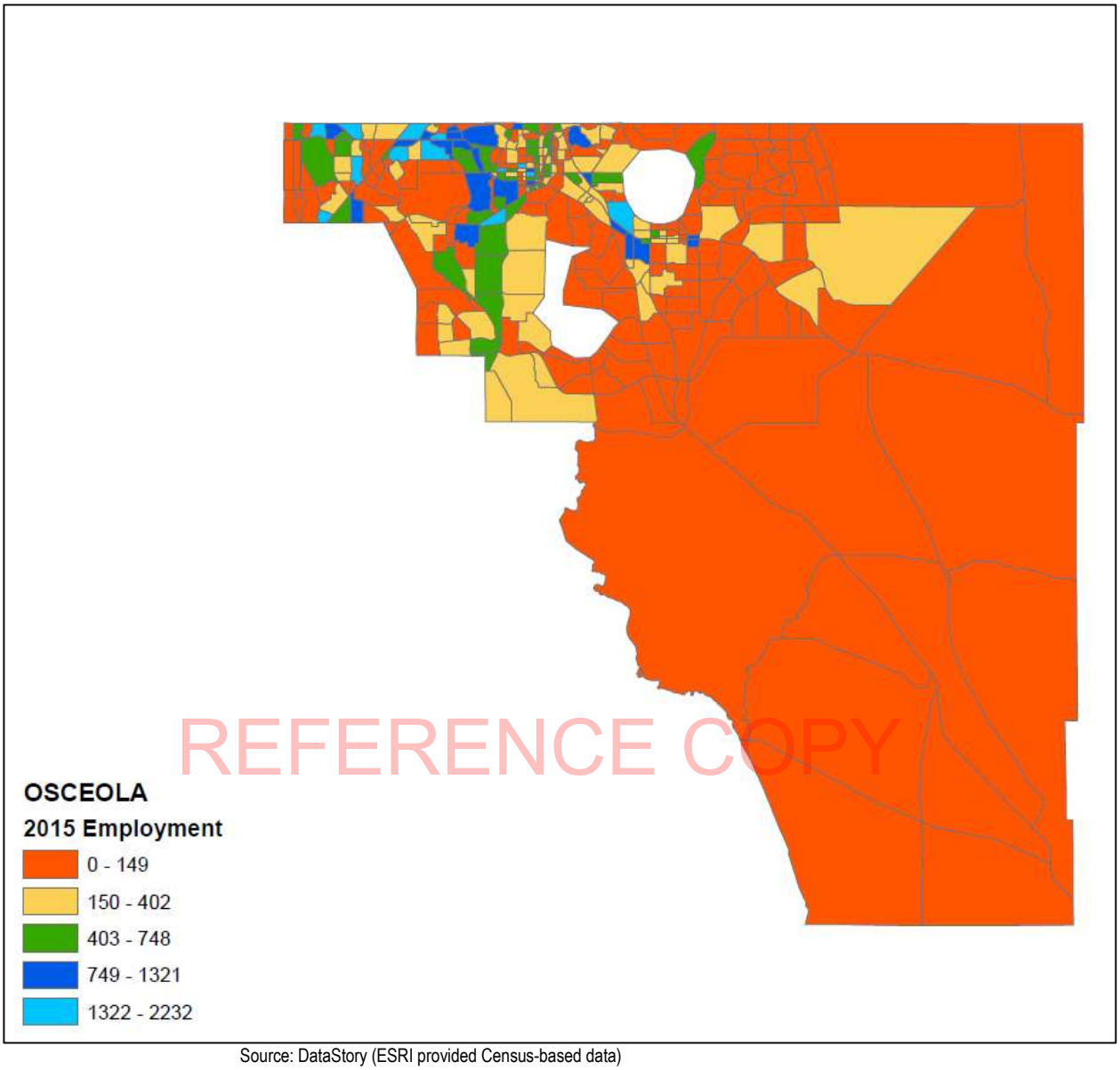
Source: DataStory (ESRI provided Census-based data)

Map 4. Osceola County TAZ Population Concentrations (2000, 2010, 2015 and 2020)



Source: DataStory (ESRI provided Census-based data)

Map 5. Osceola County TAZ Employment Concentrations (2015)



Source: DataStory (ESRI provided Census-based data)

Based on the local planning knowledge and FKA's market analysis, specific locations within each county were identified as more or less attractive to future growth. FKA created nine Super Zones: four in Orange County and five in Osceola County. These zones were created using an index of attractiveness, which is a collection of criteria that make areas within each county more likely to see growth. These criteria include: 1) transportation access in terms of highway, rail and/or airports, 2) coastal development / retiree activity, 3) juxtaposition to current employment centers, and 4) other factors. FKA identified the following economic drivers and activity areas within each county:

Orange County Study Area Super Zones

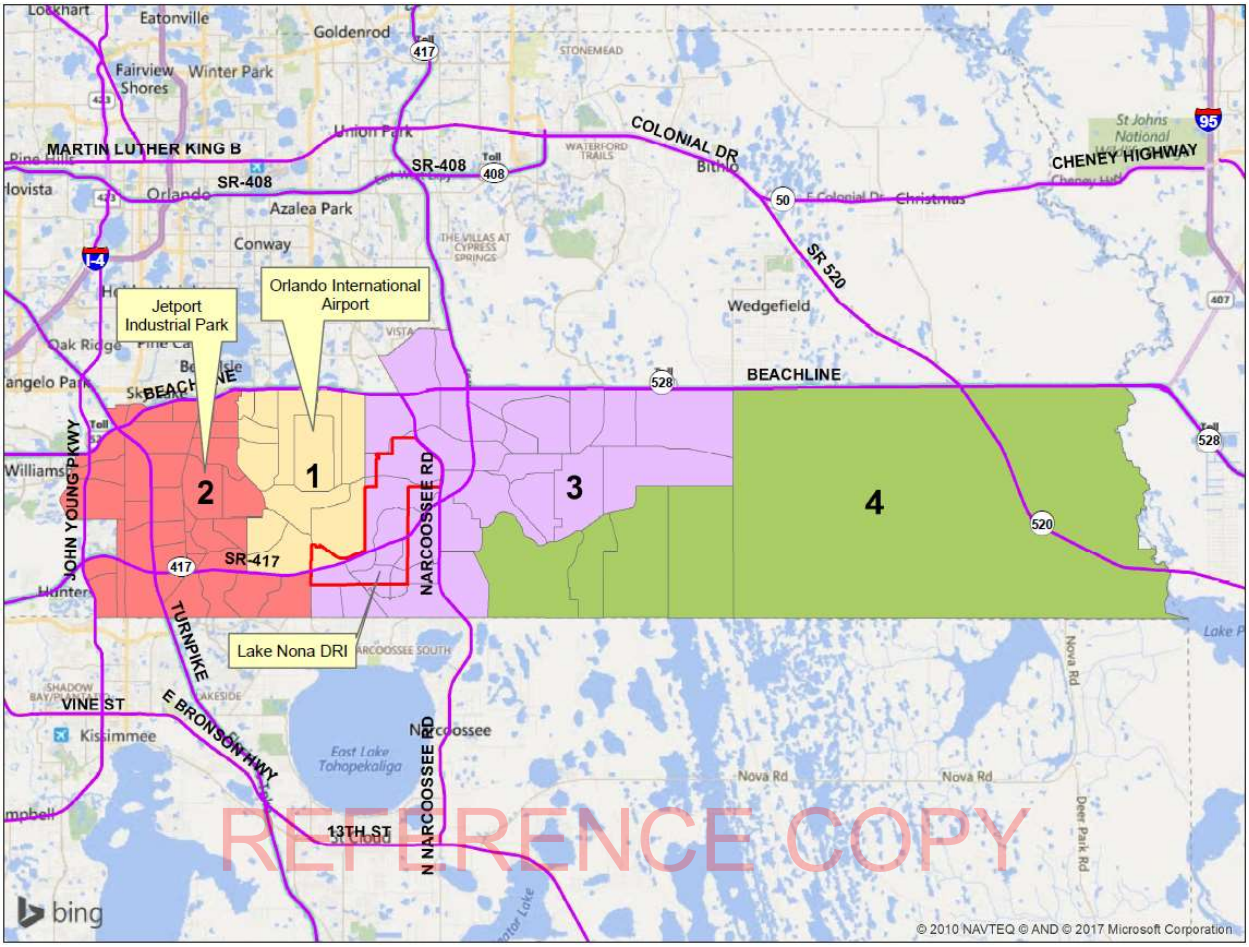
- Super Zone 1: Orlando International Airport (OIA)
- Super Zone 2: Florida Turnpike and SR 417 Intersection and Jetport Industrial Park
- Super Zone 3: SR 417 and SR 528 and Lake Nona/Medical City
- Super Zone 4: Eastern Orange County (predominantly rural)

Osceola County Super Zones

- Super Zone 1: Celebration, SR 429 and I-4, SR 417 and I-4, Irlo Bronson Hwy and I-4
- Super Zone 2: Kissimmee, Osceola Parkway and Florida Turnpike
- Super Zone 3: Poinciana
- Super Zone 4: St. Cloud, Eastern Osceola Parkway, Irlo Bronson Hwy
- Super Zone 5: Southern and Eastern County (predominantly rural)

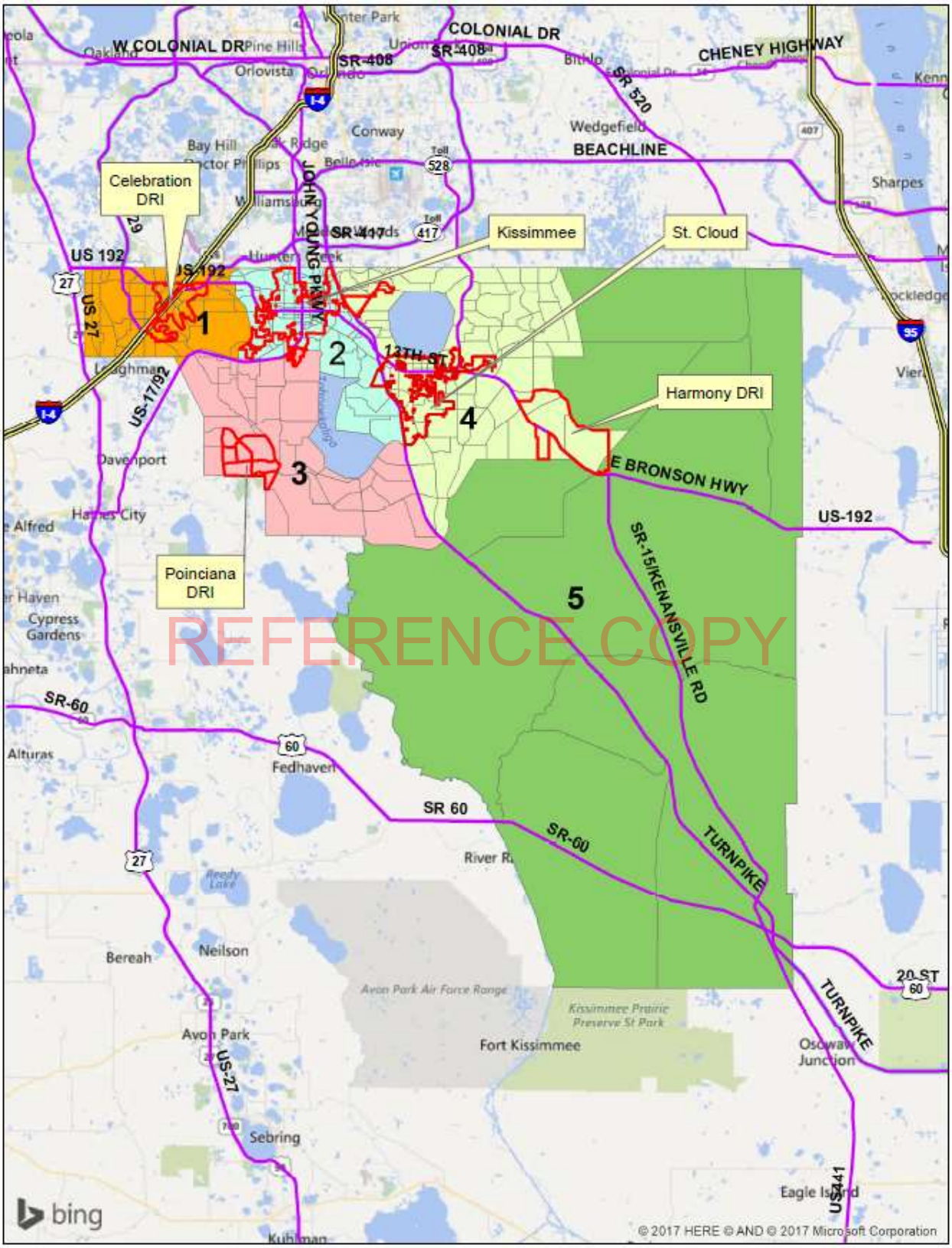
The boundary of each Super Zones defines specific areas to which to allocate forecasted growth. This methodology allows FKA to allocate growth in to areas within each county that are likely to see higher or lower growth based on historic growth patterns. Maps 6 and 7 show FKA's Super Zones' boundaries for the Orange Study Area and Osceola Counties respectively. By applying FKA's assumptions and understanding of the local market dynamics, known environmental constraints, and growth trends, FKA estimated and allocated countywide growth to each Super Zone within the Study Area from 2015 through 2045.

Map 6. Orange County Study Area TAZ Super Zones



Source: Fishkind and Associates, Inc.

Map 7. Osceola County TAZ Super Zones



Source: Fishkind and Associates, Inc.

5.1 Developments of Regional Impact (DRI) Analysis

As part of its development of its forecast for the Study Area, in conjunction with the Super Zone analysis, FKA reviewed the status of DRIs within Orange and Osceola Counties. FKA met with representatives of Tavistock which is the developer of Lake Nona in southern Orange County and Sunbridge which is a project located in both eastern Orange County and comprises the Northeast District Sector Planning Area in northeast Osceola County. DRIs represent concentrations of development potential which have entitlements to develop residential and commercial real estate. These development rights typically extend from ten years to 25 years depending on the scale of the project. These projects represent likely sources of future traffic given their respective development potential to unentitled property within each county.

In the case of each county, FKA compared the DRI entitlements to the development currently constructed as provided via each county's property appraiser data. Based on the findings, FKA calculated the amount of remaining development potential within each DRI and based on the information in the introduction of Section 5.0, FKA forecast the development timing of remaining residential and commercial DRI entitlements.

Orange County (Study Area)

FKA mapped the locations of the DRIs within Orange County and specifically the DRIs within the Orange County Study Area (Map 8). FKA estimates that the unbuilt residential and commercial holding capacity of the 22 DRIs within the Study Area total the following: 1) 51,898 residential units, 2) 53.4 million square feet of commercial space and 3) 15,718 hotel rooms. Table 27 summarizes the findings.

Map 8. Orange County DRIs within Study Area

Source: East Central Florida Regional Planning Council (2017)

Table 27. Orange County Study Area DRIs Unbuilt Development Capacity Summary

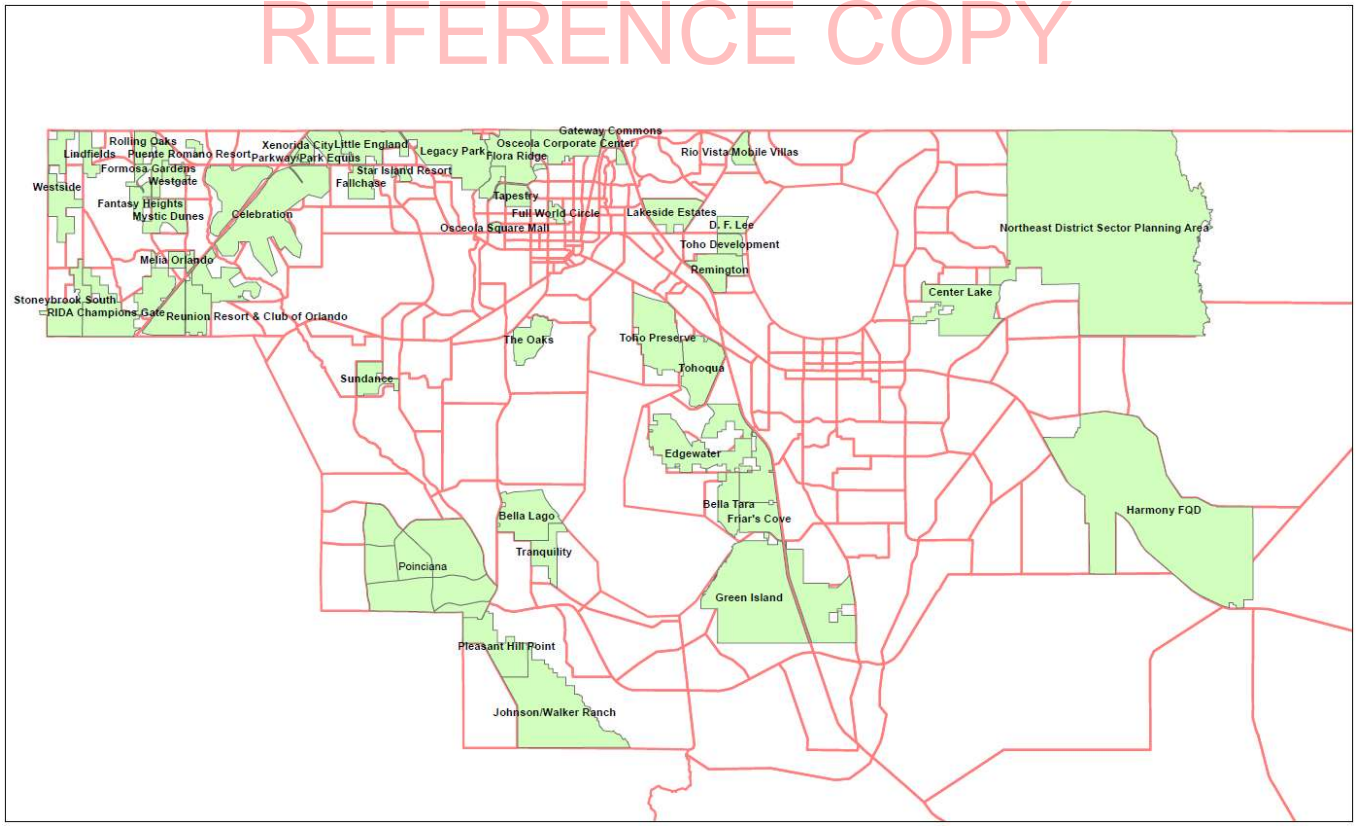
Residential	Units
Single Family Units	24,970
Multi-Family Units	26,928
Total Units	51,898
Commercial	Square Feet / Units
Retail	14,227,442
Office	8,241,682
Industrial	30,888,265
Hotel	15,718

Source: East Central Florida Regional Planning Council (2017) and Fishind and Associates, Inc.

Osceola County

FKA mapped the locations of the DRIs within Osceola County (Map 9). There are no DRIs located farther to the south or east in Osceola County other than those shown. FKA estimates that the unbuilt residential and commercial holding capacity of the 46 DRIs within the Study Area total the following: 1) 67,789 residential units, 2) 31.6 million square feet of commercial space and 3) 30,235 hotel rooms. Table 28 summarizes the findings.

Map 9. Osceola County DRIs



Source: East Central Florida Regional Planning Council (2017)

Table 28. Osceola County DRIs Unbuilt Development Capacity Summary

Residential	Units
Single Family Units	54,197
Multi-Family Units	13,592
Total Units	67,789
Commercial	Square Feet / Units
Retail	18,014,715
Office	9,495,321
Industrial	4,044,891
Hotel	30,235

Source: East Central Florida Regional Planning Council (2017) and Fishind and Associates, Inc.

FKA allocated a portion of future population, employment, and hotel unit/population growth to the DRI locations based on each DRI's respective unbuilt capacity, competitive location and reported development schedules (if available). Specifically, with respect to the Lake Nona DRI and its Poitras Property acquisition, which is adjacent to the Lake Nona property, FKA applied Tavistock's development schedule for both holdings through its reported development horizon.

5.2 Population and Dwelling Units

Table 29 summarizes FKA's population forecasts for each county within the Study Area for the three forecast years.

Table 29. Population Forecasts (Study Area)

County	2025	2035	2045
Orange – Study Area	151,181	193,563	234,908
Osceola	436,348	537,245	634,366
Total	587,529	730,808	869,274

Source: Fishkind and Associates, Inc.

FKA generated the data in Table 29 via its annual population forecast for each county within the Study Area. The annual population growth is cumulatively added to the 2015 Base Year population. The annual growth is first allocated across each Super Zone within each county by percentage. This percentage was adjusted annually. The percentage of annual population growth within each Super Zone is then divided equally among each of the TAZs within each Super Zone.

It is important to note that this allocation of population growth per TAZ varied annually based on the percentage of population growth allocated to each Super Zone within each county. With respect to the forecasted population growth in each county within the Study Area, FKA made an assumption that all vacant developable land within each defined Super Zone of TAZs within each county (Super Zones 1 through 4 in the Orange County Study Area and Super Zones 1 through 5 in Osceola County) have the ability to capture its relative share of forecasted annual population based on each individual TAZ's population capacity and that all TAZs were equal in terms of development desirability

within each zone. For example, this assumption means that a TAZ with a larger amount of residential population capacity relative to other TAZs in the same Super Zone will capture a larger share of annual population growth based on its capacity regardless of its comparative location/attractiveness to other TAZs within the zone.

FKA calculated the capacity of each TAZ and Super Zone annually so that if all the vacant land was exhausted in a specific TAZ and Super Zone for population growth, that growth can be allocated to another TAZ within the Super Zone. As discussed, FKA calculated the existing density of development within each TAZ on a population per acre basis and an employee per acre basis. FKA calculated the percentage of population within each Super Zone to evaluate that each Super Zone continues to capture its historic share of existing countywide population. It is assumed that development patterns will continue to generally emulate historic activity at the Super Zone level.

FKA converted each county's annual population growth to annual household growth using the 2015 TAZ-specific PPH factor. FKA's population and household levels from 2015 through 2045 are calculated at the aggregate Super Zone level for the forecast years of 2025, 2035 and 2045 for the Study Area. Table 30 summarizes the estimates and allocation of population and households through 2045. The percentage of population within each Super Zone is also calculated through 2045 to evaluate the allocation among the Super Zones in each county within the Study Area.

Map 10 shows the total population levels at the TAZ level in 2015, 2025, 2035 and 2045 for the Orange County Study Area. Map 11 shows the total population levels at the TAZ level in 2015, 2025, 2035 and 2045 for Osceola County. Appendix 4 contains a summary of the final set of socioeconomic data which includes the forecast years' employment data by category at the TAZ level.

Table 30. Summary of Population and Dwelling Units Estimates (by Super Zone)

Super Zone	Orange Study Area Population 2015	2025	2035	2045
1	3,642	5,288	7,059	8,503
2	61,708	77,295	88,029	96,061
3	40,047	66,774	96,580	128,691
4	1,399	1,825	1,896	2,452
Total	106,796	151,182	193,564	235,707

Super Zone	Orange Study Area Population (%) 2015	2025	2035	2045
1	3.4%	3.5%	3.6%	3.6%
2	57.8%	51.1%	45.5%	40.8%
3	37.5%	44.2%	49.9%	54.6%
4	1.3%	1.2%	1.0%	1.0%
Total	100.0%	100.0%	100.0%	100.0%

Super Zone	Orange Study Area Dwelling Units 2015	2025	2035	2045
1	1,402	2,026	2,698	3,252
2	25,773	32,261	36,727	40,105
3	14,296	24,996	36,290	48,276
4	445	591	615	801
Total	41,916	59,874	76,330	92,434

Super Zone	Orange Study Area Dwelling Units (%) 2015	2025	2035	2045
1	3.3%	3.4%	3.5%	3.5%
2	61.5%	53.9%	48.1%	43.4%
3	34.1%	41.7%	47.5%	52.2%
4	1.1%	1.0%	0.8%	0.9%
Total	100.0%	100.0%	100.0%	100.0%

Super Zone	Osceola Co Population 2015	2025	2035	2045
1	42,974	59,555	74,985	90,032
2	93,761	124,084	151,610	176,967
3	64,945	85,781	101,353	116,981
4	119,596	163,332	204,991	246,565
5	2,717	3,595	4,305	5,218
Total	323,993	436,347	537,244	635,763

Super Zone	Osceola Co Population % 2015	2025	2035	2045
1	13.3%	13.6%	14.0%	14.2%
2	28.9%	28.4%	28.2%	27.8%
3	20.0%	19.7%	18.9%	18.4%
4	36.9%	37.4%	38.2%	38.8%
5	0.8%	0.8%	0.8%	0.8%
Total	100.0%	100.0%	100.0%	100.0%

Super Zone	Osceola Co Dwelling Units 2015	2025	2035	2045
1	21,868	29,326	36,241	42,998
2	37,952	50,032	60,979	71,006
3	22,601	30,763	36,861	43,001
4	44,011	61,103	77,363	93,479
5	1,178	1,545	1,844	2,227
Total	127,610	172,769	213,288	252,711

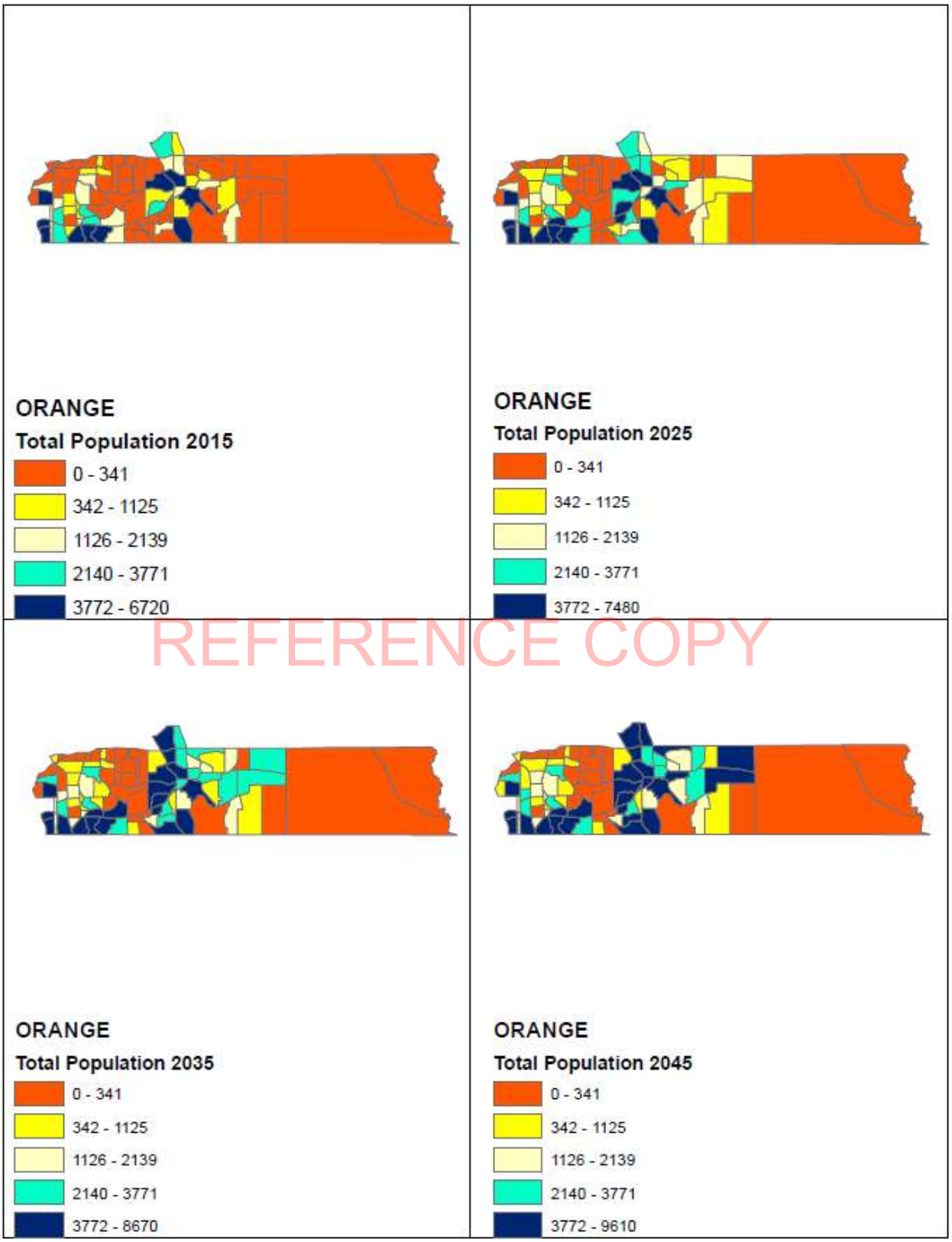
Super Zone	Osceola Co Dwelling Units % 2015	2025	2035	2045
1	17.1%	17.0%	17.0%	17.0%
2	29.7%	29.0%	28.6%	28.1%
3	17.7%	17.8%	17.3%	17.0%
4	34.5%	35.4%	36.3%	37.0%
5	0.9%	0.9%	0.9%	0.9%
Total	100.0%	100.0%	100.0%	100.0%

Source: Fishkind and Associates, Inc.

OIA
Lake Nona

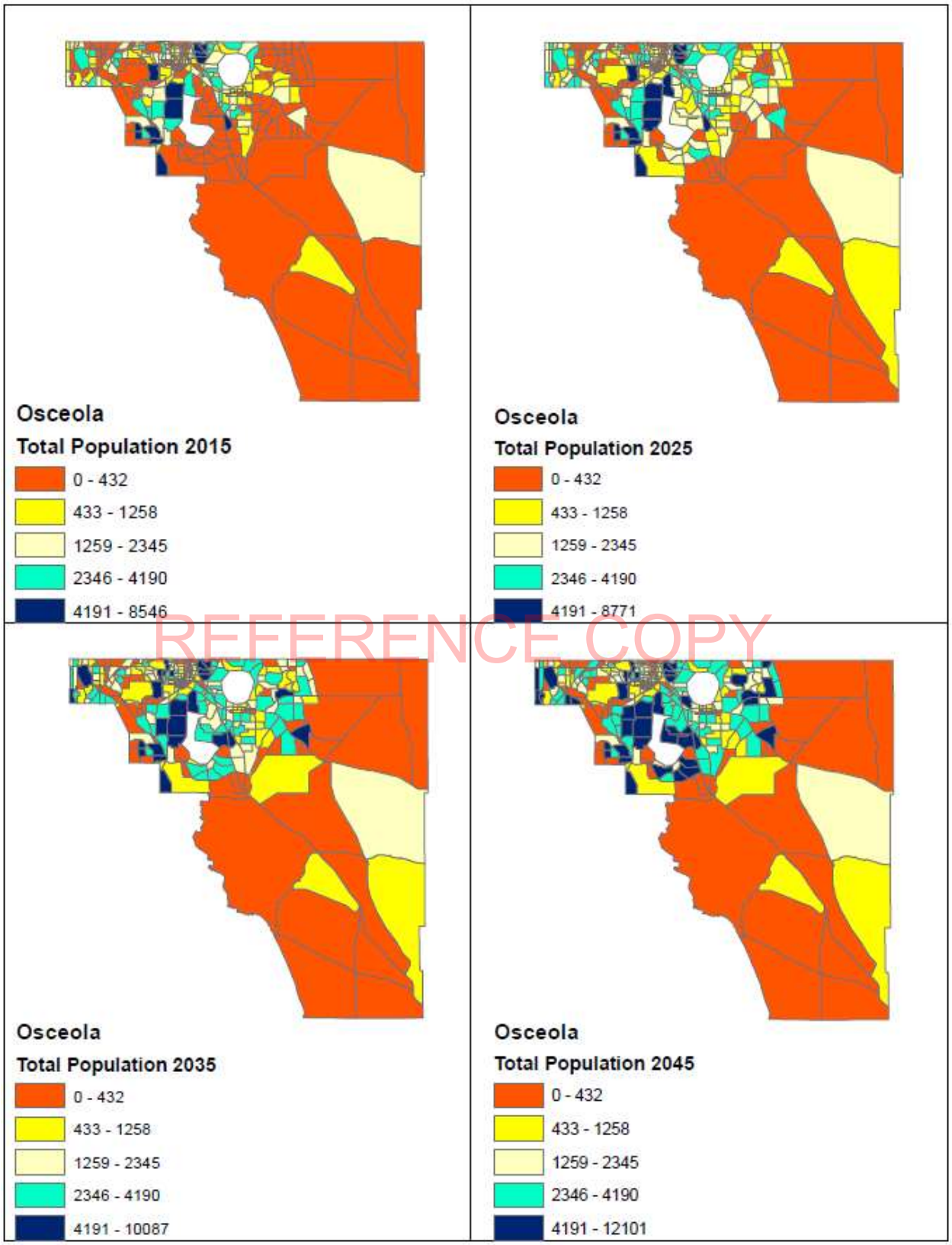
NED &
Narcoossee

Map 10. Total Population Concentration at the TAZ Level (Orange Study Area)



Source: Fishkind and Associates, Inc.

Map 11. Total Population Concentration at the TAZ Level (Osceola County)



Source: Fishkind and Associates, Inc.

5.3 Employment (2025, 2035 and 2045 Industrial, Retail-Commercial and Service)

The development of the 2025, 2035 and 2045 employment estimates for the two counties within the Study Area involved the same methodology as outlined in Section 2.3 for the 2015 Base Year. A summary of the steps is provided herein:

1. **Identify/establish FKA's guiding employment control total for each county's Study Area (See Section 2.2 – Table 8)**

FKA estimated the 2025, 2035 and 2045 aggregate employment control totals for each county within the Study Area. Table 31 summarizes the forecast employment control totals.

Table 31. Forecast Employment County-Level Control Totals (for Study Area)

County	2025	2035	2045
Orange Study Area	102,576	129,397	154,687
Osceola	156,213	192,114	227,612

Source: Fishkind and Associates, Inc.

2. **Allocate FKA's (W&P-based) employment control total across the three employment categories (retail, service and other)**

Table 32 summarizes the forecast employment allocations by employment type for the Study Area.

Table 32. 2025, 2035 and 2045 Forecast Employment Estimates by Type for the Study Area

	2025	2035	2045
Orange Study Area			
OTHER	40,723	50,724	59,554
COMMERCIAL	21,951	28,338	33,876
SERVICE	39,902	50,335	61,256
TOTAL	102,576	129,397	154,687
% OTHER	39.70%	39.20%	38.50%
% COMMERCIAL	21.40%	21.90%	21.90%
% SERVICE	38.90%	38.90%	39.60%
	2025	2035	2045
Osceola			
OTHER	20,583	25,351	30,424
COMMERCIAL	42,307	49,639	56,709
SERVICE	93,323	117,123	140,478
TOTAL	156,213	192,114	227,612
% OTHER	13.18%	13.20%	13.37%
% COMMERCIAL	27.08%	25.84%	24.91%
% SERVICE	59.74%	60.97%	61.72%

Source: Fishkind and Associates, Inc.

3. Calculated employment by TAZ as a percentage of total employment by category

4. Calculate employment by category at the TAZ level

To obtain the TAZ-level employment, FKA multiplied the 2025, 2035 and 2045 category-level employment control totals provided in Table 30 to the corresponding employment percentages illustrated in Table 7 in Section 2.3. Table 33 summarizes the total employment by FKA's defined zones through 2045.

Table 33. Summary of Employment Estimates (by Super Zone)

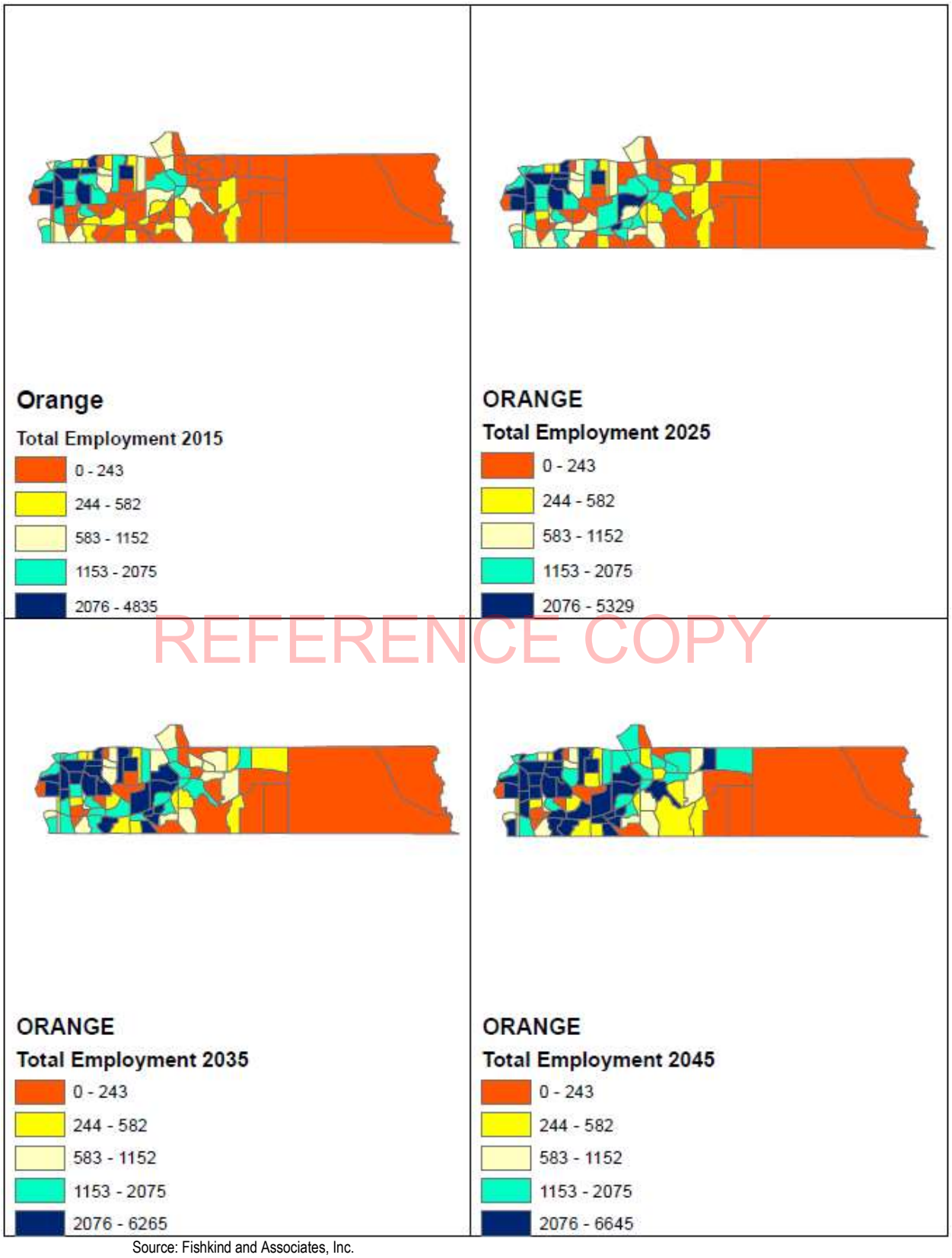
	Orange Study Area Employment (Total)					Orange Study Area Employment Total (%)			
Zone	2015	2025	2035	2045	Zone	2015	2025	2035	2045
1	10,907	14,105	16,975	19,369	1	14.7%	13.8%	13.1%	12.5%
2	49,000	57,469	67,427	77,099	2	65.9%	56.0%	52.1%	49.8%
3	13,949	30,327	44,216	57,288	3	18.7%	29.6%	34.2%	37.0%
4	547	670	765	915	4	0.7%	0.7%	0.6%	0.6%
Total	74,403	102,571	129,383	154,671	Total	100.0%	100.0%	100.0%	100.0%

	Osceola Co Employment					Osceola Co Employment (%)			
Zone	2015	2025	2035	2045	Zone	2015	2025	2035	2045
1	29,371	41,643	53,223	63,670	1	25.5%	26.7%	27.7%	28.0%
2	51,406	69,704	85,271	101,010	2	44.7%	44.6%	44.4%	44.4%
3	9,713	12,729	15,369	17,845	3	8.4%	8.1%	8.0%	7.8%
4	23,653	30,957	36,882	43,504	4	20.6%	19.8%	19.2%	19.1%
5	890	1,158	1,368	1,559	5	0.8%	0.7%	0.7%	0.7%
Total	115,033	156,191	192,113	227,588	Total	100.0%	100.0%	100.0%	100.0%

Source: Fishkind and Associates, Inc.

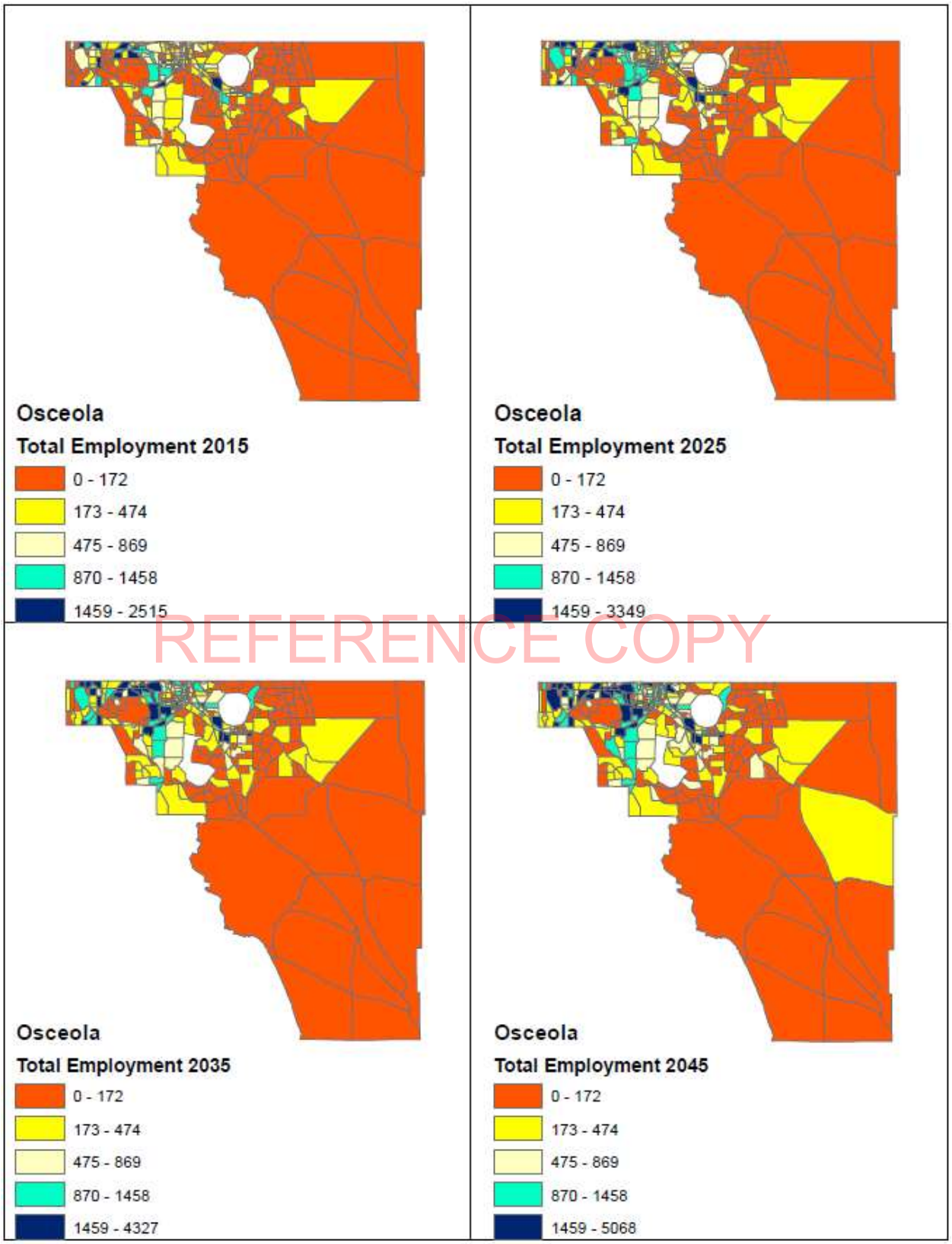
Map 12 shows the total employment levels at the TAZ level in 2015, 2025, 2035 and 2045 for the Orange County Study Area. Map 13 shows the total employment levels at the TAZ level in 2015, 2025, 2035 and 2045 for Osceola County. Appendix 4 contains a summary of the final set of socioeconomic data which includes the forecast years' employment data by category at the TAZ level.

Map 12. Total Employment Concentration at the TAZ Level (Orange Study Area)



Source: Fishkind and Associates, Inc.

Map 13. Total Employment Concentration at the TAZ Level (Osceola County)



Source: Fishkind and Associates, Inc.

5.4 Schools – Pre-Kindergarten to 12th Grade Enrollment (2025-2035-2045)

FKA estimated the 2025, 2035 and 2045 (PK-12) school enrollments in the Study Area. FKA developed the forecast PK-12 school enrollment data for the two counties within the Study Area via the following steps:

1. Identify the existing location and 2015 enrollments for the Orange and Osceola County public schools within the Study Area as provided by each county public school district
2. Identify the existing location and 2015 enrollments for the Orange and Osceola County private schools within the Study Area as provided by NCES
3. FKA analyzed county-specific detailed-age profiles for each county to evaluate growth trends from 2010 to 2020 for population age 4 to 17 (Table 34 summarizes the growth rates applied for modeling)
4. FKA geo-located each school within the TAZs and forecast student enrollment based on each TAZs share of student estimates based on the 2015 percentage allocation

Table 34. County-Specific Annual Population Growth Rates (Age 4 to 17)

	2010	2015	2020
Population (4-17)	210,855	218,115	236,828
Orange - Annual Growth Rate (2010-2021)			1.12%
	2010	2015	2020
Population (4-17)	56,244	58,727	66,491
Osceola - Annual Growth Rate (2015-2020)			1.66%

Source: ESRI (2015)

FKA applied each county's specific annual growth rate to the student volumes located within each TAZ beyond 2015 through 2045. For example, TAZ 883 in Orange County has an estimated student volume of 865 in 2015 and is forecast to grow at 1.12% annually through 2045. The aggregate data for school age children from age 4 to 17 within the Study Area was calculated in 2015, 2025, 2035 and 2045. FKA calculated the percentage of children age 4 to 17 compared to the total forecast population within the Study Area. Table 35 summarizes the Study Area PK-12 enrollment and total population through 2045. This table provided FKA a relationship between the overall population and total students and a quality control tool for its estimates of total students through the forecast horizon.

Table 35. Summary of Study Area PK-12 Student Volumes and Total Population*

	Orange County - Study Area				
	2010	2015	2025	2035	2045
Total Population	182,265	204,543	225,564	264,992	300,466
Students*	32,920	34,347	38,660	44,998	52,377
% students	18.1%	16.8%	17.1%	17.0%	17.4%

	Osceola County - Study Area				
	2010	2015	2025	2035	2045
Total Population	383,766	389,850	395,434	403,650	407,083
Students*	72,069	68,070	68,512	69,415	70,336
% students	18.8%	17.5%	17.3%	17.2%	17.3%

Source: Fishkind and Associates, Inc.
*includes university students within Study Area

5.5 College & University Student Enrollment Estimates (2025-2035-2045)

FKA produced 2025, 2035 and 2045 estimates of college/university enrollment for the colleges/universities located within the two county Study Area. The development of these estimates involved the following steps:

1. Identify the existing location and 2015 enrollments for the Orange and Osceola County colleges and universities within the Study Area
2. FKA geo-located each college/university within the TAZs and estimated the enrollment data at each school based on the county-specific student growth rates identified in Table 34

The colleges/universities identified within the Orange and Osceola County Study Area included the following: 1) Valencia Community College – Lake Nona Campus (TAZ 1093), 2) Valencia Community College – Osceola Campus (TAZ 1346) and 3) Florida Christian College (TAZ 1378). Table 36 summarizes the 2015 student enrollment estimates associated with these three colleges. The forecasted enrollments for these college students is included within the student forecast provided in Table 35.

Table 36. Summary of Study Area College Enrollment and Location (2015)

College/University	County	TAZ	Number of Students
Valencia – Lake Nona	Orange	1093	2,452
Valencia – Osceola	Osceola	1346	12,896
Florida Christian College	Osceola	1378	256
		Total of Enrollment	15,604

Source: Fishkind and Associates, Inc.

5.6 Socioeconomic Data Forecast Summary (2025 – 2035 – 2045)

FKA combined the methodologies from Section 6.1 through Section 6.5 to estimate the full socioeconomic data for the forecast years of 2025, 2035 and 2045. Table 37 provides the summary of the forecast socioeconomic data for each county within the Study Area for 2025, 2035 and 2045.

Table 37. 2025, 2035 and 2045 Study Area SE Data Summary

	2025			2035			2045		
	Orange	Osceola	Total	Orange	Osceola	Total	Orange	Osceola	Total
Single Family Dwelling Units	42,080	126,727	168,807	52,809	154,276	207,085	63,193	182,053	245,246
Multi-Family Dwelling Units	17,794	46,042	63,836	23,521	59,012	82,533	29,241	70,658	99,899
Total Dwelling Units	59,874	172,769	232,643	76,330	213,288	289,618	92,434	252,711	345,145
Single Family Population	112,495	334,109	446,604	141,699	405,101	546,800	170,342	476,869	647,211
Multi-Family Population	38,687	102,238	140,925	51,865	132,143	184,008	65,365	158,894	224,259
Total Population	151,182	436,347	587,529	193,564	537,244	730,808	235,707	635,763	871,470
Hotel/Motel Units	6,075	50,346	56,421	6,875	57,714	64,589	7,545	65,141	72,686
Hotel/Motel Population	12,740	108,649	121,389	14419	124,547	138,966	15,823	140,576	156,399
Industrial Employment	37,262	19,542	56,804	46,142	23,271	69,413	55,539	26,742	82,281
Commercial Employment	24,532	46,541	71,073	29,301	60,460	89,761	33,683	74,520	108,203
Service Employment	40,777	90,108	130,885	53,940	108,382	162,322	65,449	126,326	191,775
Total Employment	102,571	156,191	258,762	129,383	192,113	321,496	154,671	227,588	382,259
School Enrollment (Students)	32,123	96,539	128,662	41,293	113,775	155,068	46,160	134,095	180,255

Source: Fishkind and Associates, Inc.

6.0 Forecast Sensitivity High-Low Analysis

6.1 Methodology

As part of the development of the CFX analysis, the Consultant created alternative high and low population and employment forecasts which provide brackets associated with growth for the two counties within the Study Area. The first step in creating reasonable estimates of growth involved an analysis of over 40 years of Florida population growth. The Consultant used Florida population growth as a proxy for the Central Florida counties due to its larger base resulting in less annual volatility over the history. The Consultant believes this statewide volatility will be more consistent with Central Florida in the future compared to Central Florida annual growth over the past 40 years.

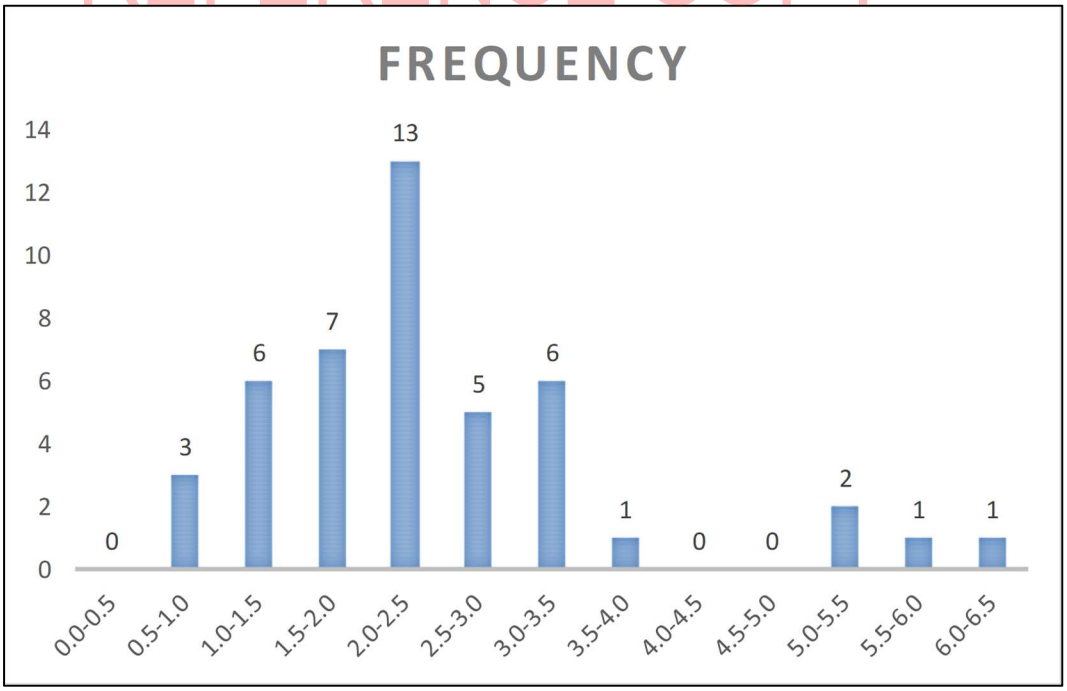
The Consultant reviewed the history and created a frequency distribution with respect to the annual percentage change in population growth. Table 38 and Figure 1 summarize the frequency distribution. The "Bins" represent a range of annual percentage change in population growth. Table 39 summarizes the Florida population level, growth and annual percentage growth.

Table 38. Frequency Distribution of Florida Population Annual Growth Rates

Bins	Frequency	Agg	Cum Agg %
0.0-0.5	0	0	0%
0.5-1.0	3	3	7%
1.0-1.5	6	9	20%
1.5-2.0	7	16	36%
2.0-2.5	13	29	64%
2.5-3.0	5	34	76%
3.0-3.5	6	40	89%
3.5-4.0	1	41	91%
4.0-4.5	0	41	91%
4.5-5.0	0	41	91%
5.0-5.5	2	43	96%
5.5-6.0	1	44	98%
6.0-6.5	1	45	100%
TOTAL	**45**		

Source: US. Census and Fishkind and Associates, Inc.

Figure 1. Frequency Distribution of Florida Population Annual Growth Rates



Source: US. Census and Fishkind and Associates, Inc.

Table 39. Florida Population Growth Summary

Year	Population	Change	% Change		Year	Population	Change	% Change
1970	6,791,400				1993	13,927,185	276,632	2.0%
1971	7,178,450	387,050	5.7%		1994	14,239,444	312,259	2.2%
1972	7,565,500	387,050	5.4%		1995	14,537,875	298,431	2.1%
1973	8,041,700	476,200	6.3%		1996	14,853,360	315,485	2.2%
1974	8,453,100	411,400	5.1%		1997	15,186,304	332,944	2.2%
1975	8,618,500	165,400	2.0%		1998	15,486,559	300,255	2.0%
1976	8,744,300	125,800	1.5%		1999	15,759,421	272,862	1.8%
1977	8,920,000	175,700	2.0%		2000	15,982,374	111,477	0.7%
1978	9,156,700	236,700	2.7%		2001	16,356,971	374,597	2.3%
1979	9,448,500	291,800	3.2%		2002	16,689,375	332,404	2.0%
1980	9,746,400	297,900	3.2%		2003	17,004,080	314,705	1.9%
1981	10,106,000	359,600	3.7%		2004	17,415,314	411,234	2.4%
1982	10,375,300	269,300	2.7%		2005	17,842,035	426,721	2.5%
1983	10,591,700	216,400	2.1%		2006	18,166,997	324,962	1.8%
1984	10,930,400	338,700	3.2%		2007	18,367,856	200,859	1.1%
1985	11,287,900	357,500	3.3%		2008	18,527,304	159,448	0.9%
1986	11,654,100	366,200	3.2%		2009	18,652,639	125,335	0.7%
1987	12,000,200	346,100	3.0%		2010	18,849,881	197,242	1.1%
1988	12,327,600	327,400	2.7%		2011	19,104,534	254,653	1.4%
1989	12,650,900	323,300	2.6%		2012	19,347,395	242,861	1.3%
1990	12,937,071	286,171	2.3%		2013	19,586,474	239,079	1.2%
1991	13,369,798	432,727	3.3%		2014	19,890,079	303,605	1.6%
1992	13,650,553	280,755	2.1%		2015	20,244,245	354,166	1.8%

Source: US. Census and Fishkind and Associates, Inc.

The historic population data indicates that the median annual growth rate from 1970 through 2015 is 2.17 percent. The highlighted Bins in Table 38 represent the probability range of the annual growth rate occurring between 25 percent and 75 percent of the time. The Consultant than calculated the percentage difference to growth compared to the median (e.g. on the high side 2.75/2.17-1 = 27 percent). Based on the frequency distribution data and the median growth rate, the Consultant recommended an adjustment to the existing forecasted growth rate of an additional 30 percent on the high side. The Consultant recommended a reduction in the existing forecasted growth of 20 percent on the low side. Table 40 summarizes those findings and recommendations.

Table 40. Florida Population Annual Average Growth Rates and High-Low Recommendations

Average Annual Growth	2.45%
Median Annual Growth	2.17%
% Diff in Growth Compared to Median	
High	30.00%
Low	-20.00%

Source: US. Census and Fishkind and Associates, Inc. and FDOT

6.2 Population Estimates (High and Low)

FKA applied the recommended high and low brackets to the "base" growth within the Study Area. Table 41 summarizes the impact of the application of the recommended brackets with respect to the base case forecast.

Table 41. Annual Population Growth Rates (Summary)

AVG Annual Growth Rate Population		
	2015-2045	
Orange (Study Area)	HI	3.2%
	BASE	2.7%
	LOW	2.3%
	2015-2045	
Osceola	HI	2.7%
	AVG	2.3%
	LOW	1.9%

Source: Fishkind and Associates, Inc.

FKA applied the high and low thresholds with respect to forecasted growth with respect to the population forecasts and associated socioeconomic data sets. The high and low population forecasts for both counties within the defined Study Area are provided in Table 42. Table 43 summarizes the historic and forecasted CAGR for population forecasts for the Study Area.

Table 42. Study Area Population Levels with Delta from Base Case Forecast

		2015	2025	2035	2045			2025	2035	2045
Orange (Study Area)	High	0	164,496	219,593	274,380	Orange (Study Area)	High	13,316	26,030	38,673
	Base Case	106,795	151,181	193,563	235,707		Base Case			
	Low	0	142,304	176,209	209,924		Low	(8,877)	(17,354)	(25,782)
		2015	2025	2035	2045			2025	2035	2045
Osceola	High	0	470,055	601,221	729,296	Osceola	High	33,707	63,976	93,531
	Base Case	323,993	436,348	537,245	635,764		Base Case			
	Low	0	413,877	494,595	573,410		Low	(22,471)	(42,650)	(62,354)

Source: Fishkind and Associates, Inc.

Table 43. Population CAAGR Summary (with High and Low)

Low Population					
	County		Study Area		
CAGR	1990-2000	2000-2010	2015-2025	2025-2035	2035-2045
Orange Study Area	2.84%	2.49%	2.91%	2.16%	1.77%
Osceola	4.82%	4.53%	2.48%	1.80%	1.49%
Base Population					
	County		Study Area		
CAGR	1990-2000	2000-2010	2015-2025	2025-2035	2035-2045
Orange Study Area	2.84%	2.49%	3.54%	2.50%	1.95%
Osceola	4.82%	4.53%	3.02%	2.10%	1.68%
High Population					
	County		Study Area		
CAGR	1990-2000	2000-2010	2015-2025	2025-2035	2035-2045
Orange Study Area	2.84%	2.49%	4.41%	2.93%	2.25%
Osceola	4.82%	4.53%	3.79%	2.49%	1.95%

Source: Fishkind and Associates, Inc.

6.3 Employment Estimates (High and Low)

FKA applied the recommended high and low brackets to the "base" growth within the Study Area. Table 44 summarizes the impact of the application of the recommended brackets with respect to the base case forecast.

Table 44. Annual Employment Growth Rates (Summary)

AVG Annual Growth Rate Employment		
	2015-2045	
Orange (Study Area)	HI	3.0%
	AVG	2.5%
	LOW	2.1%
	2015-2045	
Osceola	HI	2.8%
	AVG	2.3%
	LOW	1.9%

Source: Fishkind and Associates, Inc.

FKA applied the high and low thresholds with respect to forecasted growth with respect to the employment forecasts and associated socioeconomic data sets. The high and low employment forecasts for both counties within the defined Study Area are provided in Table 45. Table 46 summarize the historic and forecasted CAGR for employment forecasts for the Study Area.

Table 45. Study Area Employment Levels with Delta from Base Case Forecast

		2015	2025	2035	2045
Orange (Study Area)	High	0	111,027	145,894	178,771
	Base Case	74,407	102,576	129,397	154,687
	Low	0	96,943	118,399	138,631
		2015	2025	2035	2045
Osceola	High	0	168,566	215,237	261,385
	Base Case	115,035	156,213	192,114	227,612
	Low	0	147,977	176,698	205,096

		2025	2035	2045
Orange (Study Area)	High	8,451	16,497	24,084
	Base Case			
	Low	(5,634)	(10,998)	(16,056)
		2025	2035	2045
Osceola	High	12,353	23,124	33,773
	Base Case			
	Low	(8,236)	(15,416)	(22,515)

Source: Fishkind and Associates, Inc.

Table 46. Employment CAAGR Summary (with High and Low)

Low Employment					
	County		Study Area		
CAGR	1990-2000	2000-2010	2015-2025	2025-2035	2035-2045
Orange Study Area	3.62%	1.06%	2.68%	2.02%	1.59%
Osceola	4.01%	3.84%	2.55%	1.79%	1.50%
Base Employment					
	County		Study Area		
CAGR	1990-2000	2000-2010	2015-2025	2025-2035	2035-2045
Orange Study Area	3.62%	1.06%	3.26%	2.35%	1.80%
Osceola	4.01%	3.84%	3.11%	2.09%	1.71%
High Employment					
	County		Study Area		
CAGR	1990-2000	2000-2010	2015-2025	2025-2035	2035-2045
Orange Study Area	3.62%	1.06%	4.08%	2.77%	2.05%
Osceola	4.01%	3.84%	3.89%	2.47%	1.96%

Source: Fishkind and Associates, Inc.

6.4 Students - Pre-Kindergarten to 12th Grade and College Enrollment Estimates (High and Low)

Assuming that population levels change as part of the high and low analyses, FKA estimated high and low student enrollment and university enrollment within the Study Area. FKA developed the high and low PK-12 school enrollment forecasts for the two counties within the Study Area via the following steps:

- FKA calculated the percentage of students in 2025, 2035 and 2045 as a percentage of total population for the base-case forecast for each county within the Study Area (Table 47)
- FKA calculated the number of students in 2025, 2035 and 2045 in the high and low population forecasts based on the application of the student percentages calculated as part of the base-case forecast (Table 48)
- FKA allocated the control total student populations for the high and low forecasts based on the 2015 percentage allocation of student enrollment at the TAZ level

Table 47. Summary of PK-12 and College Control Totals for 2025, 2035 and 2045

	Orange County - Study Area			
	2015	2025	2035	2045
Base Population	106,795	151,181	193,563	235,707
Students	26,240	32,123	41,293	46,160
% students	24.57%	21.25%	21.33%	19.58%
High Population		164,496	219,593	274,380
Students		34,952	46,846	53,734
% students		21.25%	21.33%	19.58%
Low Population		142,304	176,209	209,924
Students		30,237	37,591	41,111
% students		21.25%	21.33%	19.58%
	Osceola County			
	2015	2025	2035	2045
Base Population	323,993	436,348	537,245	635,764
Students	78,547	96,539	113,775	134,095
% students	24.24%	22.12%	21.18%	21.09%
High Population		470,055	601,221	729,296
Students		103,996	127,324	153,823
% students		22.12%	21.18%	21.09%
Low Population		413,877	494,595	573,410
Students		91,567	104,743	120,943
% students		22.12%	21.18%	21.09%

Source: Fishkind and Associates, Inc.

6.5 Socioeconomic Data High and Low Summary (2025 – 2035 – 2045)

FKA combined the methodologies from Section 7.1 through Section 7.4 to estimate the high and low forecasts for years 2025, 2035 and 2045. Table 48 provides the summary of the forecast socioeconomic data for each county within the Study Area for 2025, 2035 and 2045.

Table 48. 2025, 2035 and 2045 Study Area SE Data Summary (High and Low)

	High								
	2025			2035			2045		
	Orange	Osceola	Total	Orange	Osceola	Total	Orange	Osceola	Total
Single Family Dwelling Units	42,080	126,727	168,807	52,809	154,276	207,085	63,193	182,053	245,246
Multi-Family Dwelling Units	17,794	46,042	63,836	23,521	59,012	82,533	29,241	70,658	99,899
Total Dwelling Units	59,874	172,769	232,643	76,330	213,288	289,618	92,434	252,711	345,145
Single Family Population	112,495	334,109	446,604	141,699	405,101	546,800	170,342	476,869	647,211
Multi-Family Population	38,687	102,238	140,925	51,865	132,143	184,008	65,365	158,894	224,259
Total Population	151,182	436,347	587,529	193,564	537,244	730,808	235,707	635,763	871,470
Hotel/Motel Units	6,075	50,346	56,421	6,875	57,714	64,589	7,545	65,141	72,686
Hotel/Motel Population	12,740	108,649	121,389	14419	124,547	138,966	15,823	140,576	156,399
Industrial Employment	37,262	19,542	56,804	46,142	23,271	69,413	55,539	26,742	82,281
Commercial Employment	24,532	46,541	71,073	29,301	60,460	89,761	33,683	74,520	108,203
Service Employment	40,777	90,108	130,885	53,940	108,382	162,322	65,449	126,326	191,775
Total Employment	102,571	156,191	258,762	129,383	192,113	321,496	154,671	227,588	382,259
School Enrollment (Students)	32,123	96,539	128,662	41,293	113,775	155,068	46,160	134,095	180,255
	Low								
	2025			2035			2045		
	Orange	Osceola	Total	Orange	Osceola	Total	Orange	Osceola	Total
Single Family Dwelling Units	42,080	126,727	168,807	52,809	154,276	207,085	63,193	182,053	245,246
Multi-Family Dwelling Units	17,794	46,042	63,836	23,521	59,012	82,533	29,241	70,658	99,899
Total Dwelling Units	59,874	172,769	232,643	76,330	213,288	289,618	92,434	252,711	345,145
Single Family Population	112,495	334,109	446,604	141,699	405,101	546,800	170,342	476,869	647,211
Multi-Family Population	38,687	102,238	140,925	51,865	132,143	184,008	65,365	158,894	224,259
Total Population	151,182	436,347	587,529	193,564	537,244	730,808	235,707	635,763	871,470
Hotel/Motel Units	6,075	50,346	56,421	6,875	57,714	64,589	7,545	65,141	72,686
Hotel/Motel Population	12,740	108,649	121,389	14419	124,547	138,966	15,823	140,576	156,399
Industrial Employment	37,262	19,542	56,804	46,142	23,271	69,413	55,539	26,742	82,281
Commercial Employment	24,532	46,541	71,073	29,301	60,460	89,761	33,683	74,520	108,203
Service Employment	40,777	90,108	130,885	53,940	108,382	162,322	65,449	126,326	191,775
Total Employment	102,571	156,191	258,762	129,383	192,113	321,496	154,671	227,588	382,259
School Enrollment (Students)	32,123	96,539	128,662	41,293	113,775	155,068	46,160	134,095	180,255

Source: Fishkind and Associates, Inc.

Attachment B-3
No-Build Analysis

Osceola Parkway Extension 2045 LOS Analysis

11/06/2017

Table-1 Generalized Annual Average Daily Volumes for Florida's Urbanized Areas

- Used ***Table-1 Generalized Annual Average Daily Volumes for Florida's Urbanized Areas*** in ***2013 Q/LOS Handbook*** for LOS analysis

Local Facility

Freeway Mainline

Freeway Ramp

TABLE 1

Generalized **Annual Average Daily** Volumes for Florida's **Urbanized Areas**

12/18/12

INTERRUPTED FLOW FACILITIES

STATE SIGNALIZED ARTERIALS

Class I (40 mph or higher posted speed limit)

Lanes	Median	B	C	D	E
2	Undivided	*	16,800	17,700	**
4	Divided	*	37,900	39,800	**
6	Divided	*	58,400	59,900	**
8	Divided	*	78,800	80,100	**

Class II (35 mph or slower posted speed limit)

Lanes	Median	B	C	D	E
2	Undivided	*	7,300	14,800	15,600
4	Divided	*	14,500	32,400	33,800
6	Divided	*	23,300	50,000	50,900
8	Divided	*	32,000	67,300	68,100

Non-State Signalized Roadway Adjustments

(Alter corresponding state volumes by the indicated percent.)

Non-State Signalized Roadways - 10%

Median & Turn Lane Adjustments

Lanes	Median	Exclusive Left Lanes	Exclusive Right Lanes	Adjustment Factors
2	Divided	Yes	No	+5%
2	Undivided	No	No	-20%
Multi	Undivided	Yes	No	-5%
Multi	Undivided	No	No	-25%
–	–	–	Yes	+ 5%

One-Way Facility Adjustment

Multiply the corresponding two-directional volumes in this table by 0.6

UNINTERRUPTED FLOW FACILITIES

FREEWAYS

Core Urbanized

Lanes	B	C	D	E
4	47,400	64,000	77,900	84,600
6	69,900	95,200	116,600	130,600
8	92,500	126,400	154,300	176,600
10	115,100	159,700	194,500	222,700
12	162,400	216,700	256,600	268,900

Urbanized

Lanes	B	C	D	E
4	45,800	61,500	74,400	79,900
6	68,100	93,000	111,800	123,300
8	91,500	123,500	148,700	166,800
10	114,800	156,000	187,100	210,300

Freeway Adjustments

Auxiliary Lanes Present in Both Directions	Ramp Metering
+ 20,000	+ 5%

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Median	B	C	D	E
2	Undivided	8,600	17,000	24,200	33,300
4	Divided	36,700	51,800	65,600	72,600
6	Divided	55,000	77,700	98,300	108,800

Uninterrupted Flow Highway Adjustments

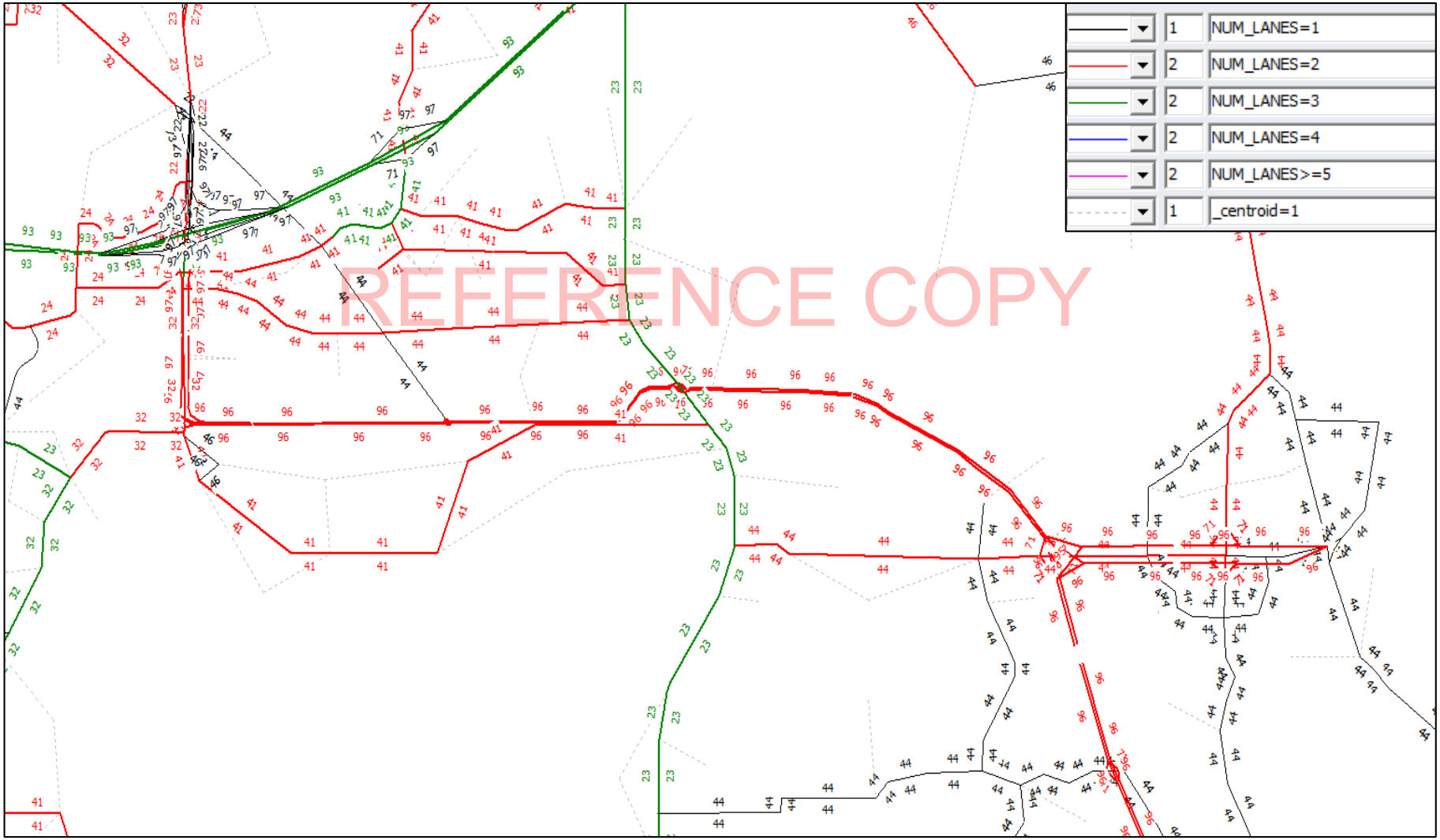
Lanes	Median	Exclusive left lanes	Adjustment factors
2	Divided	Yes	+5%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

CFRPM V6.0 Facility Type Definition

Table 5-2
CFRPM Version 6.0 Description of Facility Types

Facility Type	Description
1X -- Freeways and Expressways	
11	Urban Freeway Group 1 (cities of 500,000 or more)
12	Other Freeway (not in Group 1)
16	Controlled Access Expressways
17	Controlled Access Parkways
2X -- Divided Arterials	
21	Divided Arterial Unsignalized (55 mph)
22	Divided Arterial Unsignalized (45 mph)
23	Divided Arterial Class I
24	Divided Arterial Class II
25	Divided Arterial Class III / IV
26	Divided Signalized Arterial with High Capacity
3X -- Undivided Arterials	
31	Undivided Arterial Unsignalized with Turn Bays
32	Undivided Arterial Class I with Turn Bays
33	Undivided Arterial Class II with Turn Bays
34	Undivided Arterial Class III / IV with Turn Bays
35	Undivided Arterial Unsignalized without Turn Bays
36	Undivided Arterial Class I without Turn Bays
37	Undivided Arterial Class II without Turn Bays
38	Undivided Arterial Class III / IV without Turn Bays
39	Undivided Signalized Arterial with High Capacity
4X--Collectors	
41	Major Local Divided Roadway
42	Major Local Undivided Roadway with Turn Bays
43	Major Local Undivided Roadway without Turn Bays
44	Other Local Divided Roadway
45	Other Local Undivided Roadway with Turn Bays
46	Other Local Divided Roadway without Turn Bays
47	Low Speed Local Collector
48	Very Low Speed Local Collector

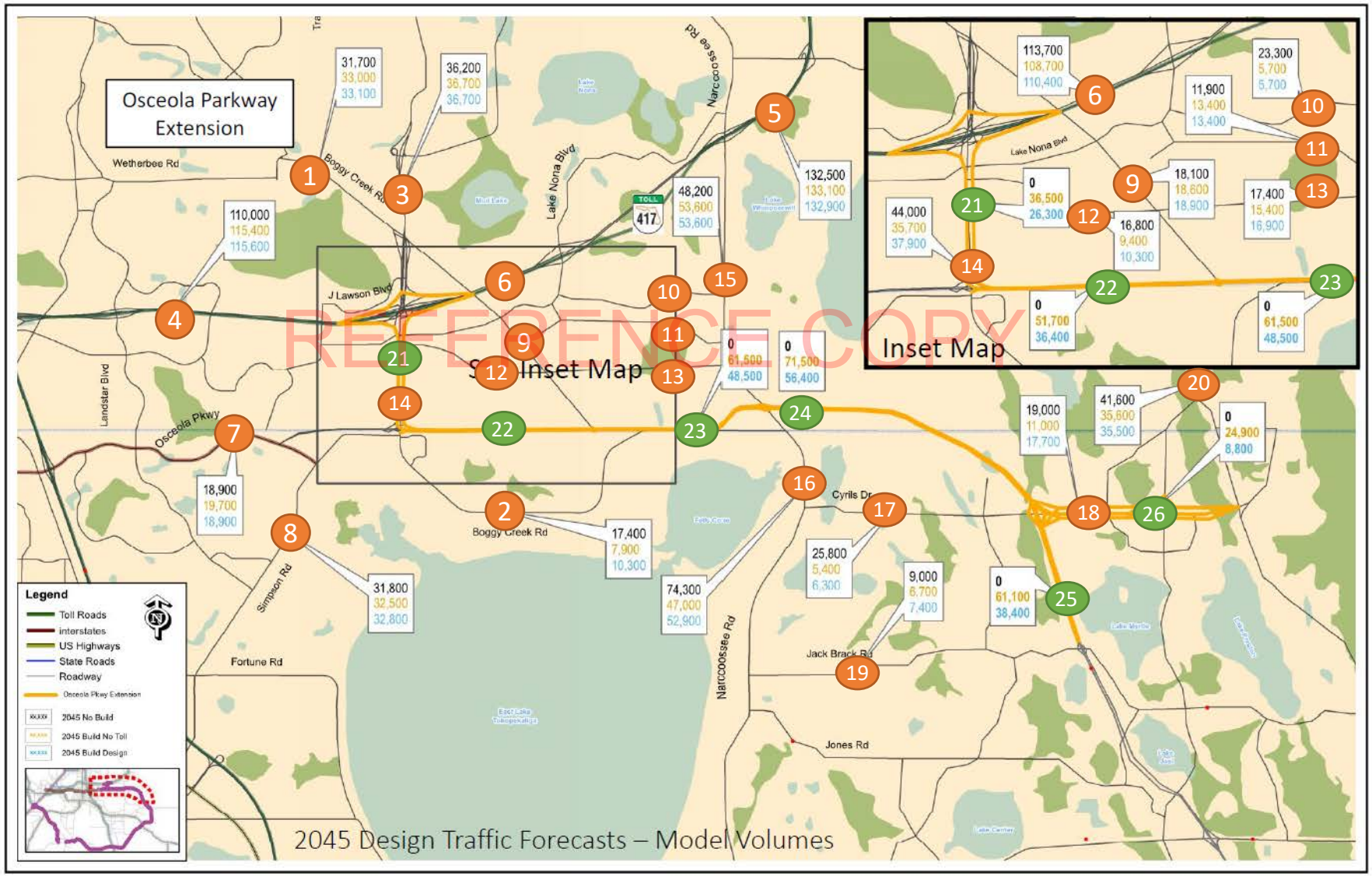
Model Loaded Network Facility Type and Number of Lanes Map - 2045 Build (No Toll)



Osceola Parkway Extension - LOS Analysis Location

1 Osceola Parkway Extension Segment

1 Other street segment



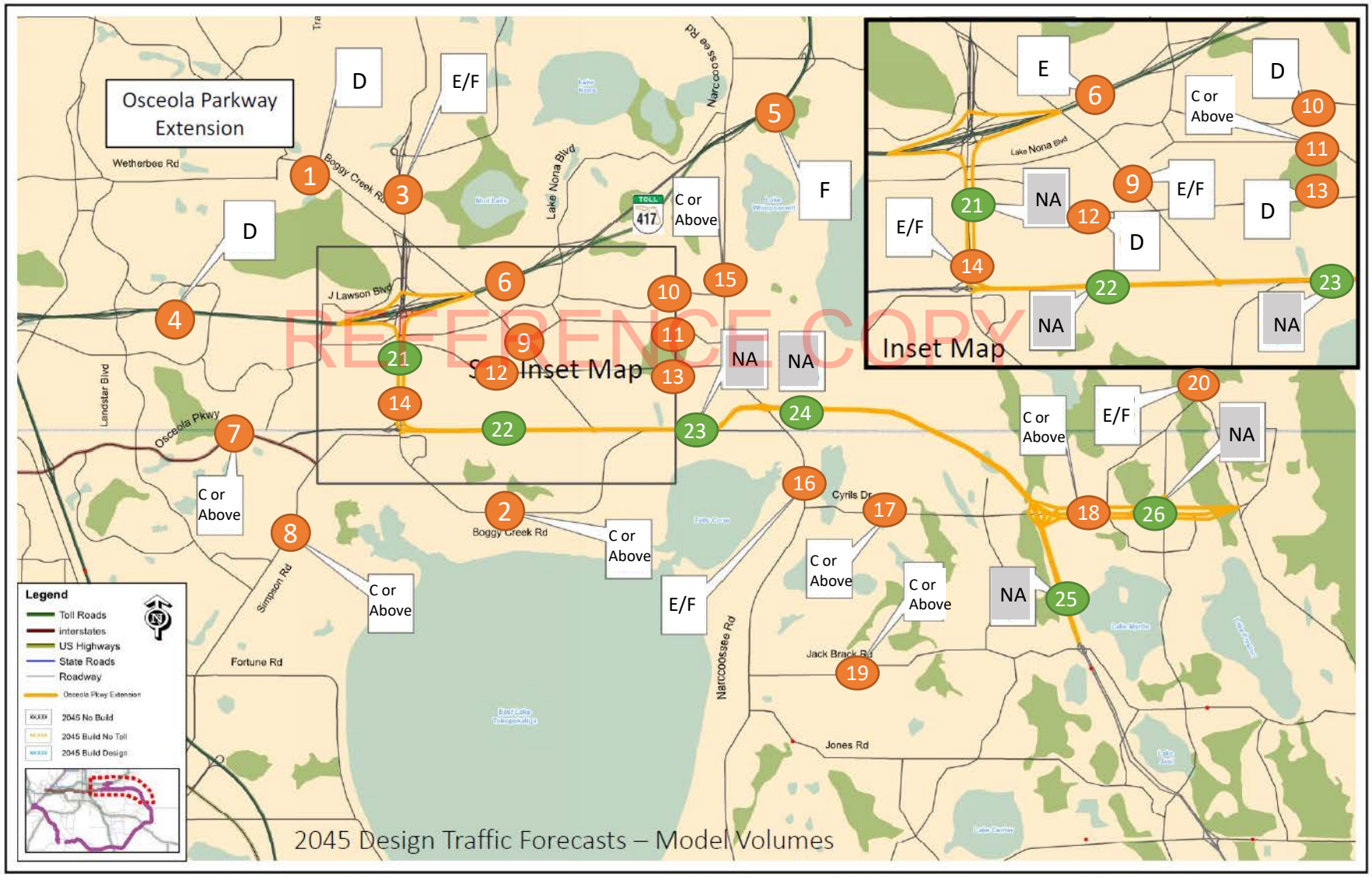
Osceola Parkway Extension - 2045 LOS Analysis Table

Divided/Undivided	State Road (Y/N)	From	To	Number of Lanes	Speed (mph)	2045 No Build Volume	2045 No Build LOS	2045 Build (No Toll) Volume	2045 No Build (No Toll) LOS
Undivided	Y	Wetherbee Rd	Access Rd	4	55	31,700	D	33,000	E/F
Divided	N	Springlake Village Blvd	Turnberry Blvd	4	55	17,400	C or Above	7,900	C or Above
Divided	N	Heintzelman Blvd	Boggy Creek Rd	4	45	36,200	E/F	36,700	E/F
		Landstar Blvd	Rhode Island Woods Cir	6	70	110,000	D	115,400	E
		Narcoossee Rd	Moss Park Rd	6	70	132,500	F	133,100	F
		Boggy Creek Rd	Lake Nona Blvd	6	70	113,700	E	108,700	D
Divided	N	Windy Cove Dr	Pheasant Run Blvd	6	50	18,900	C or Above	19,700	C or Above
Undivided	N	Eagle Bay Blvd	Pebble Pointe Way	6	50	31,800	C or Above	32,500	C or Above
Divided	N	Lake Nona Blvd	New Roadway 2	2	45	18,100	E/F	18,600	E/F
Divided	N	Briand Ave	Granger Ave	4	25	23,300	D	5,700	C or Above
Divided	N	Briand Ave	Granger Ave	4	25	11,900	C or Above	13,400	D
Divided	N	Osceola Parkway Extension	New Roadway 1	4	35	16,800	D	9,400	C or Above
Divided	N	New Roadway 1	Narcoossee Rd	4	35	17,400	D	15,400	D
Undivided	Y	Lake Nona Blvd	Osceola Parkway Extension	4	45	44,000	E/F	35,700	E/F
Divided	N	Tyson Rd	Tavistock Lakes Blvd	6	45	48,200	C or Above	53,600	D
Divided	N	Boggy Creek Road	Cyrills Dr	6	45	74,300	E/F	47,000	C or Above
Divided	N	Franklin Rd	Absher Rd	4	45	25,800	C or Above	5,400	C or Above
Divided	N	Osceola Parkway Extension	New Roadway 3	4	45	19,000	C or Above	11,000	C or Above
Divided	N	Zuni Rd	McMichael Rd	2	45	9,000	C or Above	6,700	C or Above
Divided	N	New Roadway 3	TM Ranch Rd	4	45	41,600	E/F	35,600	D
		Lake Nona Blvd	Beth Rd	4	35	NA	NA	36,500	B
		SR 527A	New Roadway 1	4	65	NA	NA	51,700	C
		Tindall Acres Rd	Narcoossee Rd	4	65	NA	NA	61,500	C
		Narcoossee Rd	Zuni Rd	4	65	NA	NA	71,500	D
		Cyrills Dr	Jack Brack Rd	4	65	NA	NA	61,100	C
		New Roadway 3	New Roadway 4	4	65	NA	NA	24,900	B

Osceola Parkway Extension - 2045 No-Build LOS

1 Osceola Parkway Extension Segment

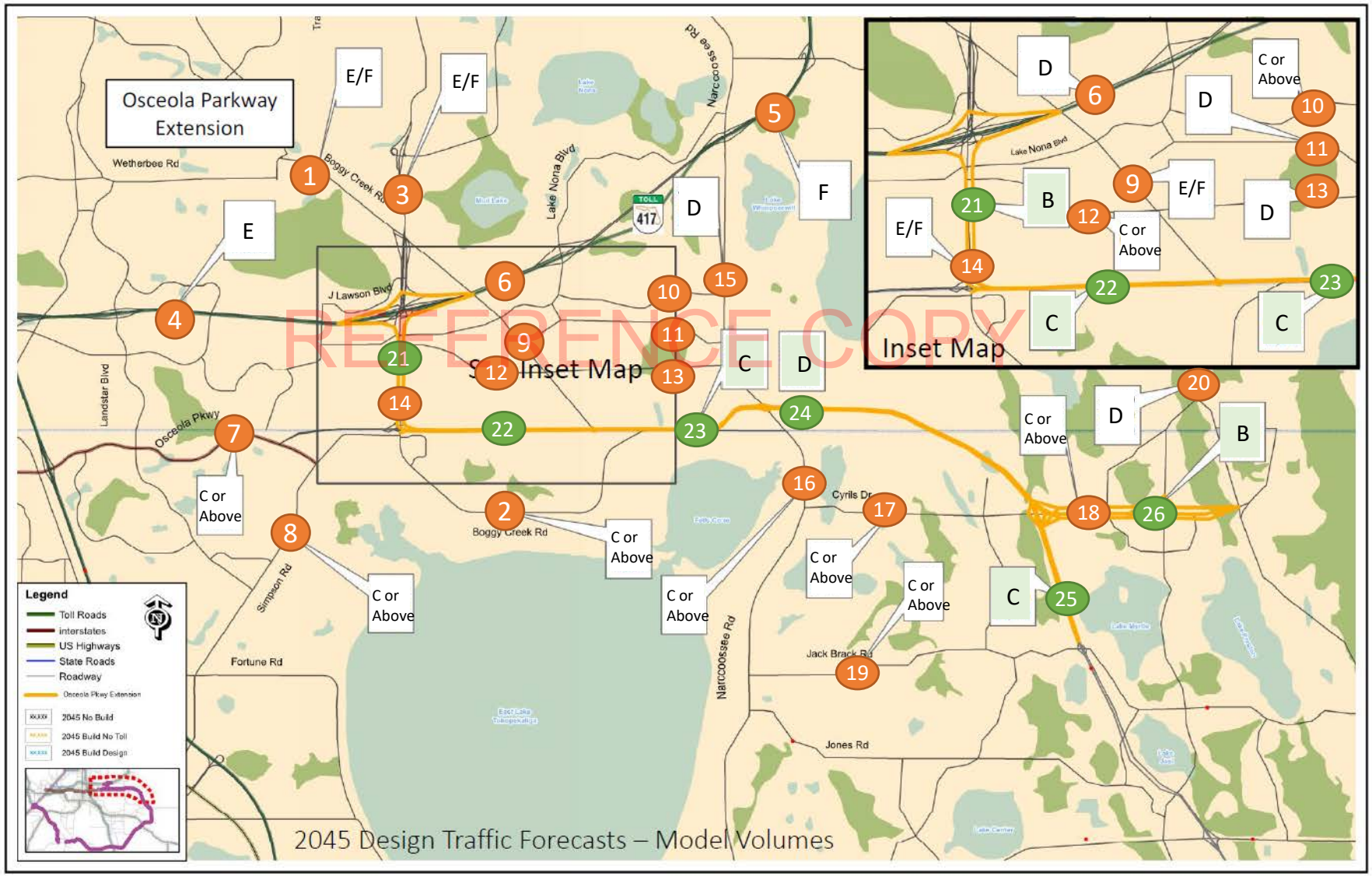
1 Other street segment



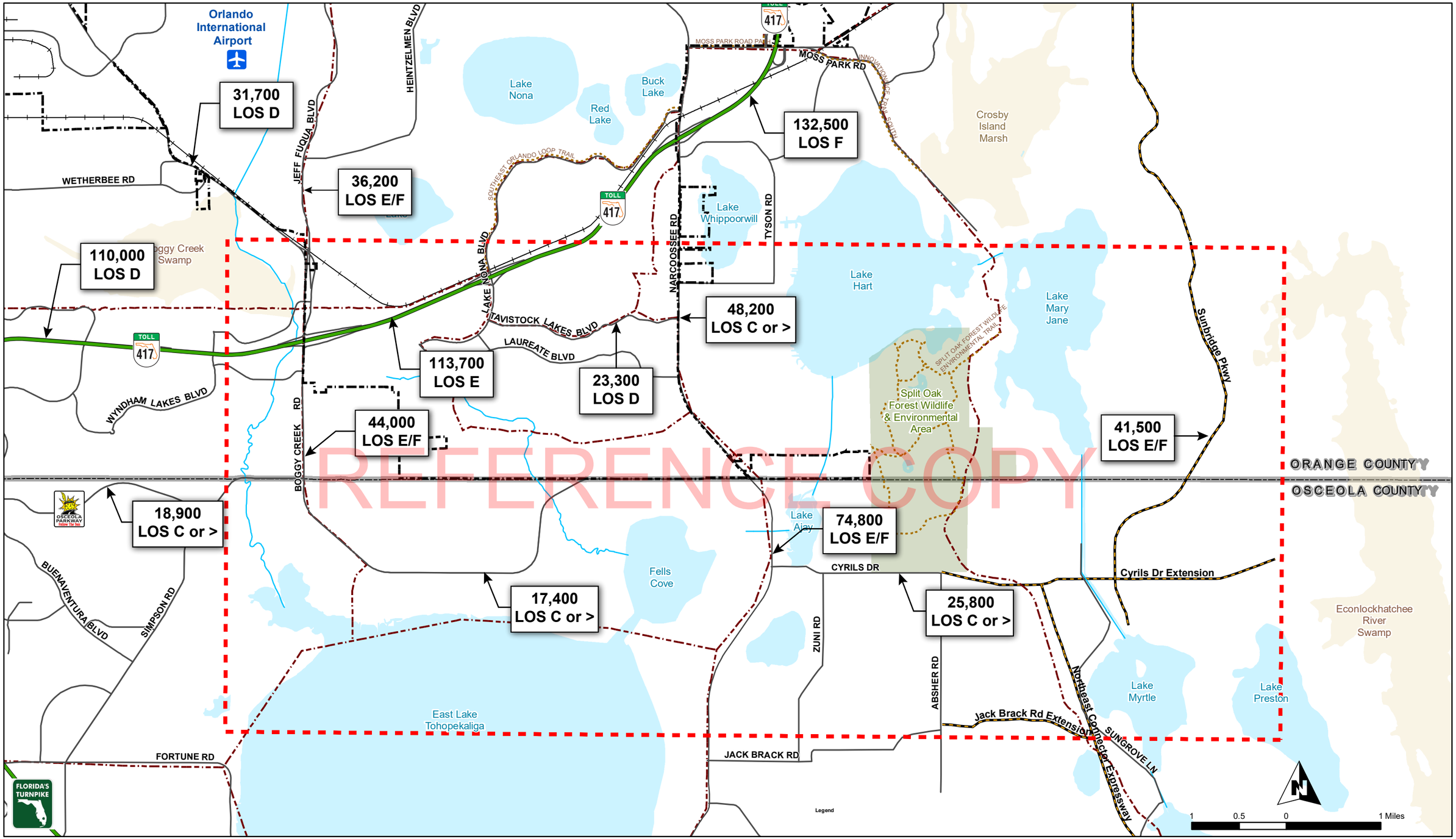
Osceola Parkway Extension - 2045 Build (No Toll) LOS

1 Osceola Parkway Extension Segment

1 Other street segment



Attachment B-4
2045 No-Build Volumes



Legend

- Study Area
- County Boundary
- Orlando City Limits
- RailRoad
- Existing Trails
- Planned Florida Greenways & Trails
- Planned Roads
- 000,000 No Build Year 2045 Annual Average Daily Traffic (AADT)

2045 No Build Volumes

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180219
BaseMap
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, CH2M, ESRI, Orange and Osceola County, Central Florida Geographic Information DRI Interactive Mapping, FDEP, National Hydrography Data (NHD))</ITA>

Attachment B-5
2045 Build Traffic Volumes

Map Location	Roadway	Location	West 1B + East Alternatives LOS	West 2 + East Alternatives LOS
A	SR 417	Proposed Interchange with Frontage Road	105,900 D	104,700 D
B	Narcoossee Road	Interchange with OPE	57,100 C	57,100 C
C	Sunbridge Parkway	North of OPE	36,000 C	35,500 C
D	Sunbridge Parkway	South of OPE	53,200 C	53,000 C

Legend

- Study Area
- County Boundary
- Orlando City Limits
- RailRoad
- Existing Trails
- Planned Florida Greenways & Trails
- Planned Roads
- West 1B
- West 2
- East 4A
- East 4C
- East 5
- East 6

000,000 Build Year 2045 Annual Average Daily Traffic (AADT)

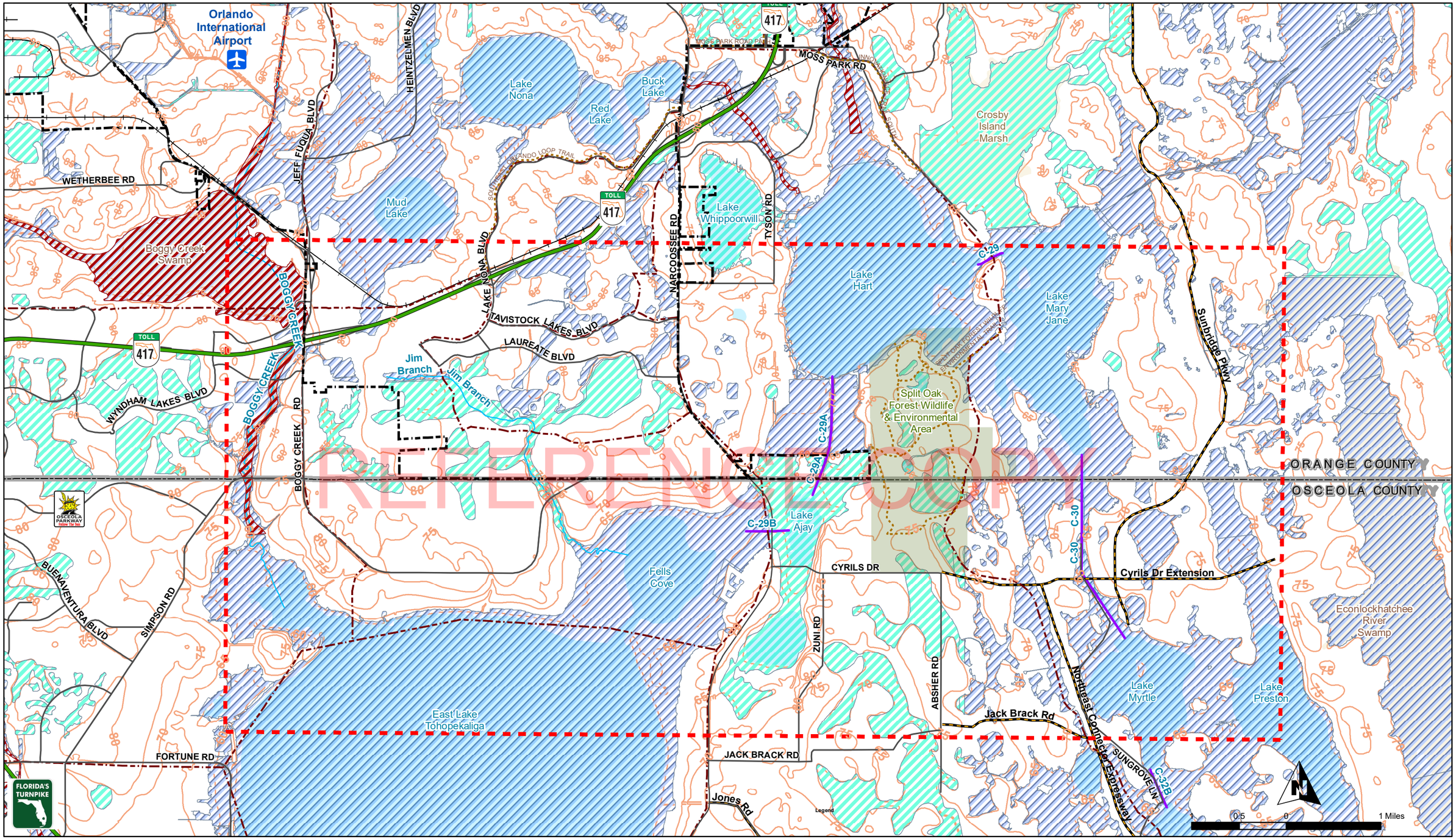
2045 Build Traffic Volumes

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180219
BaseMap
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, CH2M, ESRI, Orange and Osceola County, Central Florida Geographic Information DRI Interactive Mapping, FDEP, National Hydrography Data (NHD))</ITA>

Attachment C
Existing Conditions Graphics and Data

Attachment C-1
Flood Hazard Map



Legend

- Study Area
- County Boundary
- Orlando City Limits
- RailRoad
- Existing Trails
- Planned Florida Greenways & Trails
- Planned Roads
- SFWMA and USACE Regulated Floodway
- 5ft Contours
- FEMA Regulatory Floodway
- A Flood Hazard
- AE Flood Hazard

Flood Hazard Map

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180307
FloodHazard
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, CH2M, ESRI, Orange and Osceola County, Central Florida Geographic Information DRI Interactive Mapping, FDEP, National Hydrography Data (NHD), Federal Emergency Management Agency (FEMA)

Attachment C-2
GIS Layers

Exhibit C-2

GIS Database Layers

Osceola Parkway Extension Project

GIS Layer	**Source (Year)**
Social Layers	
Airports	Florida Geographic Data Library (FGDL) (2015)
Cemeteries	FGDL (2015)
Churches	FGDL (2015)
Community Centers	FGDL (2015)
Daycare	FGDL (2010)
Developments of Regional Impacts (DRI's)	CFGIS (2014-2017), Orange County Interactive Mapping Site (2017), Orange County Property Appraiser (2017), Osceola County Property Appraiser (2017), Osceola County GIS Interactive Maps (2017)
Fire Stations	FGDL (2013), Orange County Interactive Mapping Site (2017), Osceola County GIS Interactive Maps (2017)
Government Buildings	FGDL (2013)
Health Care Facilities	FGDL (2014), Orange County Interactive Mapping Site (2017), Osceola County GIS Interactive Maps (2017)
Hospitals	FGDL (2012), Orange County Interactive Mapping Site (2017), Osceola County GIS Interactive Maps (2017)
Land Use	GIS files from Osceola County, Orange County, City of Orlando, FDOT District 5
Law Enforcement	FGDL (2012)
Osceola County Parcels	Osceola County
Orange County Parcels	Orange County
Planned Unit Developments (PUD)	FGDL (2009)

Exhibit C-2

GIS Database Layers

Osceola Parkway Extension Project

GIS Layer	**Source (Year)**
Planned Developments (PD)	Orange County Interactive Mapping Site (2017), Orange County Property Appraiser (2017), Osceola County Property Appraiser (2017), Osceola County GIS Interactive Maps (2017)
Residential	FGDL/University of Florida Geoplan (2015), Orange County Interactive Mapping Site (2017), Osceola County GIS Interactive Maps (2017)
Schools	FGDL (2012), Orange County Interactive Mapping Site (2017), Osceola County GIS Interactive Maps (2017)
Vacant Residential	FGDL /University of Florida Geoplan (2015)
Cultural Layers	
Federal Parks	FGDL/FLMA (2016)
FLMA Managed Lands	FGDL (2016)
Greenways	FGDL/FDEP (2013)
Historical Sites	Search, Inc. Desktop Analysis of the Osceola Parkway Extension PD&E Study Area (2017)
Existing Trails	FGDL (2016)
Local Parks	FGDL (2016); Orange County (2008-2017)
Managed Lands	Florida Natural Area Inventory (FNAI), (2016)
Military Lands	FGDL (2010)
Parks and Zoos	SFWMD (2005)
SHPO Bridges/Structures	Search, Inc. Desktop Analysis of the Osceola Parkway Extension PD&E Study Area (2017)
SHPO Cemeteries	Search, Inc. Desktop Analysis of the Osceola Parkway Extension PD&E Study Area (2017)
State Parks	FGDL/FDEP (2015)
SFWMD District Lands	FGDL/WMDL (2008) (2017)

Exhibit C-2

GIS Database Layers

Osceola Parkway Extension Project

GIS Layer	**Source (Year)**
Natural Environment Layers	
Aquatic Preserves	FGDL (1993)
Eagle Nests	FWC (2014)
FDEP Mitigation Banks	FDGL/FDEP (2017)
Floodways	FGDL/FEMA (2016)
Florida Managed Areas – Florida Natural Inventory	FGDL (2017)
FWC Eagle Nesting Locations in Florida 1988-2015	FGDL (2015)
FWC Potential Habitat by Species	FGDL (2009)
FWC Wildlife Species Specific KMZs	FWC (2018)
FWC Wildlife Management Areas	FGDL (2017)
FWS Florida Wood Stork Nesting Colony Core Foraging Areas	FGDL (2010)
Impaired Waters	FDEP (2014)
Integrated Wildlife Habitat Ranking System for Florida (IWHRS)	FGDL (2009)
Wetlands	FGDL (2017), Dewberry, Inc. provided data based on soil data, established wetland delineations from existing permit data, and FLUCCS changes associated with wetland mitigation
Native Scrub	Bowman and Blair Ecology and Design, Inc., Existing Conditions Technical Memorandum - Natural Environmental Resources (2017)
Outstanding Florida Waters	FDEP/FDGL (2016)
Orange County Flood Hazard	FEMA, National Flood Hazard Layer (2017)
Osceola County Flood Hazard	FEMA, National Flood Hazard Layer (2017)

Exhibit C-2

GIS Database Layers

Osceola Parkway Extension Project

GIS Layer	**Source (Year)**
Wildlife Occurrence System Database (WILDOBS) Species Locations in Florida 1988-2015	FGDL (2015)
Physical Environment Layers	
2015 Census Block Groups in Florida	FGDL (2015)
Brownfield Areas (EPA/FDEP)	FGDL (2016)
Electrical Power Facilities	FGDL (2010)
EPA Pollutant Sites (air, water, RCRA)	FGDL (2016)
Existing Recreational Trails in Florida FDEP	FGDL (2016)
Florida Greenways and Trails System	FGTS (2017)
National Hydrography Dataset – Hydrographic Waterbody Features 1:24K	FGDL (2016)
Petroleum Contamination Monitoring (PCTS)- FDEP	FGDL (2018)
Rail Network in Florida - DOT	FGDL (2017)
South Florida Water Management District Canals	FGDL (2008)
Solid Waste Facilities	FGDL (2017)
South Florida Water Management District Land Use and Cover 2008	FGDL (2008)
St. Johns River Water Management District Land Use and Cover 2012	FGDL (2012)
Storage Tank Contamination Monitoring (STCM) - FDEP	FGDL (2018)
Superfund Sites	FGDL (2016)

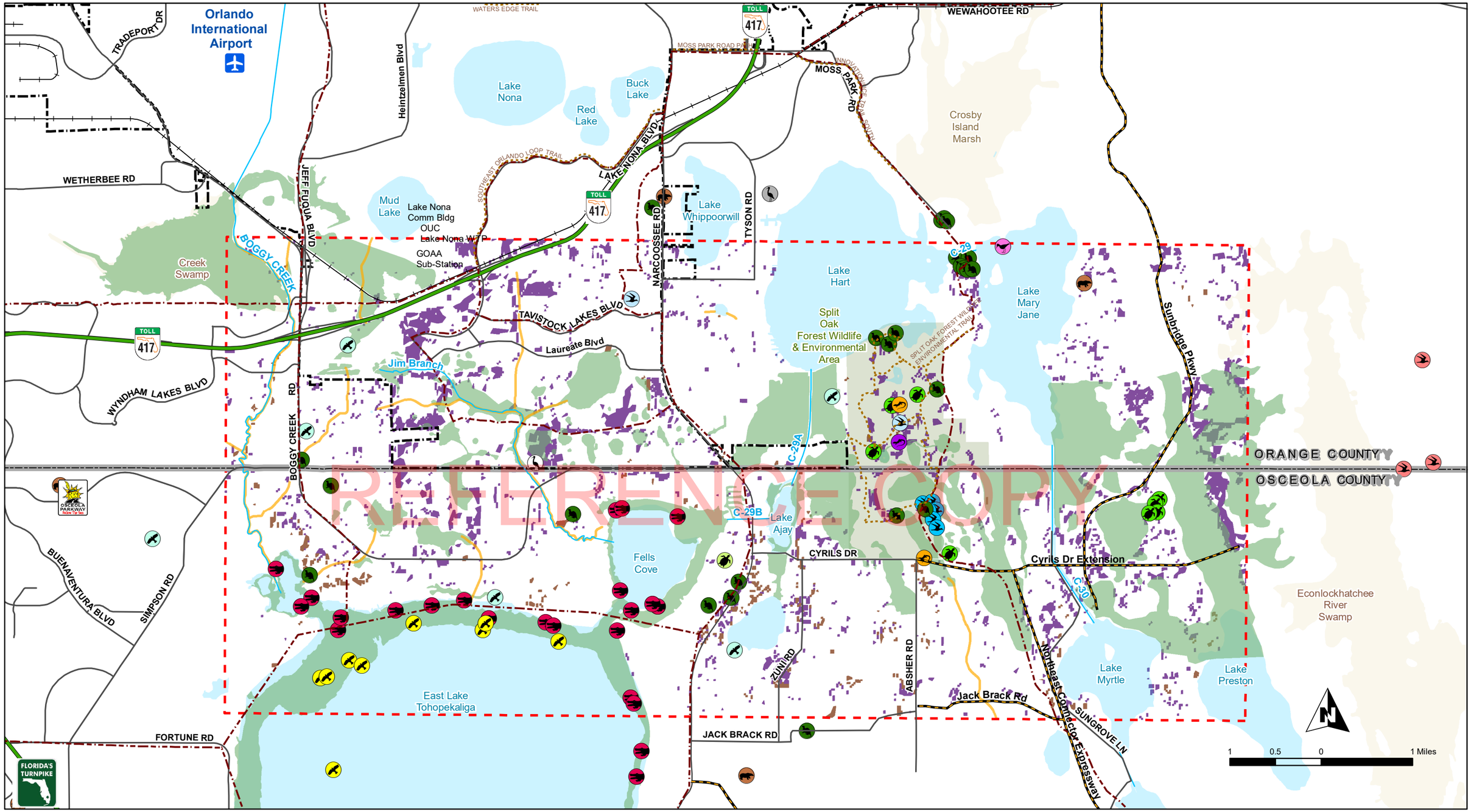
Exhibit C-2

GIS Database Layers

Osceola Parkway Extension Project

GIS Layer	**Source (Year)**
Utilities Parcels in Florida – Florida Department of Revenue	FGDL (2010)
Wastewater Treatment Plants	FGDL (2017), Osceola County Planning Department (2017)
Water Treatment Plants	FGDL (2016)/Google (2017), Osceola County Planning Department (2017)

Attachment C-3
Natural Characteristics



Legend

- Existing Trails
- Planned Florida Greenways & Trails
- Planned Roads
- Orlando City Limits
- County Boundary
- RailRoad
- Study Area
- Wetlands Desktop
- Softwater Streams
- Sandhill Ecological Complex
- Xeric Scrubland

FWC-FWRI Recorded Observations

- American Alligator Nest
- Bald Eagle Nest
- Florida Black Bear nuisance report
- Eastern Indigo Snake
- Florida Scrub-Jay
- Snail Kite
- Gopher Tortoise
- Red-cockaded Woodpecker
- Sandhill Crane
- Sherman's Fox Squirrel
- Wading Bird Rookery

Previous Study Field Survey Observations (2012-2015)

- Florida Scrub-Jay
- Sandhill Crane
- Gopher

Natural Characteristics

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180307
NaturalCharacteristics_NoCorridors
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, Bowman & Blair Ecology and Design Inc, CH2M, ESRI, Orange and Osceola County, Florida Fish and Wildlife Conservation (FWC), FDEP, National Hydrography Data (NHD), US Fish and Wildlife Service

Attachment C-4
NRCS Custom Soil Report

United States Department of Agriculture

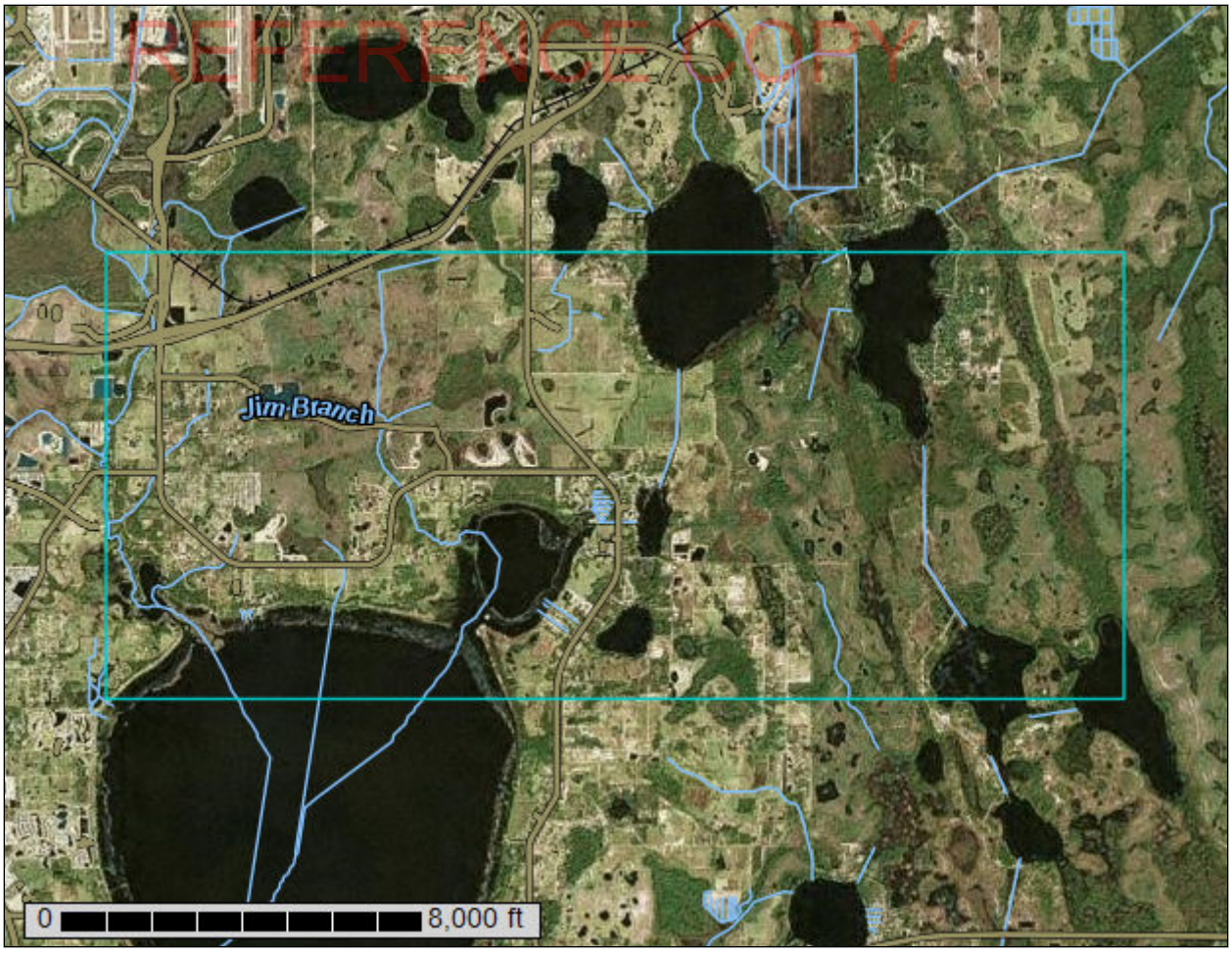
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Orange County, Florida, and Osceola County, Florida

Osceola Parkway Extension Project



February 25, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

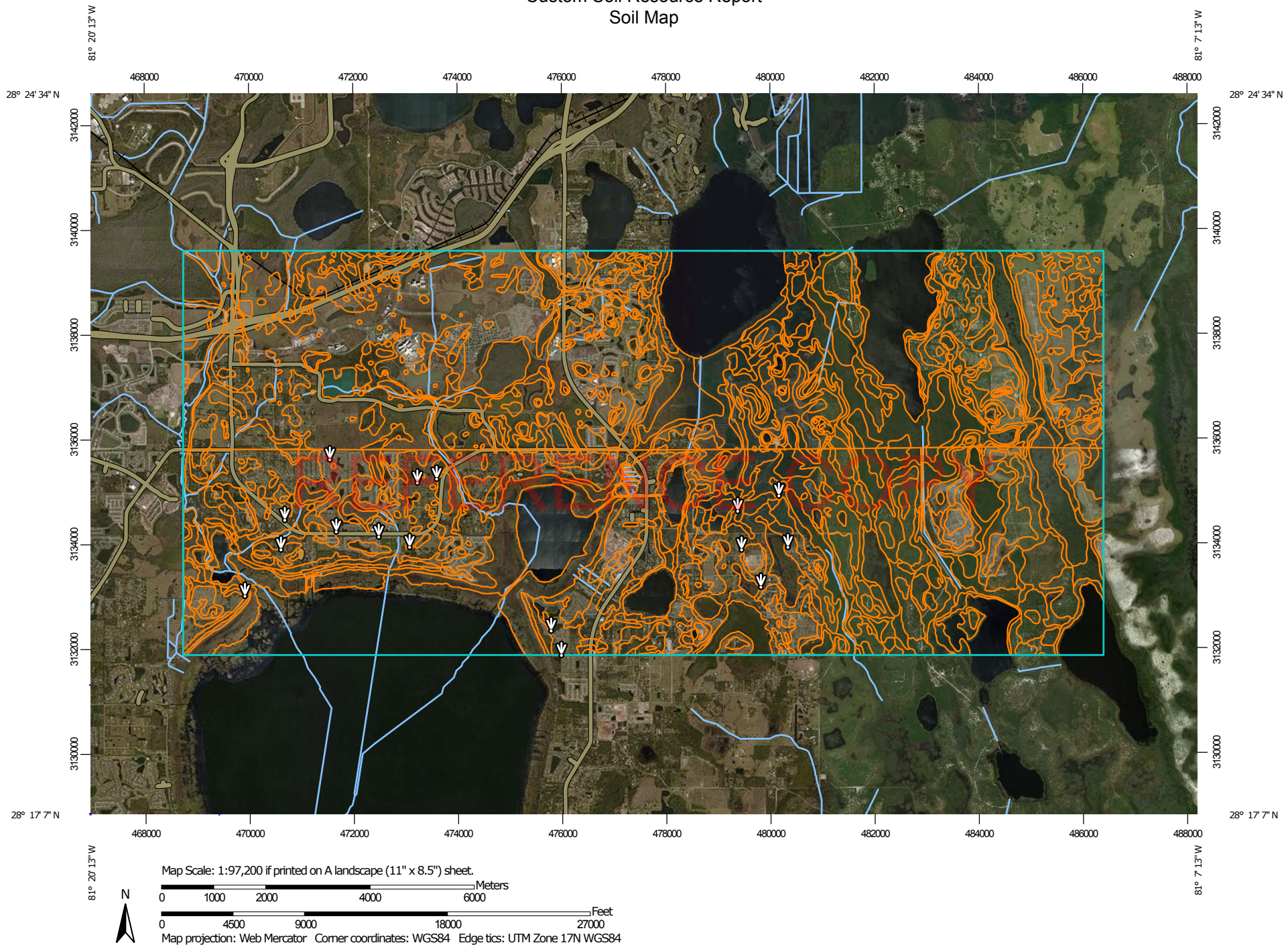
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:97,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 1000 2000 4000 6000

Feet
0 4500 9000 18000 27000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County, Florida
Survey Area Data: Version 14, Oct 6, 2017

Soil Survey Area: Osceola County, Florida
Survey Area Data: Version 14, Oct 6, 2017

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 8, 2010—Mar 17, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND	MAP INFORMATION
	imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Arents, nearly level	46.1	0.1%
2	Archbold fine sand, 0 to 5 percent slopes	63.1	0.2%
3	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	1,175.4	3.5%
4	Candler fine sand, 0 to 5 percent slopes	2.9	0.0%
19	Hontoon muck, frequently ponded, 0 to 1 percent slopes	534.0	1.6%
20	Immokalee fine sand	501.8	1.5%
23	Malabar fine sand	3.4	0.0%
26	Ona fine sand, 0 to 2 percent slopes	289.5	0.9%
33	Pits	1.3	0.0%
34	Pomello fine sand, 0 to 5 percent slopes	1,281.0	3.8%
37	St. Johns fine sand	1,411.0	4.2%
40	Samsula muck, frequently ponded, 0 to 1 percent slopes	1,406.3	4.2%
41	Samsula-Hontoon-Basinger association, depressional	362.8	1.1%
42	Sanibel muck	1,028.0	3.0%
43	Seffner fine sand, 0 to 2 percent slopes	10.8	0.0%
44	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	6,258.5	18.5%
46	Tavares fine sand, 0 to 5 percent slopes	56.2	0.2%
54	Zolfo fine sand, 0 to 2 percent slopes	157.9	0.5%
99	Water	2,010.7	5.9%
Subtotals for Soil Survey Area		**16,600.7**	**49.1%**
Totals for Area of Interest		**33,828.8**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Adamsville sand, 0 to 2 percent slopes	487.2	1.4%
2	Adamsville variant fine sand, 0 to 5 percent slopes	135.1	0.4%
4	Arents, 0 to 5 percent slopes	43.4	0.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5	Basinger fine sand, 0 to 2 percent slopes	1,380.7	4.1%
6	Basinger fine sand, depressional, 0 to 1 percent slopes	1,544.1	4.6%
7	Candler sand, 0 to 5 percent slopes	2.2	0.0%
9	Cassia fine sand, 0 to 2 percent slopes	29.5	0.1%
10	Delray loamy fine sand, depressional	8.3	0.0%
15	Hontoon muck, frequently ponded, 0 to 1 percent slopes	665.0	2.0%
16	Immokalee fine sand, 0 to 2 percent slopes	1,424.9	4.2%
19	Malabar fine sand, 0 to 2 percent slopes	11.5	0.0%
22	Myakka fine sand, 0 to 2 percent slopes	1,517.3	4.5%
24	Narcoossee fine sand, 0 to 2 percent slopes	421.8	1.2%
27	Ona fine sand, 0 to 2 percent slopes	107.1	0.3%
28	Paola sand, 0 to 5 percent slopes	10.1	0.0%
31	Pits	6.1	0.0%
32	Placid fine sand, frequently ponded, 0 to 1 percent slopes	1,224.9	3.6%
33	Placid variant fine sand	164.3	0.5%
34	Pomello fine sand, 0 to 5 percent slopes	765.8	2.3%
36	Pompano fine sand, 0 to 2 percent slopes	172.2	0.5%
37	Pompano fine sand, frequently ponded, 0 to 1 percent slopes	39.4	0.1%
38	Riviera fine sand, 0 to 2 percent slopes	7.9	0.0%
39	Riviera fine sand, frequently ponded, 0 to 1 percent slopes	61.9	0.2%
40	Samsula muck, frequently ponded, 0 to 1 percent slopes	1,139.6	3.4%
42	Smyrna fine sand, 0 to 2 percent slopes	2,076.0	6.1%
43	St. Lucie fine sand, 0 to 5 percent slopes	342.5	1.0%
44	Tavares fine sand, 0 to 5 percent slopes	434.2	1.3%
99	Water	3,005.2	8.9%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Subtotals for Soil Survey Area		**17,228.1**	**50.9%**
Totals for Area of Interest		**33,828.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Orange County, Florida

1—Arents, nearly level

Map Unit Setting

National map unit symbol: bv78
Mean annual precipitation: 45 to 53 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Arents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arents

Setting

Landform: Rises on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Altered marine deposits

Typical profile

AC - 0 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 50.02 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

2—Archbold fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: bv7m
Mean annual precipitation: 45 to 53 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Archbold and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Archbold

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian or sandy marine deposits

Typical profile

A - 0 to 2 inches: fine sand
C - 2 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 in/hr)
Depth to water table: About 42 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

Minor Components

Pomello

Percent of map unit: 8 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

3—Basinger fine sand, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v16v
Elevation: 0 to 70 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Basinger and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Basinger

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 14 inches: fine sand
Bh/E - 14 to 36 inches: fine sand
Cg - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 0 to 6 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Smyrna

Percent of map unit: 5 percent
Landform: — error in exists on —
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Samsula

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Floridana

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

4—Candler fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2shkf
Elevation: 10 to 260 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Candler and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear, concave
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

Ap - 0 to 5 inches: fine sand
E - 5 to 74 inches: fine sand
E and Bt - 74 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A

Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL), Sandy soils on ridges and dunes of xeric uplands (G154XB111FL)
Hydric soil rating: No

Minor Components

Tavares
Percent of map unit: 4 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave, convex
Across-slope shape: Concave, linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Hydric soil rating: No

Adamsville
Percent of map unit: 3 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Other vegetative classification: South Florida Flatwoods (R154XY003FL), Sandy soils on rises and knolls of mesic uplands (G154XB131FL)
Hydric soil rating: No

Millhopper
Percent of map unit: 3 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear, convex
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Hydric soil rating: No

19—Hontoon muck, frequently ponded, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: 2vbpf
Elevation: 0 to 250 feet
Mean annual precipitation: 38 to 65 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition
Hontoon and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hontoon

Setting

Landform: Depressions on marine terraces, swamps on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Herbaceous organic material

Typical profile

Oe - 0 to 5 inches: mucky peat
Oa1 - 5 to 60 inches: muck
Oa2 - 60 to 65 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very high (about 24.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Minor Components

Samsula

Percent of map unit: 7 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Placid

Percent of map unit: 5 percent
Landform: Depressions on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Basinger
Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Myakka
Percent of map unit: 2 percent
Landform: Drainageways on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Pompano
Percent of map unit: 2 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

20—Immokalee fine sand

Map Unit Setting
National map unit symbol: bv7n
Mean annual precipitation: 45 to 53 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition
Immokalee, non-hydric, and similar soils: 82 percent
Immokalee, hydric, and similar soils: 10 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Immokalee, Non-hydric

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 35 inches: fine sand
Bh - 35 to 67 inches: fine sand
C - 67 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Immokalee, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 35 inches: fine sand
Bh - 35 to 67 inches: fine sand
C - 67 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained

Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Wabasso

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Pineda

Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

23—Malabar fine sand

Map Unit Setting

National map unit symbol: bv7r
Elevation: 20 to 100 feet
Mean annual precipitation: 45 to 53 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days

Farmland classification: Not prime farmland

Map Unit Composition

Malabar, hydric, and similar soils: 60 percent
Malabar, non-hydric, and similar soils: 37 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Malabar, Hydric

Setting

Landform: Drainageways on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 3 inches: fine sand
E - 3 to 18 inches: fine sand
Bw - 18 to 30 inches: fine sand
E' - 30 to 42 inches: fine sand
Btg - 42 to 58 inches: fine sandy loam
C - 58 to 80 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Description of Malabar, Non-hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 3 inches: fine sand
E - 3 to 18 inches: fine sand
Bw - 18 to 30 inches: fine sand
E' - 30 to 42 inches: fine sand
Btg - 42 to 58 inches: fine sandy loam
C - 58 to 80 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Minor Components

Wabasso

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

26—Ona fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w4gy
Elevation: 10 to 130 feet

Mean annual precipitation: 44 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Ona and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ona

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
Bh - 4 to 22 inches: fine sand
C - 22 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Minor Components

Basinger, hydric

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)

Hydric soil rating: Yes

Immokalee

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Eaugallie

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: South Florida Flatwoods (R155XY003FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

33—Pits

Map Unit Setting

National map unit symbol: bv83
Mean annual precipitation: 45 to 53 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Pits: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits

Setting

Landform: Marine terraces
Landform position (three-dimensional): Interfluve, dip
Down-slope shape: Linear
Across-slope shape: Linear

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Unranked

Minor Components

Aquents

Percent of map unit: 30 percent
Landform: Depressions
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Yes

34—Pomello fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2v16y
Elevation: 0 to 180 feet
Mean annual precipitation: 44 to 52 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 342 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Pomello and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pomello

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve, riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 47 inches: fine sand
Bh - 47 to 58 inches: fine sand
Bw - 58 to 65 inches: fine sand
C - 65 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None

Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Minor Components

Smyrna

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Tavares

Percent of map unit: 1 percent
Landform: Ridges on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Hydric soil rating: No

Bulow

Percent of map unit: 1 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on knolls and ridges of mesic uplands (G155XB211FL)
Hydric soil rating: No

37—St. Johns fine sand

Map Unit Setting

National map unit symbol: bv87

Elevation: 30 to 150 feet
Mean annual precipitation: 45 to 53 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

St. johns, non-hydric, and similar soils: 60 percent
St. johns, hydric, and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of St. Johns, Non-hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 12 inches: fine sand
E - 12 to 24 inches: fine sand
Bh - 24 to 44 inches: fine sand
C - 44 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of St. Johns, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Sandy marine deposits

Typical profile

A - 0 to 12 inches: fine sand
E - 12 to 24 inches: fine sand
Bh - 24 to 44 inches: fine sand
C - 44 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Immokalee, non-hydric

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Wabasso

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

40—Samsula muck, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2tzw9
Elevation: 0 to 250 feet
Mean annual precipitation: 44 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 335 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Samsula and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Samsula

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over sandy marine deposits

Typical profile

Oa1 - 0 to 24 inches: muck
Oa2 - 24 to 32 inches: muck
Cg1 - 32 to 35 inches: sand
Cg2 - 35 to 44 inches: sand
Cg3 - 44 to 80 inches: sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very high (about 13.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w

Hydrologic Soil Group: A/D
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Minor Components

Basinger
Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Kaliga
Percent of map unit: 3 percent
Landform: Depressions on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Myakka

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Sanibel
Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Anclote
Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, convex
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Floridana

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

41—Samsula-Hontoon-Basinger association, depressional

Map Unit Setting

National map unit symbol: bv8d
Mean annual precipitation: 45 to 53 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Samsula and similar soils: 47 percent
Hontoon and similar soils: 31 percent
Basinger and similar soils: 14 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Samsula

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over sandy marine deposits

Typical profile

Oa - 0 to 34 inches: muck
C - 34 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Description of Hontoon

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material

Typical profile

Oa - 0 to 80 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained

Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very high (about 23.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Description of Basinger

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 25 inches: fine sand
B/E - 25 to 35 inches: fine sand
C - 35 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Holopaw

Percent of map unit: 4 percent
Landform: Flood plains on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Ona

Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

42—Sanibel muck

Map Unit Setting

National map unit symbol: bv8f
Mean annual precipitation: 45 to 53 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Sanibel, undrained, and similar soils: 65 percent
Sanibel, drained, and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sanibel, Undrained

Setting

Landform: Marshes on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Thin organic material over sandy marine deposits

Typical profile

Oa - 0 to 11 inches: muck
A - 11 to 15 inches: fine sand
C - 15 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w

Hydrologic Soil Group: A/D
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Description of Sanibel, Drained

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Thin organic material over sandy marine deposits

Typical profile

Oa - 0 to 11 inches: muck
A - 11 to 15 inches: fine sand
C - 15 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Minor Components

Hontoon, undrained

Percent of map unit: 5 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Samsula

Percent of map unit: 5 percent
Landform: Depressions on marine terraces

Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

43—Seffner fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2v17t
Elevation: 30 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Seffner and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Seffner

Setting

Landform: Flats on marine terraces, rises on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 12 inches: fine sand
AC - 12 to 18 inches: fine sand
C - 18 to 33 inches: fine sand
Cg - 33 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 2.9 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Other vegetative classification: Upland Hardwood Hammock (R154XY008FL), Sandy soils on rises and knolls of mesic uplands (G154XB131FL)
Hydric soil rating: No

Minor Components

Ona, non-hydric
Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL), Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Hydric soil rating: No

Sparr
Percent of map unit: 3 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R154XY008FL), Sandy soils on rises and knolls of mesic uplands (G154XB131FL)
Hydric soil rating: No

Pompano, hydric
Percent of map unit: 3 percent
Landform: Drainageways on marine terraces, flats on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Slough (R154XY011FL), Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Hydric soil rating: Yes

44—Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2v171
Elevation: 0 to 150 feet
Mean annual precipitation: 38 to 62 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Smyrna, non-hydric, and similar soils: 76 percent
Smyrna, hydric, and similar soils: 20 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Smyrna, Non-hydric

Setting

Landform: Flats on marine terraces, flatwoods on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 17 inches: fine sand
Bh - 17 to 27 inches: loamy fine sand
C - 27 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w

Hydrologic Soil Group: A/D
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Smyrna, Hydric

Setting

Landform: Flats on marine terraces, flatwoods on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 17 inches: fine sand
Bh - 17 to 27 inches: loamy fine sand
C - 27 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Basinger, depressional

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Pomona, non-hydric

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Eaugallie, hydric

Percent of map unit: 1 percent
Landform: Flats on marine terraces, flatwoods on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL), Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Hydric soil rating: Yes

46—Tavares fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2w0pz
Elevation: 30 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Tavares and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tavares

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve, side slope, tread, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Eolian or sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand

C - 5 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 42 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Hydric soil rating: No

Minor Components

Candler

Percent of map unit: 5 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear, concave
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL), Sandy soils on ridges and dunes of xeric uplands (G154XB111FL)
Hydric soil rating: No

Apopka

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Shoulder, summit, footslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL), Sandy soils on ridges and dunes of xeric uplands (G154XB111FL)
Hydric soil rating: No

Narcoossee

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R154XY008FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)

Hydric soil rating: No

Zolfo

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: North Florida Flatwoods (R154XY004FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

54—Zolfo fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w0q1
Elevation: 30 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Zolfo and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zolfo

Setting

Landform: Rises on marine terraces, flatwoods on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 59 inches: fine sand
Bh - 59 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None

Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Minor Components

Myakka

Percent of map unit: 5 percent
Landform: Drainageways on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 4 percent
Landform: Rises on marine terraces, flatwoods on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, rise, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

Tavares

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, ridges on marine terraces, flats on marine terraces, hills on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, side slope, tread, rise
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Longleaf Pine-Turkey Oak Hills (R155XY002FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

Malabar

Percent of map unit: 2 percent
Landform: — error in exists on —
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Ecological site: Slough (R155XY011FL)

Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Unranked

Osceola County, Florida

1—Adamsville sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2r8hb
Elevation: 10 to 100 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Adamsville and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Adamsville

Setting

Landform: Knolls on flatwoods, rises on flatwoods
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, rise, talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: sand
C1 - 4 to 33 inches: sand
C2 - 33 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A
Other vegetative classification: Upland Hardwood Hammock (R154XY008FL), Upland Hardwood Hammock (R155XY008FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Minor Components

Narcoossee

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Riviera

Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

2—Adamsville variant fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1lt1w
Elevation: 10 to 100 feet
Mean annual precipitation: 44 to 52 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 342 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Adamsville variant and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Adamsville Variant

Setting

Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
C - 5 to 33 inches: fine sand
Oa - 33 to 49 inches: muck

A/Cb - 49 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (0.60 to 19.98 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A
Other vegetative classification: Upland Hardwood Hammock (R155XY008FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Minor Components

Riviera

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Basinger

Percent of map unit: 2 percent
Landform: Drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Gentry

Percent of map unit: 2 percent
Landform: Flood plains on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Placid

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Pompano

Percent of map unit: 2 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

4—Arents, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1lt1y
Mean annual precipitation: 44 to 52 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 342 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Arents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arents

Setting

Landform: Rises on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Altered marine deposits

Typical profile

C1 - 0 to 10 inches: gravelly sand
C2 - 10 to 32 inches: sand
C3 - 32 to 60 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

5—Basinger fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2svym
Elevation: 0 to 180 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 68 to 79 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Basinger and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Basinger

Setting

Landform: Drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Convex, linear
Across-slope shape: Linear, concave
Parent material: Sandy marine deposits

Typical profile

Ag - 0 to 2 inches: fine sand
Eg - 2 to 18 inches: fine sand
Bh/E - 18 to 36 inches: fine sand
Cg - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 3 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Myakka

Percent of map unit: 5 percent
Landform: Drainageways on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Immokalee

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Riser, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Placid

Percent of map unit: 4 percent
Landform: Depressions on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Margate

Percent of map unit: 1 percent
Landform: Drainageways on marine terraces

Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Forage suitability group not assigned (G156AC999FL)
Hydric soil rating: Yes

Felda

Percent of map unit: 1 percent
Landform: Drainageways on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Ecological site: Slough (R155XY011FL)
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

6—Basinger fine sand, depressional, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v16t
Elevation: 0 to 150 feet
Mean annual precipitation: 48 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 287 to 317 days
Farmland classification: Not prime farmland

Map Unit Composition

Basinger, depressional, and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Basinger, Depressional

Setting

Landform: Depressions on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 3 inches: fine sand
E - 3 to 8 inches: fine sand
E/Bh - 8 to 24 inches: fine sand
C - 24 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 50.02 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Freshwater Marshes and Ponds (R154XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G154XB145FL)
Hydric soil rating: Yes

Minor Components

Smyrna

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: South Florida Flatwoods (R155XY003FL)
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Immokalee, hydric

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: South Florida Flatwoods (R154XY003FL)
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Hydric soil rating: Yes

Floridana, hydric

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy over loamy soils on stream terraces, flood plains, or in depressions (G154XB245FL)
Hydric soil rating: Yes

7—Candler sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3z1
Elevation: 10 to 260 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Candler and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 63 inches: sand
E and Bt - 63 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A

Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL), Longleaf Pine-Turkey Oak Hills (R155XY002FL), Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)
Hydric soil rating: No

Minor Components

Tavares

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave, convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Hydric soil rating: No

9—Cassia fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tzx6
Elevation: 0 to 130 feet
Mean annual precipitation: 42 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Cassia and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cassia

Setting

Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Tread, talf

Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 26 inches: fine sand
Bh - 26 to 42 inches: fine sand
C - 42 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 12 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A/D
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Minor Components

Myakka

Percent of map unit: 7 percent
Landform: Drainageways on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Pomello

Percent of map unit: 6 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, interfluve, riser
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: Sand Pine Scrub (R155XY001FL)
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Satellite

Percent of map unit: 4 percent
Landform: Rises on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, rise, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Jonathan

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

10—Delray loamy fine sand, depressional

Map Unit Setting

National map unit symbol: 1lt24
Elevation: 10 to 100 feet
Mean annual precipitation: 44 to 52 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 342 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Delray, depressional, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Delray, Depressional

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 14 inches: loamy fine sand
E - 14 to 44 inches: fine sand
Btg - 44 to 62 inches: fine sandy loam
BCg - 62 to 80 inches: loamy fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Floridana

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Holopaw

Percent of map unit: 3 percent
Landform: Drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Kaliga

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

15—Hontoon muck, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2vbpf
Elevation: 0 to 250 feet
Mean annual precipitation: 38 to 65 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Hontoon and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hontoon

Setting

Landform: Depressions on marine terraces, swamps on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Herbaceous organic material

Typical profile

Oe - 0 to 5 inches: mucky peat
Oa1 - 5 to 60 inches: muck
Oa2 - 60 to 65 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very high (about 24.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)

Hydric soil rating: Yes

Minor Components

Samsula

Percent of map unit: 7 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Placid

Percent of map unit: 5 percent
Landform: Depressions on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Basinger

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Myakka

Percent of map unit: 2 percent
Landform: Drainageways on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Pompano

Percent of map unit: 2 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

16—Immokalee fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2s3lk
Elevation: 0 to 130 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Immokalee and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Immokalee

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Riser, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 35 inches: fine sand
Bh - 35 to 54 inches: fine sand
BC - 54 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D

Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Minor Components

Basinger

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Wabasso

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Pomello

Percent of map unit: 2 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, interfluve, riser
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: Sand Pine Scrub (R155XY001FL)
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Margate

Percent of map unit: 1 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Forage suitability group not assigned (G156AC999FL)
Hydric soil rating: Yes

Placid

Percent of map unit: 1 percent
Landform: Depressions on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)

Hydric soil rating: Yes

19—Malabar fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2svz3
Elevation: 10 to 140 feet
Mean annual precipitation: 42 to 63 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Malabar and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Malabar

Setting

Landform: Drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 17 inches: fine sand
Bw - 17 to 42 inches: fine sand
Btg - 42 to 59 inches: fine sandy loam
Cg - 59 to 80 inches: loamy fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Ecological site: Slough (R155XY011FL)
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Valkaria

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Oldsmar

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Pineda

Percent of map unit: 4 percent
Landform: Drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Basinger

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

22—Myakka fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2s3lg
Elevation: 0 to 130 feet
Mean annual precipitation: 42 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Myakka and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myakka

Setting

Landform: Drainageways on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 20 inches: fine sand
Bh - 20 to 36 inches: fine sand
C - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D

Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Minor Components

Basinger
Percent of map unit: 5 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Wabasso
Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Cassia
Percent of map unit: 3 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Immokalee
Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Riser, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Satellite
Percent of map unit: 1 percent
Landform: Rises on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, rise, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

24—Narcoossee fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2v17r
Elevation: 0 to 180 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Narcoossee and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Narcoossee

Setting

Landform: Knolls on marine terraces, ridges on marine terraces, rises on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 22 inches: fine sand
Bh - 22 to 26 inches: fine sand
BC - 26 to 36 inches: fine sand
C - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A
Other vegetative classification: Upland Hardwood Hammock (R154XY008FL), Sandy soils on rises and knolls of mesic uplands (G154XB131FL)
Hydric soil rating: No

Minor Components

Smyrna, non-hydric
Percent of map unit: 10 percent
Landform: Flats on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R154XY008FL), Sandy soils on rises and knolls of mesic uplands (G154XB131FL)
Hydric soil rating: No

27—Ona fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w4gy
Elevation: 10 to 130 feet
Mean annual precipitation: 44 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Ona and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ona

Setting
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile
A - 0 to 4 inches: fine sand
Bh - 4 to 22 inches: fine sand
C - 22 to 80 inches: fine sand

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches

Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Minor Components

Basinger, hydric

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Immokalee

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Eaugallie

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: South Florida Flatwoods (R155XY003FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

28—Paola sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2tzwj
Elevation: 0 to 100 feet
Mean annual precipitation: 44 to 60 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Paola and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paola

Setting

Landform: Ridges on marine terraces, hills on marine terraces
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 55 inches: sand
B/E - 55 to 80 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 50.02 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A

Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)
Hydric soil rating: No

Minor Components

Apopka
Percent of map unit: 6 percent
Landform: Knolls on marine terraces, ridges on marine terraces, hills on marine terraces
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope, riser, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL), Sandy soils on ridges and dunes of xeric uplands (G154XB111FL)
Hydric soil rating: No

Astatula
Percent of map unit: 5 percent
Landform: Knolls on marine terraces, ridges on marine terraces, hills on marine terraces
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope, riser, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)
Hydric soil rating: No

Pomello
Percent of map unit: 4 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, interfluve, riser
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: Sand Pine Scrub (R155XY001FL)
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

31—Pits

Map Unit Setting
National map unit symbol: 1lt2t
Mean annual precipitation: 44 to 52 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 342 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Pits: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits

Setting

Landform: Marine terraces
Landform position (three-dimensional): Interfluve, dip
Down-slope shape: Linear
Across-slope shape: Linear

Interpretive groups

Land capability classification (irrigated): None specified
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Unranked

Minor Components

Arents

Percent of map unit: 5 percent
Landform: Rises on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

32—Placid fine sand, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2tzx9
Elevation: 0 to 160 feet
Mean annual precipitation: 44 to 61 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Placid and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Placid

Setting

Landform: Depressions on marine terraces, drainageways on marine terraces

Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 24 inches: fine sand
Cg - 24 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Basinger

Percent of map unit: 7 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Myakka

Percent of map unit: 5 percent
Landform: Drainageways on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Samsula

Percent of map unit: 3 percent

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Gentry

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Felda

Percent of map unit: 2 percent
Landform: Drainageways on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Ecological site: Slough (R155XY011FL)
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

33—Placid variant fine sand

Map Unit Setting

National map unit symbol: 1lt2w
Elevation: 10 to 100 feet
Mean annual precipitation: 44 to 52 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 342 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Placid variant and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Placid Variant

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf

Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A1 - 0 to 8 inches: fine sand
A2 - 8 to 17 inches: fine sand
C - 17 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Other vegetative classification: Upland Hardwood Hammock (R155XY008FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Minor Components

Ona

Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Basinger

Percent of map unit: 4 percent
Landform: Drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Adamsville

Percent of map unit: 4 percent
Landform: Flats on marine terraces, rises on marine terraces

Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Placid

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

34—Pomello fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2v16y
Elevation: 0 to 180 feet
Mean annual precipitation: 44 to 52 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 342 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Pomello and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pomello

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve, riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 47 inches: fine sand
Bh - 47 to 58 inches: fine sand
Bw - 58 to 65 inches: fine sand
C - 65 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Minor Components

Smyrna

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Tavares

Percent of map unit: 1 percent
Landform: Ridges on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Hydric soil rating: No

Bulow

Percent of map unit: 1 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on knolls and ridges of mesic uplands (G155XB211FL)
Hydric soil rating: No

36—Pompano fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tzw3
Elevation: 0 to 100 feet
Mean annual precipitation: 44 to 65 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Pompano and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pompano

Setting

Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
C - 4 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)

Hydric soil rating: Yes

Minor Components

Valkaria

Percent of map unit: 4 percent
Landform: Drainageways on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Anclote

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, convex
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Malabar

Percent of map unit: 4 percent
Landform: — error in exists on —
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Ecological site: Slough (R155XY011FL)
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Myakka

Percent of map unit: 3 percent
Landform: Drainageways on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Immokalee

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Riser, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Riviera

Percent of map unit: 2 percent
Landform: Drainageways on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Ecological site: Slough (R155XY011FL)
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

37—Pompano fine sand, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2sm5f
Elevation: 0 to 160 feet
Mean annual precipitation: 38 to 64 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Pompano and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pompano

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 12 inches: fine sand
C - 12 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Basinger

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Malabar

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Ecological site: Slough (R155XY011FL)
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Myakka

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Anclote

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, convex
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Placid

Percent of map unit: 1 percent
Landform: Depressions on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Adamsville

Percent of map unit: 1 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R155XY008FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

38—Riviera fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tzw2
Elevation: 0 to 80 feet
Mean annual precipitation: 44 to 59 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Riviera and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riviera

Setting

Landform: Drainageways on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 28 inches: fine sand
Bt/E - 28 to 36 inches: fine sandy loam
Btg - 36 to 42 inches: sandy clay loam

C - 42 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Ecological site: Slough (R155XY011FL)
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Minor Components

Wabasso

Percent of map unit: 8 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Pinellas

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Ecological site: Cabbage Palm Flatwoods (R155XY005FL)
Other vegetative classification: Cabbage Palm Flatwoods (R155XY005FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: No

Hallandale

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)

Hydric soil rating: Yes

Oldsmar

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Floridana

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

39—Riviera fine sand, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2tzwl
Elevation: 0 to 80 feet
Mean annual precipitation: 44 to 64 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Riviera and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riviera

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 36 inches: fine sand
Bt/E - 36 to 42 inches: fine sandy loam

Cg1 - 42 to 56 inches: fine sand
Cg2 - 56 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Minor Components

Chobee

Percent of map unit: 7 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL), Loamy and clayey soils on stream terraces, flood plains, or in depressions (G156BC345FL)
Hydric soil rating: Yes

Tequesta

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL), Organic soils in depressions and on flood plains (G156AC645FL)
Hydric soil rating: Yes

Wabasso

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear

Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

40—Samsula muck, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2tzw9
Elevation: 0 to 250 feet
Mean annual precipitation: 44 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 335 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Samsula and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Samsula

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over sandy marine deposits

Typical profile

Oa1 - 0 to 24 inches: muck
Oa2 - 24 to 32 inches: muck
Cg1 - 32 to 35 inches: sand
Cg2 - 35 to 44 inches: sand
Cg3 - 44 to 80 inches: sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very high (about 13.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Minor Components

Basinger

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Kaliga

Percent of map unit: 3 percent
Landform: Depressions on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Myakka

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Sanibel

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Anclote

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, convex

Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Floridana

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

42—Smyrna fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2v170
Elevation: 10 to 180 feet
Mean annual precipitation: 38 to 62 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Smyrna, non-hydric, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Smyrna, Non-hydric

Setting

Landform: — error in exists on —
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 13 inches: fine sand
Bh - 13 to 21 inches: fine sand
Bw - 21 to 50 inches: fine sand
E'g - 50 to 70 inches: fine sand
B'h - 70 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Minor Components

Wabasso, non-hydric

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Pomello, non-hydric

Percent of map unit: 2 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Placid, hydric

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

43—St. Lucie fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2v17s
Elevation: 80 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

St. lucie and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of St. Lucie

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian or sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
C - 4 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 50.02 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Other vegetative classification: Sand Pine Scrub (R154XY001FL), Sandy soils on ridges and dunes of xeric uplands (G154XB111FL)

Hydric soil rating: No

Minor Components

Archbold

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R154XY001FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Hydric soil rating: No

Cassia

Percent of map unit: 3 percent
Landform: Rises on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G154XB131FL)
Hydric soil rating: No

Myakka

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve, tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL), Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Hydric soil rating: No

44—Tavares fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2sw00
Elevation: 0 to 130 feet
Mean annual precipitation: 42 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Tavares and similar soils: 83 percent
Minor components: 17 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tavares

Setting

Landform: Knolls on marine terraces, ridges on marine terraces, flats on marine terraces, hills on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, side slope, tread, rise
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Eolian or sandy marine deposits

Typical profile

A - 0 to 6 inches: fine sand
C - 6 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 42 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Longleaf Pine-Turkey Oak Hills (R155XY002FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

Minor Components

Cassia

Percent of map unit: 5 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Pomello

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope, summit

Landform position (three-dimensional): Side slope, interfluve, riser
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: Sand Pine Scrub (R155XY001FL)
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Astatula

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, ridges on marine terraces, hills on marine terraces
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope, riser, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)
Hydric soil rating: No

Apopka

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, ridges on marine terraces, hills on marine terraces
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope, riser, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL), Sandy soils on ridges and dunes of xeric uplands (G154XB111FL)
Hydric soil rating: No

Adamsville

Percent of map unit: 2 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R155XY008FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Unranked

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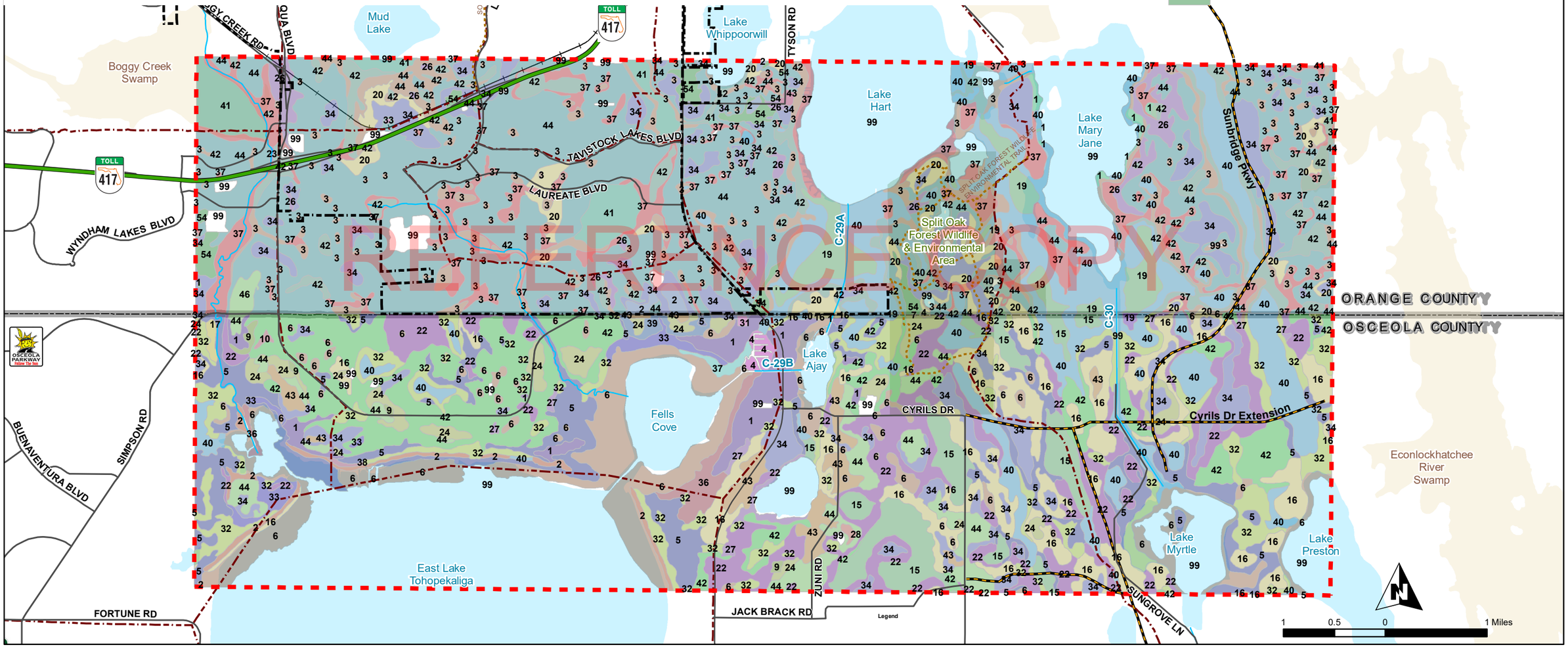
Attachment C-5
NRCS Soils Map

Legend

- 01:ADAMSVILLE SAND, 0 TO 2 PERCENT SLOPES
- 02:ADAMSVILLE VARIANT FINE SAND, 0 TO 5 PERCENT
- 02:ARCHBOLD FINE SAND, 0 TO 5 PERCENT
- 04:ARENTS, 0 TO 5 PERCENT SLOPES
- 01:ARENTS, NEARLY LEVEL
- 05:BASINGER FINE SAND, 0 TO 2 PERCENT
- 03:BASINGER FINE SAND, DEPRESSIONAL, 0 TO 1 PERCENT
- 04:CANDLER FINE SAND, 0 TO 5 PERCENT SLOPES
- 07:CANDLER SAND, 0 TO 5 PERCENT SLOPES
- 09:CASSIA FINE SAND
- 10:DELRAY LOAMY FINE SAND, DEPRESSIONAL
- 19:HONTOON MUCK
- 20:IMMOKALEE FINE SAND
- 17:KALIGA MUCK
- 23:MALABAR FINE SAND
- 22:MYAKKA FINE SAND, 0 TO 2 PERCENT SLOPES
- 24:NARCOOSSEE FINE SAND, 0 TO 2 PERCENT
- 26:ONA FINE SAND
- 28:PAOLA SAND, 0 TO 5 PERCENT SLOPES
- 33:PITS
- 32:PLACID FINE SAND, DEPRESSIONAL
- 33:PLACID VARIANT FINE SAND
- 34:POMELLO FINE SAND, 0 TO 5 PERCENT SLOPES
- 36:POMPANO FINE SAND, 0 TO 2 PERCENT SLOPES
- 37:POMPANO FINE SAND, DEPRESSIONAL
- 38:RIVIERA FINE SAND, 0 TO 2 PERCENT SLOPES
- 39:RIVIERA FINE SAND, DEPRESSIONAL, 0 TO 1 PERCENT
- 40:SAMSULA MUCK
- 41:SAMSULA-HONTOON-BASINGER ASSOCIATION,
- 42:SANIBEL MUCK
- 43:SEFFNER FINE SAND, 0 TO 2 PERCENT SLOPES
- 42:SMYRNA FINE SAND, 0 TO 2 PERCENT SLOPES
- 44:SMYRNA-SMYRNA, WET, FINE SAND, 0 TO 2 PERCENT
- 37:ST. JOHNS FINE SAND
- 43:ST. LUCIE FINE SAND, 0 TO 5 PERCENT SLOPES
- 44:TAVARES FINE SAND, 0 TO 5 PERCENT SLOPES
- 54:ZOLFO FINE SAND, 0 TO 2 PERCENT SLOPES



Legend

- Study Area
- County Boundary
- Orlando City Limits
- RailRoad
- Existing Trails
- Planned Florida Greenways & Trails
- Planned Roads

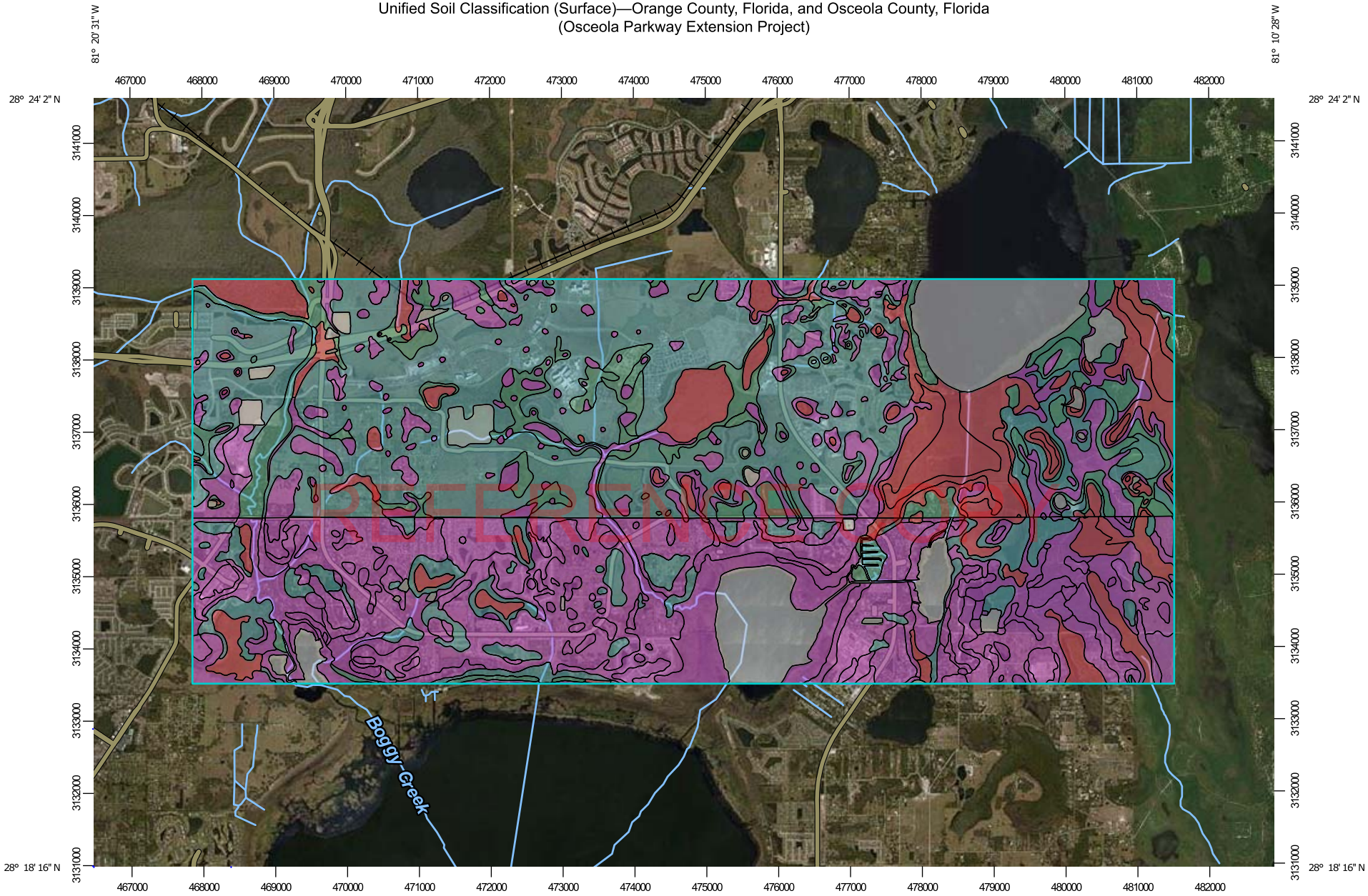
NRCS Soils

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180301
Soils
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, CH2M, ESRI, Orange and Osceola County, Central Florida Geographic Information DRI Interactive Mapping, FDEP, National Hydrography Data (NHD))</ITA>

Attachment C-6
Unified Soil Classification

Unified Soil Classification (Surface)—Orange County, Florida, and Osceola County, Florida
(Osceola Parkway Extension Project)



Map Scale: 1:75,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 1000 2000 4000 6000

Feet
0 3500 7000 14000 21000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- CH
- CL
- CL-A (proposed)
- CL-K (proposed)
- CL-ML
- CL-O (proposed)
- CL-T (proposed)
- GC
- GC-GM
- GM
- GP
- GP-GC
- GP-GM
- GW
- GW-GC
- GW-GM
- MH
- MH-A (proposed)
- MH-K (proposed)
- MH-O (proposed)
- MH-T (proposed)
- ML
- ML-A (proposed)
- ML-K (proposed)
- ML-O (proposed)
- ML-T (proposed)
- OH
- OH-T (proposed)
- OL
- PT
- SC
- SC-SM
- SM
- SP
- SP-SC
- SP-SM
- SW
- SW-SC
- SW-SM
- Not rated or not available

Soil Rating Lines
- CH
- CL
- CL-A (proposed)
- CL-K (proposed)
- CL-ML
- CL-O (proposed)
- CL-T (proposed)
- GC
- GC-GM
- GM
- GP
- GP-GC
- GP-GM
- GW
- GW-GC
- GW-GM
- MH
- MH-A (proposed)
- MH-K (proposed)
- MH-O (proposed)
- MH-T (proposed)
- ML
- ML-A (proposed)
- ML-K (proposed)
- ML-O (proposed)
- ML-T (proposed)
- OH
- OH-T (proposed)
- OL
- PT
- SC
- SC-SM
- SM
- SP
- SP-SC
- SP-SM
- SW
- SW-SC
- SW-SM
- Not rated or not available

Soil Rating Points
- CH
- CL
- CL-A (proposed)
- CL-K (proposed)
- CL-ML
- CL-O (proposed)
- CL-T (proposed)
- GC
- GC-GM
- GM
- GP
- GP-GC
- GP-GM
- GW
- GW-GC
- GW-GM
- MH
- MH-A (proposed)
- MH-K (proposed)
- MH-O (proposed)
- MH-T (proposed)
- ML
- ML-A (proposed)
- ML-K (proposed)
- ML-O (proposed)
- ML-T (proposed)
- OH
- OH-T (proposed)
- OL
- PT
- SC
- SC-SM
- SM
- SP
- SP-SC
- SP-SM
- SW
- SW-SC
- SW-SM
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails

MAP INFORMATION

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County, Florida
Survey Area Data: Version 14, Oct 6, 2017

Soil Survey Area: Osceola County, Florida
Survey Area Data: Version 14, Oct 6, 2017

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 8, 2010—Mar 17, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Unified Soil Classification (Surface)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Arents, nearly level	SP-SM	1.1	0.0%
2	Archbold fine sand, 0 to 5 percent slopes	SP	58.4	0.3%
3	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	SP-SM	745.3	3.9%
4	Candler fine sand, 0 to 5 percent slopes	SP-SM	2.9	0.0%
19	Hontoon muck, frequently ponded, 0 to 1 percent slopes	PT	333.1	1.8%
20	Immokalee fine sand	SP	396.5	2.1%
23	Malabar fine sand	SP	3.4	0.0%
26	Ona fine sand, 0 to 2 percent slopes	SP-SM	92.8	0.5%
33	Pits		1.3	0.0%
34	Pomello fine sand, 0 to 5 percent slopes	SP-SM	853.6	4.5%
37	St. Johns fine sand	SP	956.1	5.0%
40	Samsula muck, frequently ponded, 0 to 1 percent slopes	PT	643.9	3.4%
41	Samsula-Hontoon-Basinger association, depressional	PT	361.1	1.9%
42	Sanibel muck	PT	409.4	2.2%
43	Seffner fine sand, 0 to 2 percent slopes	SM	0.0	0.0%
44	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	SM	5,181.2	27.3%
46	Tavares fine sand, 0 to 5 percent slopes	SP-SM	54.7	0.3%
54	Zolfo fine sand, 0 to 2 percent slopes	SP-SM	159.2	0.8%
99	Water		941.0	5.0%
Subtotals for Soil Survey Area			**11,195.1**	**59.0%**
Totals for Area of Interest			**18,983.7**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Adamsville sand, 0 to 2 percent slopes	SP-SM	474.6	2.5%
2	Adamsville variant fine sand, 0 to 5 percent slopes	SP	46.8	0.2%
4	Arents, 0 to 5 percent slopes	SP	43.4	0.2%
5	Basinger fine sand, 0 to 2 percent slopes	SP-SM	721.0	3.8%
6	Basinger fine sand, depressional, 0 to 1 percent slopes	SP-SM	678.5	3.6%
7	Candler sand, 0 to 5 percent slopes	SP-SM	2.2	0.0%
9	Cassia fine sand, 0 to 2 percent slopes	SP-SM	28.5	0.2%
10	Delray loamy fine sand, depressional	SP-SM	8.3	0.0%
15	Hontoon muck, frequently ponded, 0 to 1 percent slopes	PT	161.7	0.9%
16	Immokalee fine sand, 0 to 2 percent slopes	SP-SM	380.2	2.0%
17	Kaliga muck, frequently ponded, 0 to 1 percent slopes	PT	20.4	0.1%
22	Myakka fine sand, 0 to 2 percent slopes	SP-SM	648.0	3.4%
24	Narcoossee fine sand, 0 to 2 percent slopes	SM	361.0	1.9%
27	Ona fine sand, 0 to 2 percent slopes	SP-SM	24.7	0.1%
31	Pits		6.1	0.0%
32	Placid fine sand, frequently ponded, 0 to 1 percent slopes	SM	552.5	2.9%
33	Placid variant fine sand	SP-SM	95.0	0.5%
34	Pomello fine sand, 0 to 5 percent slopes	SP-SM	401.9	2.1%
36	Pompano fine sand, 0 to 2 percent slopes	SP-SM	61.9	0.3%
37	Pompano fine sand, frequently ponded, 0 to 1 percent slopes	SP-SM	39.4	0.2%
38	Riviera fine sand, 0 to 2 percent slopes	SP-SM	0.6	0.0%
39	Riviera fine sand, frequently ponded, 0 to 1 percent slopes	SP-SM	61.9	0.3%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
40	Samsula muck, frequently ponded, 0 to 1 percent slopes	PT	369.1	1.9%
42	Smyrna fine sand, 0 to 2 percent slopes	SP-SM	1,561.1	8.2%
43	St. Lucie fine sand, 0 to 5 percent slopes	SP-SM	122.3	0.6%
44	Tavares fine sand, 0 to 5 percent slopes	SP-SM	209.5	1.1%
99	Water		708.0	3.7%
Subtotals for Soil Survey Area			**7,788.7**	**41.0%**
Totals for Area of Interest			**18,983.7**	**100.0%**

Description

The Unified soil classification system classifies mineral and organic mineral soils for engineering purposes on the basis of particle-size characteristics, liquid limit, and plasticity index. It identifies three major soil divisions: (i) coarse-grained soils having less than 50 percent, by weight, particles smaller than 0.074 mm in diameter; (ii) fine-grained soils having 50 percent or more, by weight, particles smaller than 0.074 mm in diameter; and (iii) highly organic soils that demonstrate certain organic characteristics. These divisions are further subdivided into a total of 15 basic soil groups. The major soil divisions and basic soil groups are determined on the basis of estimated or measured values for grain-size distribution and Atterberg limits. ASTM D 2487 shows the criteria chart used for classifying soil in the Unified system and the 15 basic soil groups of the system and the plasticity chart for the Unified system.

The various groupings of this classification correlate in a general way with the engineering behavior of soils. This correlation provides a useful first step in any field or laboratory investigation for engineering purposes. It can serve to make some general interpretations relating to probable performance of the soil for engineering uses.

For each soil horizon in the database one or more Unified soil classifications may be listed. One is marked as the representative or most commonly occurring. The representative classification is shown here for the surface layer of the soil.

Rating Options

Aggregation Method: Dominant Component

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie. The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Lower

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

For an attribute of a soil horizon, a depth qualification must be specified. In most cases it is probably most appropriate to specify a fixed depth range, either in centimeters or inches. The Bottom Depth must be greater than the Top Depth, and the Top Depth can be greater than zero. The choice of "inches" or "centimeters" only applies to the depth of soil to be evaluated. It has no influence on the units of measure the data are presented in.

When "Surface Layer" is specified as the depth qualifier, only the surface layer or horizon is considered when deriving a value for a component, but keep in mind that the thickness of the surface layer varies from component to component.

When "All Layers" is specified as the depth qualifier, all layers recorded for a component are considered when deriving the value for that component.

Whenever more than one layer or horizon is considered when deriving a value for a component, and the attribute being aggregated is a numeric attribute, a weighted average value is returned, where the weighting factor is the layer or horizon thickness.

Attachment C-7
Farmlands Map

Orlando International Airport
BOGGY CREEK
HEINTZELMEN BLVD
JEFF FUQUA BLVD
WETHERBEE RD
Lake Nona
Buck Lake
Red Lake
MOSS PARK ROAD PATH
MOSS PARK RD
INNOVATION WAY TRAIL SOUTH
Crosby Island Marsh
SOUTHEAST ORLANDO LOOP TRAIL
Mud Lake
TOLL 417
Lake Whippoorwill
TYSON RD
NARCOOSSEE RD
LAKE NONA BLVD
Boggy Creek Swamp
C-29
Lake Hart
Lake Mary Jane
TAVISTOCK LAKES BLVD
LAUREATE BLVD
Jim Branch
SPLIT OAK FOREST WILDLIFE & ENVIRONMENTAL TRAIL
Split Oak Forest Wildlife & Environmental Area
Sunbridge Pkwy
WYNDHAM LAKES BLVD
C-29A
ORANGE COUNTY
OSCEOLA COUNTY
C-29B
Lake Ajay
Fells Cove
CYRILS DR
C-30
Cyrils Dr Extension
ZUNI RD
ABSHER RD
Econlockhatchee River Swamp
BUENAVENTURA BLVD
SIMPSON RD
Lake Myrtle
Lake Preston
Jack Brack Rd
Northeast Connector Expressway
SUNGROVE LN
C-32B
East Lake Tohopekaliga
FORTUNE RD
JACK BRACK RD
Jones Rd
1 0.5 0 1 Miles

Legend

- Study Area
- County Boundary
- Orlando City Limits
- RailRoad
- Existing Trails
- Planned Florida Greenways & Trails
- Planned Roads
- NRCS Farmland of Unique Importance

Farmlands Map

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180307
FarmlandsMap
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, CH2M, ESRI, Orange and Osceola County, Central Florida Geographic Information DRI Interactive Mapping, FDEP, National Hydrography Data (NHD), NRCS 2015

Attachment C-8
IPAC Report

IPaC Information for Planning and Consultation **U.S. Fish & Wildlife Service**

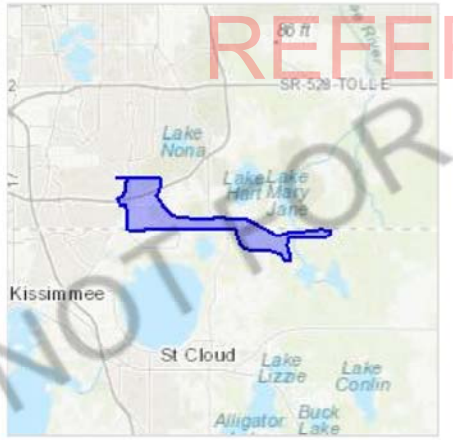
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Orange and Osceola counties, Florida



Local offices

North Florida Ecological Services Field Office

(904) 731-3336
(904) 731-3045

7915 Baymeadows Way, Suite 200
Jacksonville, FL 32256-7517

South Florida Ecological Services Field Office

(772) 562-3909

(772) 562-4288

1339 20th Street
Vero Beach, FL 32960-3559

http://fws.gov/verobeach

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species

[1] are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Florida Panther Puma (=Felis) concolor coryi No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1763	Endangered

Puma (=mountain Lion) Puma (=Felis) concolor (all subsp. except coryi) No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6049	SAT

Birds

NAME	STATUS
Audubon's Crested Caracara Polyborus plancus audubonii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8250	Threatened
Everglade Snail Kite Rostrhamus sociabilis plumbeus There is **final designated** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/7713	Endangered
Florida Grasshopper Sparrow Ammodramus savannarum floridanus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/32	Endangered
Florida Scrub-jay Aphelocoma coerulescens No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6174	Threatened
Ivory-billed Woodpecker Campephilus principalis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8230	Endangered
Red-cockaded Woodpecker Picoides borealis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7614	Endangered
Whooping Crane Grus americana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/758	EXPN
Wood Stork Mycteria americana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8477	Threatened

Reptiles

NAME	STATUS
American Alligator Alligator mississippiensis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/776	SAT
Bluetail Mole Skink Eumeces egregius lividus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2203	Threatened
Eastern Indigo Snake Drymarchon corais couperi No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/646	Threatened
Sand Skink Neoseps reynoldsi No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4094	Threatened

Flowering Plants

NAME	STATUS
Beautiful Pawpaw Deeringothamnus pulchellus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4069	Endangered
Britton's Beargrass Nolina brittoniana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4460	Endangered
Florida Bonamia Bonamia grandiflora No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2230	Threatened
Lewton's Polygala Polygala lewtonii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6688	Endangered
Papery Whitlow-wort Paronychia chartacea No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1465	Threatened

Pigeon Wings Clitoria fragrans — Threatened
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/991

Pygmy Fringe-tree Chionanthus pygmaeus — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/1084

Sandlace Polygonella myriophylla — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/5745

Scrub Buckwheat Eriogonum longifolium var. gnaphalifolium — Threatened
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/5940

Scrub Lupine Lupinus aridorum — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/736

Scrub Plum Prunus geniculata — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/2238

Wide-leaf Warea Warea amplexifolia — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/412

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any activity that results in the take (to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service

[3]. There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured. Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are USFWS Birds of Conservation Concern that might be affected by activities in this location. The list does not contain every bird you may find in this location, nor is it guaranteed that all of the birds on the list will be found on or near this location. To get a better idea of the specific locations where certain species have been reported and their level of occurrence, please refer to resources such as the E-bird data mapping tool (year-round bird sightings by birders and the general public) and Breeding Bird Survey (relative abundance maps for breeding birds). Although it is important to try to avoid and minimize impacts to all birds, special attention should be given to the birds on the list below. To get a list of all birds potentially present in your project area, visit the E-bird Explore Data Tool.

NAME	BREEDING SEASON
Bachman's Sparrow Aimophila aestivalis https://ecos.fws.gov/ecp/species/6177	Breeds May 1 to Sep 30
Black Rail Laterallus jamaicensis https://ecos.fws.gov/ecp/species/7717	Breeds Mar 1 to Sep 15
Black Skimmer Rynchops niger https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15
Common Ground-dove Columbina passerina exigua	Breeds Feb 1 to Dec 31
Dunlin Calidris alpina arcticola	Breeds elsewhere

Great Blue Heron Ardea herodias https://ecos.fws.gov/ecp/species/2170	Breeds Jan 1 to Dec 31
Henslow's Sparrow Ammodramus henslowii https://ecos.fws.gov/ecp/species/3941	Breeds elsewhere
King Rail Rallus elegans https://ecos.fws.gov/ecp/species/8936	Breeds May 1 to Sep 5
Least Tern Sterna antillarum	Breeds Apr 20 to Sep 10
Lesser Yellowlegs Tringa flavipes https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Limpkin Aramus guarauna	Breeds Jan 15 to Aug 31
Magnificent Frigatebird Fregata magnificens	Breeds Oct 1 to Apr 30
Prairie Warbler Dendroica discolor	Breeds May 1 to Jul 31
Prothonotary Warbler Protonotaria citrea	Breeds Apr 1 to Jul 31
Red-headed Woodpecker Melanerpes erythrocephalus	Breeds May 10 to Sep 10
Reddish Egret Egretta rufescens https://ecos.fws.gov/ecp/species/7617	Breeds Mar 1 to Sep 15
Semipalmated Sandpiper Calidris pusilla	Breeds elsewhere
Short-billed Dowitcher Limnodromus griseus https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Short-tailed Hawk Buteo brachyurus https://ecos.fws.gov/ecp/species/8742	Breeds Mar 1 to Jun 30
Southeastern American Kestrel Falco sparverius paulus https://ecos.fws.gov/ecp/species/4076	Breeds Apr 1 to Aug 31
Swallow-tailed Kite Elanoides forficatus https://ecos.fws.gov/ecp/species/8938	Breeds Mar 10 to Jun 30

Whimbrel Numenius phaeopus https://ecos.fws.gov/ecp/species/9483	Breeds elsewhere
Yellow Warbler Dendroica petechia gundlachi	Breeds May 20 to Aug 10

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in your project's counties during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote when the bird breeds in the Bird Conservation Region(s) in which your project lies. If there are no yellow bars shown for a bird, it does not breed in your project area.

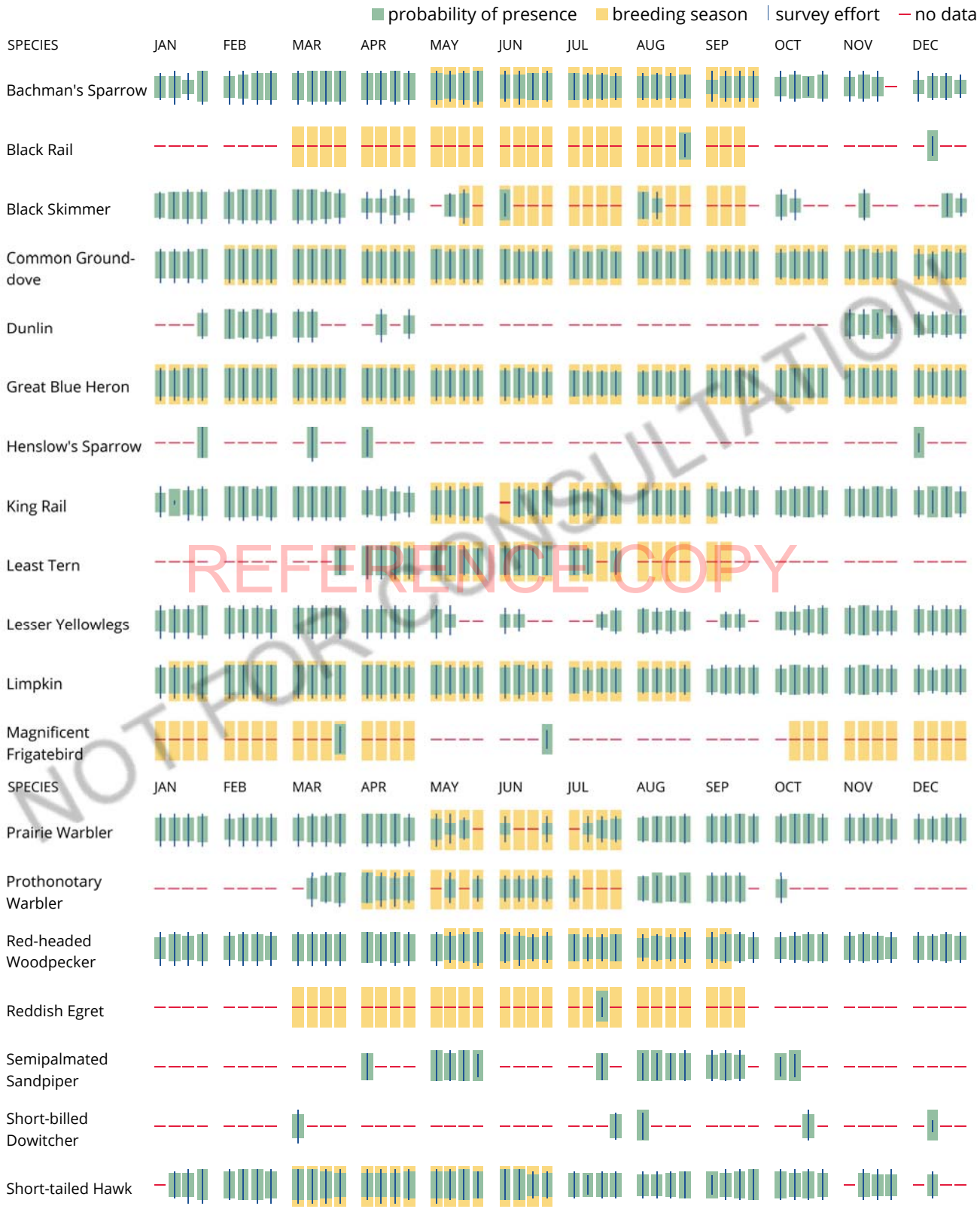
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the counties of your project area. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

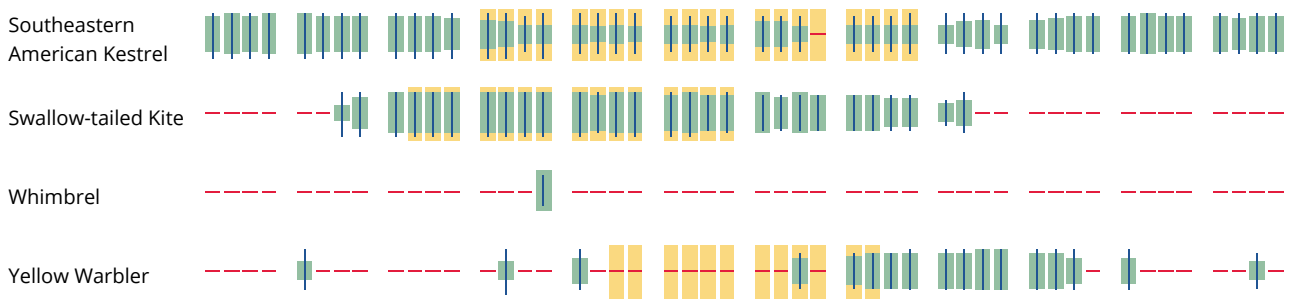
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information.





Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Such measures are particularly important when birds are most likely to occur in the project area. To see when birds are most likely to occur in your project area, view the Probability of Presence Summary. Special attention should be made to look for nests and avoid nest destruction during the breeding season. The best information about when birds are breeding can be found in Birds of North America (BNA) Online under the "Breeding Phenology" section of each species profile. Note that accessing this information may require a subscription. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) that might be affected by activities in your project location. These birds are of priority concern because it has been determined that without additional conservation actions, they are likely to become candidates for listing under the Endangered Species Act (ESA).

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets. The AKN list represents all birds reported to be occurring at some level throughout the year in the counties in which your project lies. That list is then narrowed to only the Birds of Conservation Concern for your project area.

Again, the Migratory Bird Resource list only includes species of particular priority concern, and is not representative of all birds that may occur in your project area. Although it is important to try to avoid and minimize impacts to all birds, special attention should be made to avoid and minimize impacts to birds of priority concern. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird entry on your migratory bird species list indicates a breeding season, it is probable the bird breeds in your project's counties at some point within the time-frame specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

Facilities

Wildlife refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGES AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

- PEM1F
- PEM1C
- PEM1A
- PEM1G

FRESHWATER FORESTED/SHRUB WETLAND

- PFO6F
- PFO2F
- PSS1C
- PFO7C
- PFO3C
- PSS3B
- PFO6C
- PFO2/3F
- PFO3/2C
- PFO1C
- PSS1/3C
- PFO1/3Cd
- PSS3C

PFO7A

FRESHWATER POND

PUBHx

PUBH

PAB4F

RIVERINE

R2UBHx

A full description for each wetland code can be found at the National Wetlands Inventory website: https://ecos.fws.gov/ipac/wetlands/decoder

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Attachment C-9
Physical/Historic Characteristics

Orlando International Airport
TRADEPORT DR
WETHERBEE RD
Boggy Creek
HEINTZELMEN BLVD
JEFF FUQUA BLVD
WATERS EDGE TRAIL
Lake Nona
Red Lake
Buck Lake
MOSS PARK ROAD PATH
TOLL 417
WEWAHOOTEE RD
MOSS PARK RD
INNOVATION QUARTER TRAIL SOUTH
Crosby Island Marsh
TM-Econ Mitigation Bank
SOUTHEAST ORLANDO LOOP TRAIL
Mud Lake
Lake Nona Comm Bldg
OUC
Lake Nona WTP
GOAA Sub-Station
NARCOOSSEE RD
Lake Whippoorwill
TYSON RD
Crosby Island Marsh Preserve
Bear Bay Canal
Creek Swamp
Canal C-29
Lake Hart
Lake Mary Jane
LANDSTAR BLVD
LAKE NONA BLVD
TAVISTOCK LAKES BLVD
LAUREATE BLVD
SPLIT OAK FOREST WILDLIFE ENVIRONMENTAL TRAIL
Sunbridge Pkwy
WYNDHAM LAKES BLVD
Eagles Roost
Split Oak Forest Wildlife & Environmental Area
Moss Park
Isle of Pine Preserve
World Gateway DRI Mitigation Area
Canal C-29A
CR-29A Canal
C-30 Canal
ORANGE COUNTY
OSCEOLA COUNTY
BOGGY CREEK RD
Boggy Creek
Canal C-29B
Lake Ajay
Jim Branch
Fells Cove
CYRILS DR
Cyrils Dr Extension
Canal C-30
BUENAVENTURA BLVD
FLORIDA PKWY
SIMPSON RD
Hilliard Isle Tram Road
Econlockhatchee River Swamp
Ox Pond Drainage Canal
East Lake Tohopekaliga
ZUNI RD
ABSHER RD
Jack Brack Rd
Northeast Connector Expressway
SUNGROVE LN
Canal C-32B
Lake Myrtle
Lake Preston
FLORIDA'S TPKE
FORTUNE RD
JACK BRACK RD
Jones Rd
1 0.5 0 1 Miles

Legend

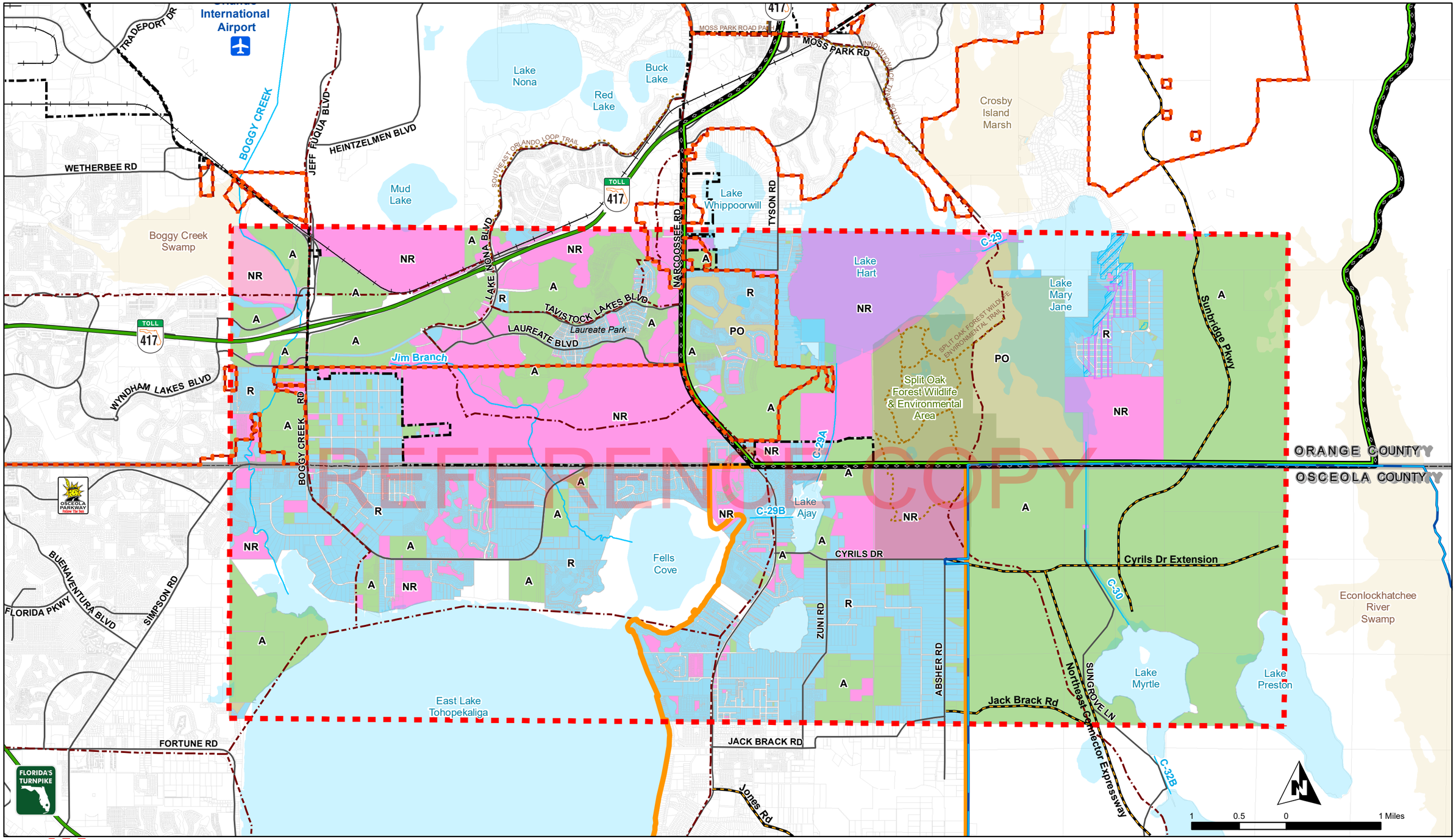
- Study Area
- County Boundary
- Orlando City Limits
- RailRoad
- Public Lands
- Proposed Northeast District Water/Wastewater Facility
- Utilities
- Linear Historic Resources
- Historic Structures
- Existing Trails
- Planned Florida Greenways & Trails
- Planned Roads

Physical Characteristics/Historic Characteristics

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180417
Physical_HistoricCharacteristics_Final
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, Search Inc, CH2M, ESRI, Orange and Osceola County, Florida Fish and Wildlife Conservation (FWC), FDEP, National Hydrography Data (NHD))

Attachment C-10
Existing Land Use



Legend

- Study Area
- County Boundary
- RailRoad
- Orlando City Limits
- Urban Service Area
- NE District Conceptual Master Planning Area
- Innovation Way
- Narcoossee Community Plan Boundary
- Existing Trails
- Planned Florida Greenways & Trails
- Planned Roads
- Agriculture **(A)**
- Residential **(R)**
- Non-Residential **(NR)**
- Parks and Recreation / Open Space **(PO)**

Existing Land Use

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180307
ExistLU2_03072018
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, CH2M, ESRI, Orange and Osceola County, Central Florida Geographic Information DRI Interactive Mapping, FDEP, National Hydrography Data (NHD))SJRWMD</ITA>

Attachment C-11
Future Land Use

Legend

- Study Area
- County Boundary
- Orlando City Limits
- RailRoad
- Existing Trails
- Planned Florida Greenways & Trails
- Planned Roads
- NE District Conceptual Master Planning Area
- Narcoossee Community Plan Boundary
- Urban Service
- Innovation Way
- Agriculture (A)
- Conservation/Preservation (C/P)
- Non-Residential (NR)
- Parks and Recreation / Open Space (PO)
- Planned Development - Non-Residential (PNR)
- Planned Development - Residential (PR)
- Residential (R)

Future Land Use

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180307
FutureLU_03072018
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, CH2M, ESRI, Orange and Osceola County, Central Florida Geographic Information DRI Interactive Mapping, FDEP, National Hydrography Data (NHD), East Central Florida Regional Planning Council

Attachment C-12
Agency Future Land Use Maps

City of Orlando
Future Land Use Map Series

Economic Development Department
City Planning Division

Future Land Use Map 25

Map 25 Effective Date: April 2, 2015
Updated Through 15-1ESR

LEGEND

- **Residential Low Intensity**
  Max.: 12 DU/Acre and/or 0.30 FAR
  Min.: None
- **Residential Medium Intensity**
  Max.: 30 DU/Acre and/or 0.30 FAR
  Min.: 12 DU/Acre
- **Residential High Intensity**
  Max.: 200 DU/Acre and/or 0.35 FAR
  Min.: 30 DU/Acre
- **Mixed Use/Neighborhood Development**
  Max.: 12 DU/Acre and/or 0.4 FAR
  Min.: None
- **Office Low Intensity**
  Max.: 21 DU/Acre and/or 0.4 FAR
  Min.: None
- **Office Medium Intensity**
  Max.: 40 DU/Acre and/or 0.7 FAR
  Min.: 12 DU/Acre and/or 0.3 FAR
- **Office High Intensity**
  Max.: 200 DU/Acre and/or 1.0 FAR
  Min.: 30 DU/Acre and/or 0.4 FAR
- **Mixed Use Corridor Medium Intensity**
  Max.: 30 DU/Acre and/or 0.5 FAR
  Min.: 15 DU/Acre
- **Mixed Use Corridor High Intensity**
  Max.: 200 DU/Acre and/or 1.0 FAR
  Min.: 30 DU/Acre and/or 0.4 FAR
- **N-AC** — **Neighborhood Activity Center**
  Max.: 30 DU/Acre and/or 0.3 FAR
  Min.: 15 DU/Acre
- **C-AC** — **Community Activity Center**
  Max.: 40 DU/Acre and/or 0.7 FAR
  Min.: 20 DU/Acre and/or 0.35 FAR
- **U-AC** — **Urban Activity Center**
  Max.: 100 DU/Acre and/or 1.0 FAR
  Min.: 30 DU/Acre and/or 0.5 FAR
- **M-AC** — **Metropolitan Activity Center**
  Max.: 200 DU/Acre and/or 3.0 FAR
  Min.: 30 DU/Acre and/or 0.75 FAR
- **D-AC** — **Downtown Activity Center**
  Max.: 200 DU/Acre and/or 4.0 FAR
  Min.: 75 DU/Acre and/or 0.75 FAR
- **Industrial**
  Max.: 40 DU/Acre**(1)** and/or 0.7 FAR
  Min.: 12 DU/Acre**(1)**
- **Airport Support District Med. Intensity**
  See Goal 4 and Associated Objectives and Policies
- **Airport Support District High Intensity**
  See Goal 4 and Associated Objectives and Policies
- **Urban Village**
  Determined by Adopted GMP Subarea Policy, consistent with Future Land Use Policy 2.4.4
- **Public/Recreational & Institutional**
  Max.: None
  Min.: None
- **Lake / Conservation**
  Max.: 1 DU/5 Acres; 0.05 FAR
  Min.: None
- **Conservation**
  Max.: 1 DU/5 Acres; 0.05 FAR
  Min.: None
- **Urban Reserve**
  Max.: 1 DU/10 Acres; 0.05 FAR
  Min.: None
- **Transitional Wildlife Habitat Overlay**
- **Resource Protection Overlay**
- 2.1 — **Growth Management Plan Subarea Policy (See Future Land Use Element)**
- Orlando / Orange County — **Jurisdiction Boundary**

N

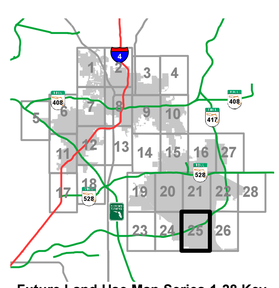
0 250 500 1,000
Feet

Notes/Definitions

FAR: Floor Area Ratio **DU:** Dwelling Units
GMP: Growth Management Plan

(1) Industrial Future Land Use Designation: Where allowed by the applicable Subarea Policy and Zoning District, residential uses may be allowed within the Traditional City through a Conditional Use Permit.

(2) Areas shown and assigned Future Land Use categories on the Official Future Land Use Map Series which are not within the Jurisdiction of the City of Orlando are only conceptual and do not assign any legally binding land uses to areas not within the city. Should these areas be annexed, a Growth Management Plan Amendment will be required to officially designate them on the Future Land Use Map.



Future Land Use Map Series 1-28 Key

City of Orlando / Orange County GIS (Printed: May 1, 2015)

NOTE: These maps are accurate as of the print date shown at the bottom of the legend. The maps are provided for reference only and should not be relied upon without reviewing the Official Future Land Use Map series kept in the City Planning Division, 6th Floor, Orlando City Hall.

City of Orlando
Future Land Use Map Series

Economic Development Department
City Planning Division

Future Land Use Map 26

Map 26 Effective Date: January 9, 2015
Updated Through 14-3ESR

LEGEND

- **Residential Low Intensity**
  Max.: 12 DU/Acre and/or 0.30 FAR
  Min.: None
- **Residential Medium Intensity**
  Max.: 30 DU/Acre and/or 0.30 FAR
  Min.: 12 DU/Acre
- **Residential High Intensity**
  Max.: 200 DU/Acre and/or 0.35 FAR
  Min.: 30 DU/Acre
- **Mixed Use/Neighborhood Development**
  Max.: 12 DU/Acre and/or 0.4 FAR
  Min.: None
- **Office Low Intensity**
  Max.: 21 DU/Acre and/or 0.4 FAR
  Min.: None
- **Office Medium Intensity**
  Max.: 40 DU/Acre and/or 0.7 FAR
  Min.: 12 DU/Acre and/or 0.3 FAR
- **Office High Intensity**
  Max.: 200 DU/Acre and/or 1.0 FAR
  Min.: 30 DU/Acre and/or 0.4 FAR
- **Mixed Use Corridor Medium Intensity**
  Max.: 30 DU/Acre and/or 0.5 FAR
  Min.: 15 DU/Acre
- **Mixed Use Corridor High Intensity**
  Max.: 200 DU/Acre and/or 1.0 FAR
  Min.: 30 DU/Acre and/or 0.4 FAR
- **N-AC** — **Neighborhood Activity Center**
  Max.: 30 DU/Acre and/or 0.3 FAR
  Min.: 15 DU/Acre
- **C-AC** — **Community Activity Center**
  Max.: 40 DU/Acre and/or 0.7 FAR
  Min.: 20 DU/Acre and/or 0.35 FAR
- **U-AC** — **Urban Activity Center**
  Max.: 100 DU/Acre and/or 1.0 FAR
  Min.: 30 DU/Acre and/or 0.5 FAR
- **M-AC** — **Metropolitan Activity Center**
  Max.: 200 DU/Acre and/or 3.0 FAR
  Min.: 30 DU/Acre and/or 0.75 FAR
- **D-AC** — **Downtown Activity Center**
  Max.: 200 DU/Acre and/or 4.0 FAR
  Min.: 75 DU/Acre and/or 0.75 FAR
- **Industrial**
  Max.: 40 DU/Acre**(1)** and/or 0.7 FAR
  Min.: 12 DU/Acre**(1)**
- **Airport Support District Med. Intensity**
  See Goal 4 and Associated Objectives and Policies
- **Airport Support District High Intensity**
  See Goal 4 and Associated Objectives and Policies
- **Urban Village**
  Determined by Adopted GMP Subarea Policy, consistent with Future Land Use Policy 2.4.4
- **Public/Recreational & Institutional**
  Max.: None
  Min.: None
- **Lake / Conservation**
  Max.: 1 DU/5 Acres; 0.05 FAR
  Min.: None
- **Conservation**
  Max.: 1 DU/5 Acres; 0.05 FAR
  Min.: None
- **Urban Reserve**
  Max.: 1 DU/10 Acres; 0.05 FAR
  Min.: None
- **Transitional Wildlife Habitat Overlay**
- **Resource Protection Overlay**
- 2.1 — **Growth Management Plan Subarea Policy (See Future Land Use Element)**
- Orlando / Orange County — **Jurisdiction Boundary**

N

0 250 500 1,000
Feet

Notes/Definitions

FAR: Floor Area Ratio **DU:** Dwelling Units

GMP: Growth Management Plan

(1) Industrial Future Land Use Designation: Where allowed by the applicable Subarea Policy and Zoning District, residential uses may be allowed within the Traditional City through a Conditional Use Permit.

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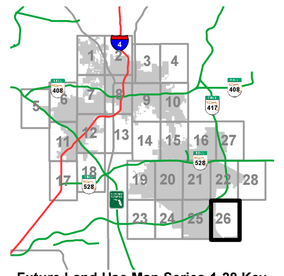

Future Land Use Map Series 1-28 Key

City of Orlando / Orange County GIS (Printed: January 9, 2015)

NOTE: These maps are accurate as of the print date shown at the bottom of the legend. The maps are provided for reference only and should not be relied upon without reviewing the Official Future Land Use Map series kept in the City Planning Division, 6th Floor, Orlando City Hall.

RANGE 27 EAST | RANGE 28 EAST | RANGE 29 EAST | RANGE 30 EAST | RANGE 31 EAST | RANGE 32 EAST | RANGE 33 EAST | RANGE 34 EAST

TOWNSHIP 20 SOUTH | TOWNSHIP 21 SOUTH | TOWNSHIP 22 SOUTH | TOWNSHIP 23 SOUTH | TOWNSHIP 24 SOUTH

2010 - 2030
Comprehensive Plan
Future Land Use Map

ORANGE COUNTY GOVERNMENT
FLORIDA

Rural *	Neighborhood Activity Corridor	Industrial	Conservation	Horizon West ***
Rural 1/1	Neighborhood Center	Institutional	Rural Settlement	Town Center ***
Rural 1/2	Neighborhood Residential	Education	Urban Service Area	Village I ***
Rural 1/5	Activity Center Residential	Parks/Recreation	Growth Center	Village F ***
Low Density Residential	Activity Center Mixed Use	Preservation	Innovation Way Overlay	Village H ***
Low-Medium Density	Community Village Center	Planned Development **	Wekiva Protection Area	Bridgewater Village ***
Medium Density Residential	Village	Water Body	Wekiva Study Area	Lakeside Village ***
High Density Residential	Office	Municipalities/Jurisdictions ****	Tosohatchee State Park	
Traditional Neighborhood	Commercial	Innovation Way MMTD *****	Econ Protection Area	

*The Rural land use designation denoted as R on the Future Land Use Map is synonymous with the Rural/Agricultural designation referenced in the Future Land Use Element - Policy FLU4.1.1.

**For properties designated Planned Development (PD), specific land uses, densities, and intensities allowed can be determined by contacting the Planning Division. The associated staff report and Geographic Information Systems label field lists the allowable land uses approved by the Board of County Commissioners. All property designated PD on this map is required to be zoned PD prior to development or redevelopment. The Zoning Division should be consulted to determine actual conditions of approval through the PD zoning district and Land Use Plan.

***For properties located in an approved Horizon West Specific Area Plan the adopted SAP should be consulted to determine the specific land uses, densities, and intensities allowed.

****City boundaries are subject to change and do not necessarily reflect annexations which have occurred.

*****MMTD stands for Multi Modal Transportation District

Disclaimer: Data is provided "as is" without warranty of any representation of accuracy, timeliness or completeness. The burden of determining accuracy, completeness, timeliness, merchantibility and fitness for or the appropriateness for use rests solely on the requester. The County makes no warranties, express or implied, as to the use of the Data. There are no implied warranties of merchantibility or fitness for a particular purpose. The requester acknowledges and accepts the limitations of the Data, including the fact that the Data is dynamic and is in a constant state of maintenance, correction and update.

Not to be resold: Data, maps or digital files may not be resold without prior consent of the Orange County Board of County Commissioners.

The map only depicts properties within unincorporated Orange County as of the latest amendment date, but may include properties that since have been annexed by various municipalities.

These maps are for display purposes only. The Official version of the Orange County Future Land Use Map can be viewed at the Orange County Planning Division office at 201 S. Rosalind Ave., 2nd Floor, Orlando, Florida.

Prepared By: Orange County Growth Management Department, GIS Section
Initially Adopted: May 19, 2009, Found Effective by the Department of Economic Opportunity: August 31, 2009
Last Amended: December 6, 2011
Effective: January 21, 2012
Source: Orange County Growth Management Department, Planning Division, Comprehensive Planning Section

0 1 2 4 6
Miles

Prepared on: 4/4/2012

RANGE 27 EAST | RANGE 28 EAST | RANGE 29 EAST | RANGE 30 EAST | RANGE 31 EAST | RANGE 32 EAST | RANGE 33 EAST | RANGE 34 EAST

FLU 1A: Future Land Use Map - 2025

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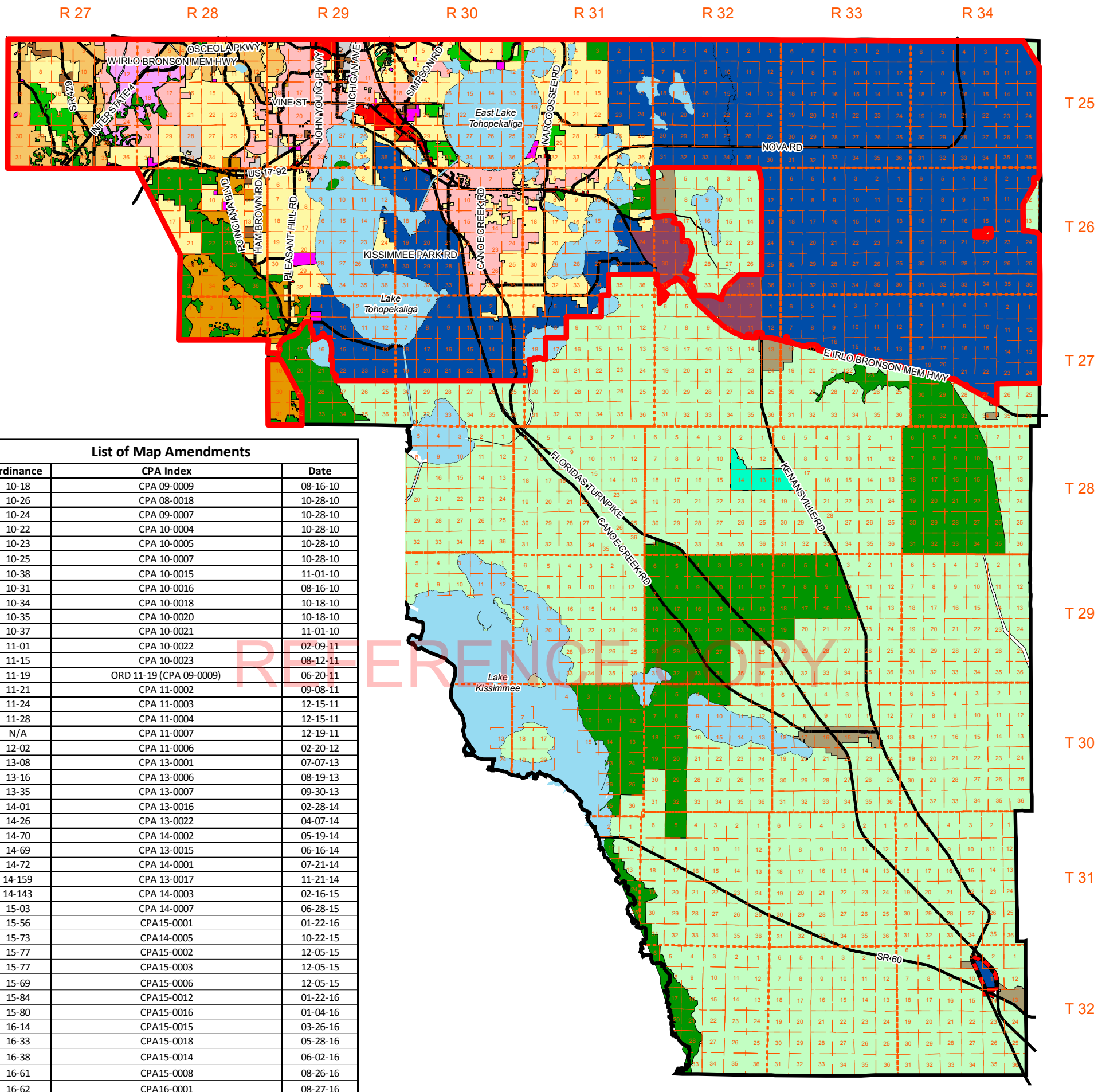

List of Map Amendments

Ordinance	CPA Index	Date
10-18	CPA 09-0009	08-16-10
10-26	CPA 08-0018	10-28-10
10-24	CPA 09-0007	10-28-10
10-22	CPA 10-0004	10-28-10
10-23	CPA 10-0005	10-28-10
10-25	CPA 10-0007	10-28-10
10-38	CPA 10-0015	11-01-10
10-31	CPA 10-0016	08-16-10
10-34	CPA 10-0018	10-18-10
10-35	CPA 10-0020	10-18-10
10-37	CPA 10-0021	11-01-10
11-01	CPA 10-0022	02-09-11
11-15	CPA 10-0023	08-12-11
11-19	ORD 11-19 (CPA 09-0009)	06-20-11
11-21	CPA 11-0002	09-08-11
11-24	CPA 11-0003	12-15-11
11-28	CPA 11-0004	12-15-11
N/A	CPA 11-0007	12-19-11
12-02	CPA 11-0006	02-20-12
13-08	CPA 13-0001	07-07-13
13-16	CPA 13-0006	08-19-13
13-35	CPA 13-0007	09-30-13
14-01	CPA 13-0016	02-28-14
14-26	CPA 13-0022	04-07-14
14-70	CPA 14-0002	05-19-14
14-69	CPA 13-0015	06-16-14
14-72	CPA 14-0001	07-21-14
14-159	CPA 13-0017	11-21-14
14-143	CPA 14-0003	02-16-15
15-03	CPA 14-0007	06-28-15
15-56	CPA15-0001	01-22-16
15-73	CPA14-0005	10-22-15
15-77	CPA15-0002	12-05-15
15-77	CPA15-0003	12-05-15
15-69	CPA15-0006	12-05-15
15-84	CPA15-0012	01-22-16
15-80	CPA15-0016	01-04-16
16-14	CPA15-0015	03-26-16
16-33	CPA15-0018	05-28-16
16-38	CPA15-0014	06-02-16
16-61	CPA15-0008	08-26-16
16-62	CPA16-0001	08-27-16
16-04	CPA16-0004	11-24-16
16-83	CPA16-0006	11-16-16
16-101	CPA16-0008	01-13-17
16-95	CPA15-0013	05-26-17
17-19	CPA17-0001	05-27-17

N
W E
S

MAP PRODUCED BY OSCEOLA COUNTY
COMMUNITY DEVELOPMENT
GIS SECTION
05JUNE2017

0 5 10 Miles

Legend

- Urban Growth Boundary
- Yeehaw Transportation Distribution Center
- Celebration
- Commercial
- Conservation
- Dual Use/HDR and Commercial
- Dual Use/Institutional and Commercial
- Harmony
- High Density Residential
- Industrial
- Institutional
- Intensive Commercial
- Low Density Residential
- Medium Density Residential
- Mixed Use
- Natural Resource Utility
- Office
- Poinciana
- Rural / Agricultural
- Rural Enclave
- Rural Settlement
- Tourist Commercial
- Other Jurisdictions

* This map includes all city annexations to date.

Attachment C-13
NED Adopted Plan

NED 5: Staging

ORANGE COUNTY

ORANGE COUNTY

1

2

3

LAKE MYRTLE

LAKE PRESTON

LAKE JOEL

CENTER LAKE

NOVA RD

IRLO BRONSON MEM HWY

OLD MELBOURNE HWY

List of Map Amendments

Ordinance	CPA Index	Date
10-19	CPA 09-0008	08-16-10

Place Types

- Urban Center
- Community Center
- Employment Center
- Neighborhood Center
- Neighborhood Type 1
- Neighborhood Type 2
- Open Space District
- Special District

Miscellaneous

- NED Boundary
- Urban Growth Boundary
- Other Jurisdictions

Staging

- Staging Areas
- 1 Staging Phases

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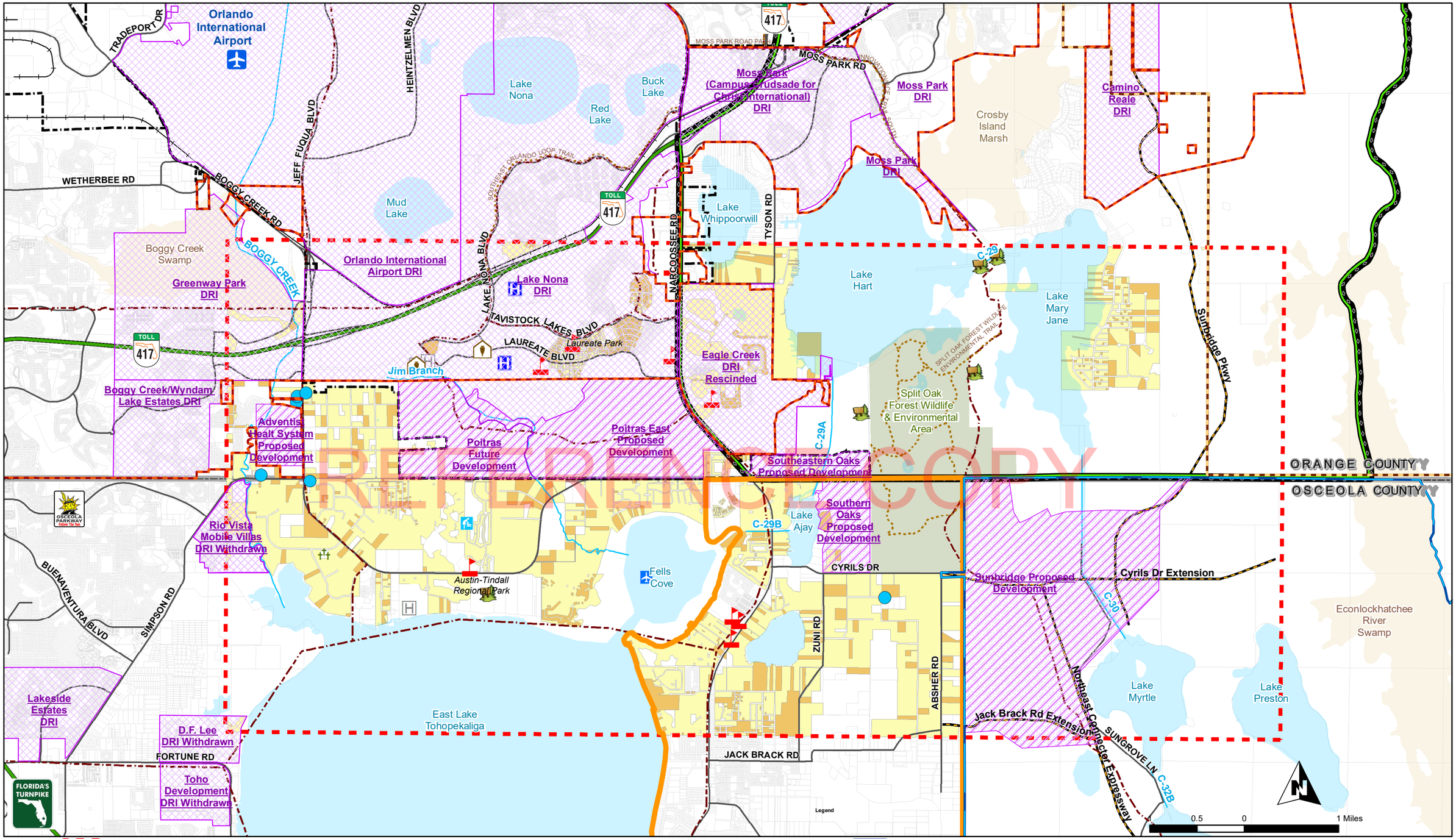
Attachment C-14
DRIs and PDs



Legend

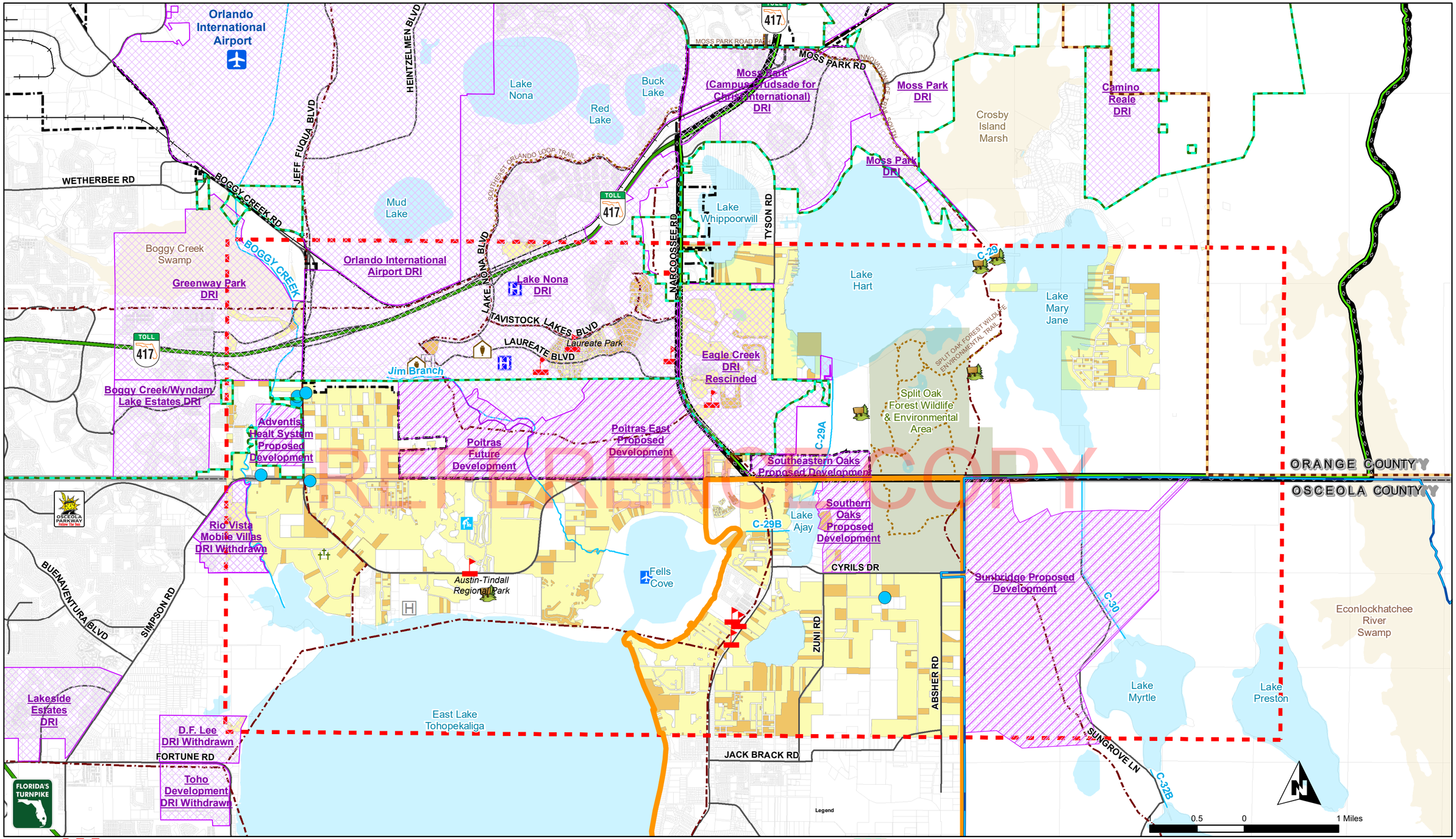
- Study Area
- County Boundary
- RailRoad
- Existing Trails
- Orlando City Limits
- Airports
- Cemeteries
- Daycare Facilities
- Health Care Facilities
- Hospitals
- University
- Parks
- Religious Facility
- Schools
- Residential
- Vacant Residential
- Planned Developments
- Development of Regional Impacts
- Innovation Way Overlay Area
- Narcoossee Planning Initiative
- NE District Conceptual Master Planning Area
- Urban Service Area
- Econ River Protection Area
- Planned Florida Greenways & Trails
- Planned Roads

Social Characteristics-Development of Regional Impacts and Planned Developments

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180220
Social_DRIs_PD
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, CH2M, ESRI, Orange and Osceola County, Central Florida Geographic Information DRI Interactive Mapping, FDEP, National Hydrography Data (NHD))</ITA>

Attachment C-15
Social Characteristics of DRIs and PDs



Legend

- Study Area
- County Boundary
- RailRoad
- Existing Trails
- Orlando City Limits
- Airports
- Cemeteries
- Daycare Facilities
- Health Care Facilities
- Hospitals
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- Residential
- Vacant Residential
- Planned Developments
- Development of Regional Impacts
- Innovation Way Overlay Area
- Narcoossee Planning Initiative
- Urban Service Area
- NE District Conceptual Master Planning Area
- Econ River Protection Area
- Planned Florida Greenways & Trails
- Planned Roads

Social Characteristics-Development of Regional Impacts and Planned Developments

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180307
Social_DRIs_PD
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, CH2M, ESRI, Orange and Osceola County, Central Florida Geographic Information DRI Interactive Mapping, FDEP, National Hydrography Data (NHD))</ITA>

Attachment C-16
Existing Neighborhoods and Communities

EXISTING
NEIGHBORHOODS AND
COMMUNITIES

Map Reference Number	Name	Approximate Location	Homeowners Association (HOA) information	Municipality
1	Lake Preserve	14154 Ward Rd, Orlando, FL 32824	4700 Millennia Blvd., STE 515 Orlando, FL 32839	Orange
2	Stonecreek	N/A	N/A	Orange
3	Lock Haven	N/A	N/A	Orange
4	Water Mark Apartment Homes (Lake Nona)	7650 Lower Gateway Loop, Orlando, FL 32827	N/A	City of Orlando
5	Village Walk (Lake Nona)	James Bay Dr, Orlando, FL 32827	8524 Insular Ln, Orlando, FL 32827	City of Orlando
6	Enclave at Village Walk (Lake Nona)	11847 Fiore Dr., Orlando, FL 32827	11754 Savona Way, Orlando, FL 32827	City of Orlando
7	Laureate Park	8472 Tavistock Lakes Blvd, Orlando, FL 32827	13245 Lower Harden Ave, Orlando, FL 32827	City of Orlando
8	Stratford Pointe	10001 Stratford Pointe Ave Orlando, FL 32832	HOA-address N/A	Orange
9	Lake Whippoorwill	N/A	12029 Betty Ann Dr., Orlando, FL 32832	Orange
10	North Shore	3702 Boggy Creek Rd, Kissimmee, FL 34744	9963 Indigo Bay Circle, Orlando, FL 32832	Orange
11	Eagle Creek	9758 Eagle Creek Center Blvd. Orlando, FL 32832	10180 Eagle Creek Center Blvd. Orlando, FL 32832	Orange
12	Eagle Creek Preserve	N/A	N/A	Orange
13	Eagle Creek Village	Eagle Creek Ct Kissimmee, FL 34746	N/A	Orange
14	Fells Landing	19400 Pummelo Dr, Orlando, FL 32827	N/A	Orange
15	Quail Ridge	Andover Dr., Kissimmee, FL 34743, Boggy Creek Rd and E. Osceola Pkwy.	Melbourne, FL 32935	Osceola
16	Heritage Lakes	3275 Abika Dr., Kissimmee, FL 34743 Boggy Creek Rd and E. Osceola Pkwy.	HOA-address N/A	Osceola
17	Amberley Park	Amberley Park Cir, Kissimmee, FL 34743	HOA-address N/A	Osceola
18	Saratoga Park	Turret Dr., Kissimmee, FL 34743 Boggy Creek	HOA-address N/A	Osceola

EXISTING
NEIGHBORHOODS AND
COMMUNITIES

Map Reference Number	Name	Approximate Location	Homeowners Association (HOA) information	Municipality
		Rd and E. Osceola Pkwy		
19	Campbell Cove	Randal Way, Kissimmee, FL 34743 Boggy Creek Rd and E. Osceola Pkwy.	HOA-address N/A	Osceola
20	Walmart Neighborhood Market	2850 E Osceola Pkwy, Kissimmee, FL 34743	N/A	Osceola
21	Villa Del Sol Townhomes	Simpson Rd, Kissimmee FL 34744 Boggy Creek and E. Osceola Prky.	HOA-address N/A	Osceola
22	Koger Oaks	N/A	HOA-address N/A	Osceola
23	Sera Bella	Sera Bella Way, Kissimmee FL 34744 Simpson Rd and E. Osceola Pkwy.	HOA-address N/A	Osceola
24	Country Downs	Belmont Place, Kissimmee, FL 34744 Simpson Rd and E. Osceola Pkwy.	HOA-address N/A	Osceola
25	Hillard Place	N/A	HOA-address N/A	Osceola
26	Villa Sol Village	N/A	HOA-address N/A	Osceola
27	Great Oaks	Great Oaks Blvd Kissimmee, FL 34744	HOA-address N/A	Osceola
28	Pine Oaks	N/A	HOA-address N/A	Osceola
29	Morningside/Morningside Villages	N/A	Early Morn Ct, Kissimmee, FL 34744	Osceola
30	Logan's Run	Boggy Creek Rd Kissimmee, FL 34744	HOA-address N/A	Osceola
31	Orlando-Kissimmee Farms	N/A	HOA-address N/A	Osceola
32	Morningside	Morningside Dr. Kissimmee, FL 34744	HOA-address N/A	Osceola
33	Silver Lake	3715 Silver Lake Dr. Kissimmee, FL 34744 Boggy Creek Rd	HOA-address N/A	Osceola
34	Spring Lake Village	Laurel View Dr. Kissimmee, FL 34744 Boggy Creek Rd.	HOA-address N/A	Osceola
35	Northeast	N/A	HOA-address N/A	Osceola

EXISTING
NEIGHBORHOODS AND
COMMUNITIES

Map Reference Number	Name	Approximate Location	Homeowners Association (HOA) information	Municipality
36	Veredas Lake Estates	3702 Boggy Creek Rd, Kissimmee, FL 34744 Boggy Creek Rd	HOA-address N/A	Osceola
37	Northshore	N/A	6436 Shoreline Dr., St. Cloud	Osceola
38	Spring Lake Village	Laurel View Dr. Kissimmee, FL 34744 Boggy Creek Rd.	HOA-address N/A	Osceola
39	Turnberry Reserve	4051 Fox Bend Ln, Kissimmee, FL 34744	Turnberry Blvd, Kissimmee, FL 34744 Boggy Creek Rd.	Osceola
40	High Plains	High Plains Ln Kissimmee, FL 34744 Boggy Creek Rd.	HOA-address N/A	Osceola
41	Semoran Farms	Semoran Farms Rd, Kissimmee, FL 34744	HOA-address N/A	Osceola
42	South Semoran Farms	Semoran Farms Rd Kissimmee, FL 34744	HOA-address N/A	Osceola
43	North Point	2799 Autumn Breeze Way, Kissimmee, FL 34744	HOA-address N/A	Osceola
44	Streeters	Boggy Creek Rd Kissimmee, FL 34744	HOA-address N/A	Osceola
45	Rustic Acres #2	Kissimmee, FL 34744 West of Fells Cove	HOA-address N/A	Osceola
46	Martha's Vineyard	1800 Epcot Resorts Blvd, Orlando, FL 32830	N/A	Osceola
47	Rustic Acres #1	Kissimmee, FL 34744 West of Fells Cove	HOA-address N/A	Osceola
48	Fells Cove #1	N. Kaliga Dr., St. Cloud, FL 34771 southeast of Fells Cove	HOA-address N/A	Osceola
49	Fells Cove #2	N/A	HOA-address N/A	Osceola
50	Majestic Oaks	Majestic Oak Cir. St Cloud, FL 34744	HOA-address N/A	Osceola
51	Hammock Point	Crane Hill Cr., St. Cloud, FL 34771	HOA-address N/A	Osceola
52	Lakeshore at Narcoossee	Constance Blvd., St. Cloud, FL 34771 East of Fells Cove	4901 Vineland Rd. Orlando, FL 32811	Osceola
53	Ellis Cove Estates	N/A	HOA-address N/A	Osceola

EXISTING
NEIGHBORHOODS AND
COMMUNITIES

Map Reference Number	Name	Approximate Location	Homeowners Association (HOA) information	Municipality
54	Marina Club Estates	Marina Dr., St. Cloud, FL 34771 southeast of Fells Cove	HOA-address N/A	Osceola
55	Lake Hinden Cove	Lake Hinden Cv., St. Cloud, FL 34771 southeast of Fells Cove	HOA-address N/A	Osceola
56	Sunny Lake Estates	Mobile homes- N/A	HOA-address N/A	Osceola
57	Lake Pointe	Whitewater Way, Watervalley Dr., Parkview Dr., St Cloud, FL 34771	5354 Rambling Rd. St. Cloud, FL 34771	Osceola
58	Blackstone	Hunter Moss Ct., St Cloud, FL 34771 East of E. Lake Tohopekaliga	HOA-address N/A	Osceola
59	Serenity Reserve	Symphony Cir., St. Cloud, FL 34771	HOA-address N/A	Osceola
60	East Lake Vista	Dan Smith Rd., St. Cloud, FL 34771	HOA-address N/A	Osceola
61	East Lake Cove	2100 N Narcoossee Rd, St Cloud, FL 34769	4911 Lazy Oaks Way, St. Cloud, FL 34771	Osceola
62	East Lake Park	Eastlake Vista Dr., St. Cloud FL 34771	Meetings held at 5354 Rambling Rd., St. Cloud, FL 34771	Osceola
63	Narcoossee Center	2475 N Narcoossee Rd., St. Cloud, FL 34771 southeast of Fell's cove	HOA-address N/A	Osceola
64	Rivera Estates	2450 N Narcoossee Rd, St. Cloud, FL 34771 East of E. Lake Tohopekaliga	HOA-address N/A	Osceola
65	Timaqua Woods	St. Cloud, FL 34744 East of E. Lake Tohopekaliga	HOA-address N/A	Osceola
66	Avellino	Avellino Ave, St. Cloud, FL 34771 East of E. Lake Tohopekaliga	HOA-address N/A	Osceola
67	Narcoossee Half Acres #2	N/A	HOA-address N/A	Osceola
68	Narcoossee Half Acres	N/A	HOA-address N/A	Osceola
69	Underwood Estates	2220 Underwood Ave. St. Cloud, FL 34771	HOA-address N/A	Osceola

EXISTING
NEIGHBORHOODS AND
COMMUNITIES

Map Reference Number	Name	Approximate Location	Homeowners Association (HOA) information	Municipality
70	Nona Grove	St. Cloud, FL 34771 East of E. Lake Tohopekaliga	HOA-address N/A	Osceola
71	Sunset Grove	1420 Benevento Street, St. Cloud, FL 34771	HOA-address N/A	Osceola
72	Hanover Reserve	2220 Underwood Ave. St. Cloud, FL 34771	2420 South Lakemont Avenue, Suite 450 Orlando, FL 32814	Osceola
73	Lake Ajay	3155 N Narcoossee Rd, St Cloud, FL 34769	3168 Whisper Wind Dr., St. Cloud, FL	Osceola
74	Tranquil Oaks	N/A	N/A	Osceola
75	Idle Hour Estates	St Cloud, FL 34771	N/A	Osceola
76	Mill Stream Estates	Mill Stream Dr. St Cloud, FL 34771	N/A	Osceola
77	Lakewood	N/A	N/A-pastureland	Osceola
78	Springhead	Springhead Ct St Cloud, FL 34771	N/A	Osceola
79	Country Meadow West	N/A	N/A Mobile Homes	Osceola
80	Country Meadow	N/A	N/A	Osceola
81	Eagles nest	Eagles Nest Orlando, FL 32811	N/A	Osceola
82	Country Meadow North	N/A	Country Meadows Blvd., Sarasota, FL	Osceola

Attachment C-17
Cultural/Historical Report

DESKTOP ANALYSIS OF THE OSCEOLA PARKWAY EXTENSION PD&E STUDY AREA ORANGE AND OSCEOLA COUNTIES, FLORIDA

CONSULTANT:	SEARCH
	1515 W. Smith Street, Orlando, Florida 32804
PRINCIPAL INVESTIGATOR:	Angela Matusik, MA
CLIENT:	CH2M
DATE:	July 2017
SEARCH PROJECT NUMBER:	3932-17076T

In July 2017, SEARCH completed a desktop analysis of the proposed Osceola Parkway Extension Study Area in Orange and Osceola Counties, Florida. The present desktop analysis was conducted with the purpose of identifying cultural resource potential and previously recorded historic properties in the vicinity of the proposed project that are listed, or may be eligible for listing, in the National Register of Historic Places (NRHP).

The project Study Area was defined by CH2M as an approximately 37,300-acre swath of land (**Figure 1**). The Florida Master Site File (FMSF) database was reviewed for any previous surveys or previously recorded resources within the Study Area. In addition, the Property Appraiser databases for Orange and Osceola Counties, historic maps, and aerial photographs were reviewed to determine if potential historic resources constructed prior to 1973 are located within the Study Area.

OSCEOLA PARKWAY EXTENSION STUDY AREA—PREVIOUS SURVEY

Examination of the FMSF database (updated April 2017) indicates that 39 previous cultural resource surveys intersect the project Study Area (**Appendix A**). **Figure 2** shows the overall coverage of these surveys within the study area. However, the existence of a previous survey in the area may not negate the need for an updated survey for the current project. Factors such as the date of the previous study and the scope/intensity of the actual work performed in a previous survey would need to be considered.

A previous cultural resource assessment survey (CRAS) from 2016 of the Osceola Parkway Extension was completed by Janus Research. The State Historic Preservation Officer (SHPO) concurred with the report but noted that archaeological testing would be necessary within the Split Oak Forest Wildlife and Environmental Area (**Figure 3**) should the preferred alignment intersect this preserve. Only an archaeological pedestrian survey was undertaken within the Split Oak Forest as part of the 2016 CRAS. A special use permit would be required in order to conduct archaeological testing within the Split Oak Forest boundaries.

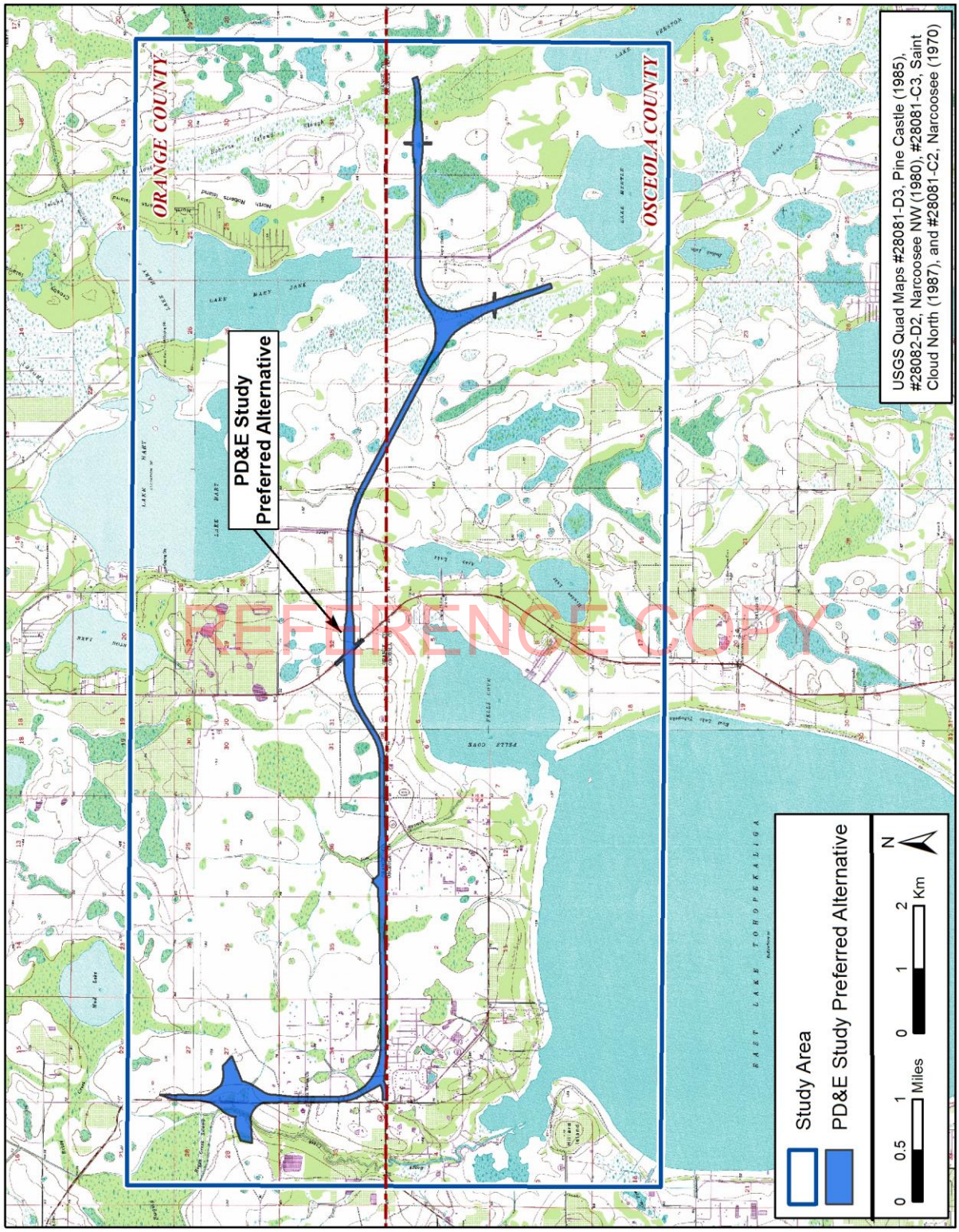

Figure 1. Osceola Parkway Extension Study Area in Orange and Osceola Counties, Florida.

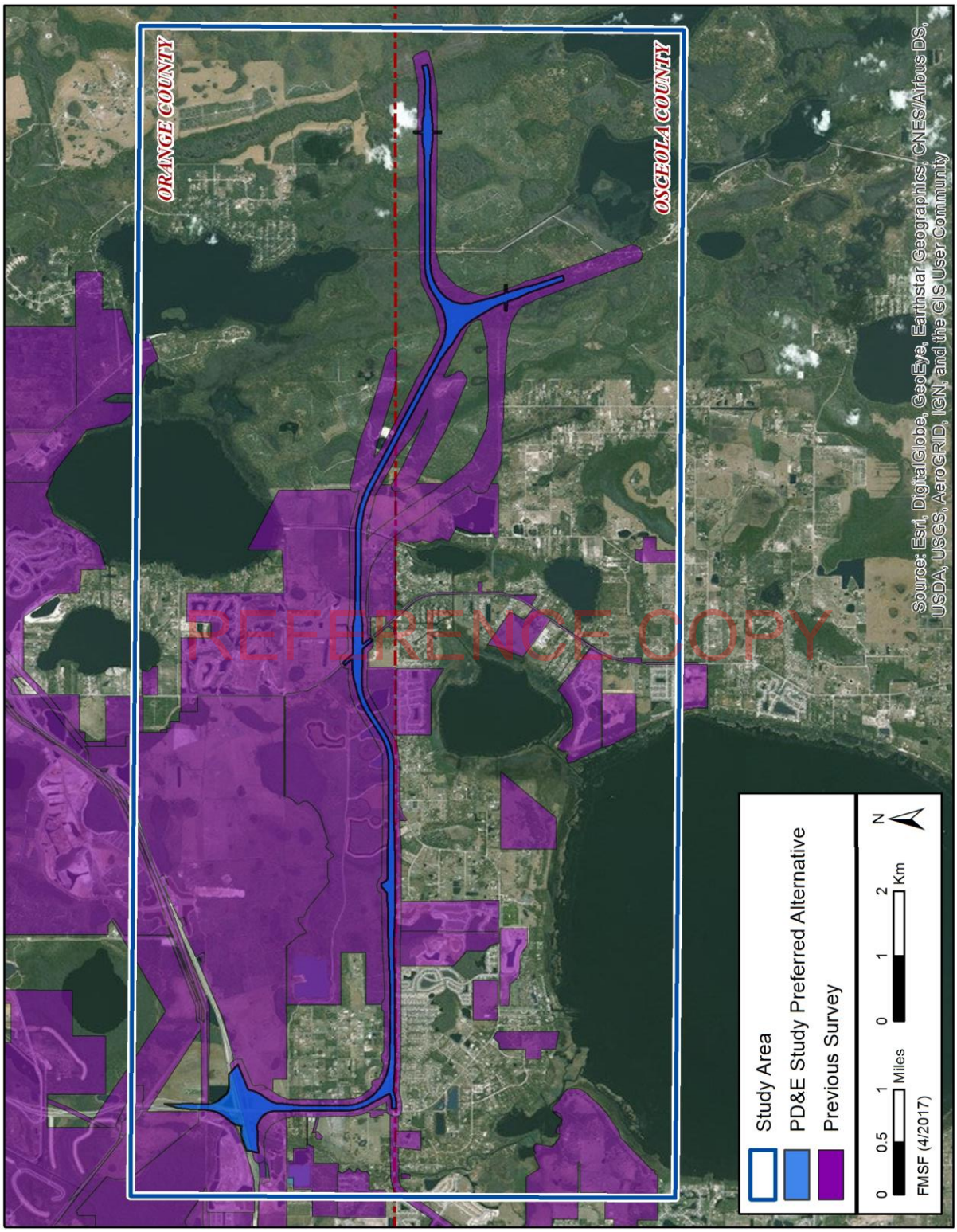

Figure 2. Previous cultural resource surveys intersecting the Osceola Parkway Extension study area.

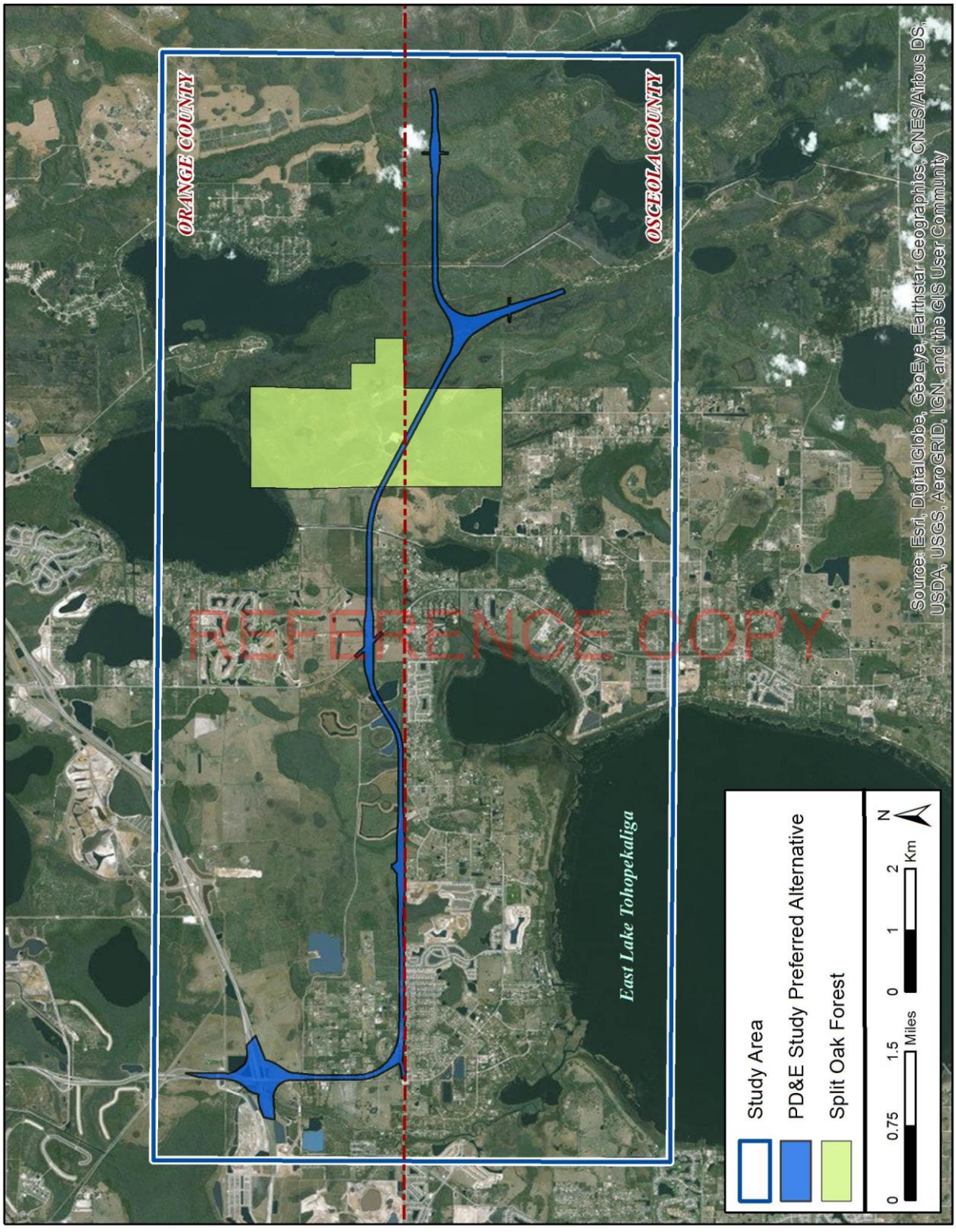

Figure 3. Location of the Split Oak Forest Wildlife and Environmental Area within the Osceola Parkway Extension study area.

OSCEOLA PARKWAY EXTENSION STUDY AREA—RECORDED RESOURCES

FMSF data (April 2017) indicates that a total of 28 historic structures, five historic linear resources, and 29 archaeological sites are within the Osceola Parkway Extension study area (**Table 1; Figure 4** and **Figure 5**). Of these, eight historic structures, three historic linear resources, and 10 archaeological sites have not been evaluated by the SHPO regarding eligibility for listing on the NRHP; these resources would need to be evaluated if located with the Area of Potential Effect (APE) of the recommended roadway alignment or ponds.

Table 1. Previously Recorded Cultural Resources within the Osceola Parkway Extension Study Area.

Historic Structures				
FMSF No.	**Name and/or Address**	**Year Built**	**Surveyor Evaluation**	**SHPO Evaluation**
8OR02174	Hi-B Ranch Barn 1	c1940	Ineligible for NRHP	Not Evaluated by SHPO
8OR02175	Hi-B Ranch Tenant House 1	c1940	Ineligible for NRHP	Not Evaluated by SHPO
8OR02176	Hi-B Ranch Tenant House 2	c1940	Ineligible for NRHP	Not Evaluated by SHPO
8OR02177	Hi-B Ranch Tenant House 3	c1930	Ineligible for NRHP	Not Evaluated by SHPO
8OR02181	Hi-B Ranch	c1940	Ineligible for NRHP	Not Evaluated by SHPO
8OR05976	14939 Ward Road	1915	Ineligible for NRHP	Ineligible for NRHP
8OR07461	5425 Boggy Creek Road	1925	Ineligible for NRHP	Ineligible for NRHP
8OR07462	5623 Boggy Creek Road	1900	Ineligible for NRHP	Ineligible for NRHP
8OR07567	11919 Clapp-Sims-Duda Road	c1935	Ineligible for NRHP	Not Evaluated by SHPO
8OR08215	House Near Narcoossee Road	c1935	Ineligible for NRHP	Ineligible for NRHP
8OR09990	14857 Boggy Creek Road	c1961	Ineligible for NRHP	Ineligible for NRHP
8OR09991	14831 Boggy Creek Road	c1956	Ineligible for NRHP	Ineligible for NRHP
8OR09992	14727 Boggy Creek Road	1927	Ineligible for NRHP	Ineligible for NRHP
8OR09993	Old Lock Haven Baptist Church	1951	Ineligible for NRHP	Ineligible for NRHP
8OR09994	14155 Boggy Creek Road	1957	Ineligible for NRHP	Ineligible for NRHP
8OR09995	14133 Boggy Creek Road	1957	Ineligible for NRHP	Ineligible for NRHP
8OR09996	14140 Boggy Creek Road	1944	Ineligible for NRHP	Ineligible for NRHP
8OR10291	6038 Kingdom Road	c1961	Ineligible for NRHP	Ineligible for NRHP
8OR10842	12769 Narcoossee Road	c1950	Ineligible for NRHP	Ineligible for NRHP
8OS01933	Frame Vernacular Building	c1953	Ineligible for NRHP	Ineligible for NRHP
8OS02277	3170 Boggy Creek Road	1940-	Ineligible for NRHP	Ineligible for NRHP
8OS02493	Hilliard Isle Structure	1900-	Insufficient Information	Not Evaluated by SHPO
8OS02582	2951 Narcoossee Road	c1958	Ineligible for NRHP	Ineligible for NRHP
8OS02666	Candler Property	1955	Ineligible for NRHP	Not Evaluated by SHPO
8OS02667	Reich Property	1930	Ineligible for NRHP	Ineligible for NRHP
8OS02768	2023 Zuni Road	c1925	Ineligible for NRHP	Ineligible for NRHP
8OS02823	4492 Boggy Creek Road	c1961	Ineligible for NRHP	Ineligible for NRHP
8OS02828	Treadwell Building	c1951	Ineligible for NRHP	Ineligible for NRHP
Linear Resource Groups				
FMSF No.	**Name**	**Time Period**		**SHPO Evaluation**
8OR10228	CR-29A Canal	Twentieth century American, 1900-present		Ineligible for NRHP
8OR10316	Bear Bay Canal	Twentieth century American, 1900-present		Not Evaluated by SHPO
8OS01938	Hilliard Isle Tram Road	American unspecified		Not Evaluated by SHPO
8OS02494	Ox Pond Drainage Canal	Nineteenth century American, 1821-1899; Twentieth century American, 1900-present		Not Evaluated by SHPO
8OS02824	C-30 Canal	Twentieth century American, 1900-present; World War I & Aftermath, 1917-1920		Ineligible for NRHP

Archaeological Sites				
FMSF No.	**Name**	**Time Period**	**Surveyor Evaluation**	**SHPO Evaluation**
8OS02769	Narcoossee School	Archaic, 8500–1000 BC; Middle Archaic	Ineligible for NRHP	Ineligible for NRHP
8OS02829	Boggy Creek Scatter	20th century American, 1900–present; Late Archaic; St. Johns, 700 BC–AD 1500	Ineligible for NRHP	Ineligible for NRHP
8OS02857	Maitland 1	Prehistoric lacking pottery	Ineligible for NRHP	Ineligible for NRHP
8OS02858	Maitland 2	Prehistoric with pottery	Ineligible for NRHP	Ineligible for NRHP
8OS01833	Sandhill Crane	20th century American, 1900-present; St. Johns, 700 BC–AD 1500	Ineligible for NRHP	Ineligible for NRHP
8OS01834	Prairie	Middle Archaic	Ineligible for NRHP	Ineligible for NRHP
8OS01835	Fox Squirrel	Middle Archaic; St. Johns, 700 BC–AD 1500	Ineligible for NRHP	Ineligible for NRHP
8OR00390	Stanton Railroad 6	St. Johns, 700 BC–AD 1500	Ineligible for NRHP	Not Evaluated by SHPO
8OR02182	NN	Late Archaic; Middle Archaic; St. Johns I, 700 BC–AD 800; St. Johns II, AD 800–1500	Ineligible for NRHP	Not Evaluated by SHPO
8OR02183	NN	Prehistoric lacking pottery	Ineligible for NRHP	Not Evaluated by SHPO
8OR02184	NN	Prehistoric lacking pottery	Ineligible for NRHP	Not Evaluated by SHPO
8OR02185	NN	Prehistoric	Ineligible for NRHP	Ineligible for NRHP
8OR03128	Southern Connector I	Prehistoric lacking pottery	Ineligible for NRHP	Ineligible for NRHP
8OR03130	Southern Connector III	Prehistoric lacking pottery	Ineligible for NRHP	Ineligible for NRHP
8OR08216	Pondsite	St. Johns, 700 B.C.-A.D. 1500	Ineligible for NRHP	Ineligible for NRHP
8OR08337	Planes Trains and Autos	Prehistoric lacking pottery	Ineligible for NRHP	Ineligible for NRHP
8OR10853	Hartog I	Prehistoric lacking pottery	Ineligible for NRHP	Ineligible for NRHP
8OR10854	Hartog II	Prehistoric lacking pottery	Ineligible for NRHP	Ineligible for NRHP
8OS01794	Hilliard Island	20th century American, 1900-present; Prehistoric; Seminole, 1716-present	Eligible for NRHP	Not Evaluated by SHPO
8OS01802	Fells Cove	Prehistoric lacking pottery	Ineligible for NRHP	Ineligible for NRHP
8OS01803	Calling Cranes	Prehistoric lacking pottery	Ineligible for NRHP	Ineligible for NRHP
8OS02271	Northpoint	Prehistoric	Ineligible for NRHP	Ineligible for NRHP
8OS02364	Northshore 1	19th century American, 1821-1899; St. Johns, 700 B.C.-A.D. 1500	Ineligible for NRHP	Ineligible for NRHP
8OS02365	Northshore 2	19th century American, 1821-1899; 20th century American, 1900-present	Ineligible for NRHP	Ineligible for NRHP
8OS02488	Hilliard Isle 2	Prehistoric	Ineligible for NRHP	Not Evaluated by SHPO
8OS02489	Hilliard Isle 3	Other	Ineligible for NRHP	Not Evaluated by SHPO
8OS02490	Hilliard Isle 4	Prehistoric	Ineligible for NRHP	Not Evaluated by SHPO
8OS02491	Hilliard Isle 5	Prehistoric	Ineligible for NRHP	Not Evaluated by SHPO
8OS02492	Rusty Metal Debris	19th century American, 1821-1899; 20th century American, 1900-present	Ineligible for NRHP	Not Evaluated by SHPO

Yellow-shaded resources have not been evaluated by SHPO for listing on the NRHP.

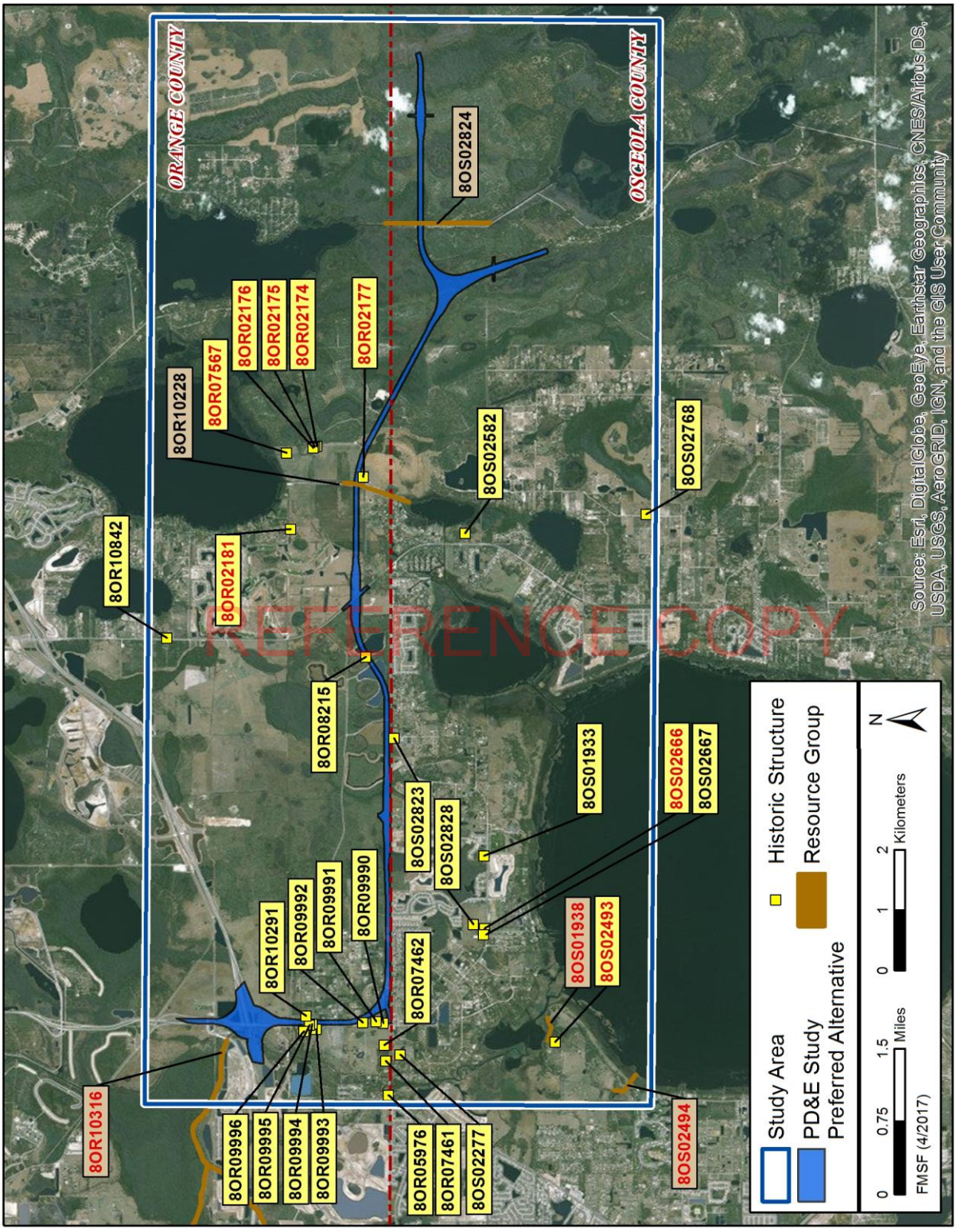

Figure 4. Previously recorded historic resources within the Osceola Parkway Extension study area. Note: Red text labels indicate the resource has not been evaluated by SHPO.

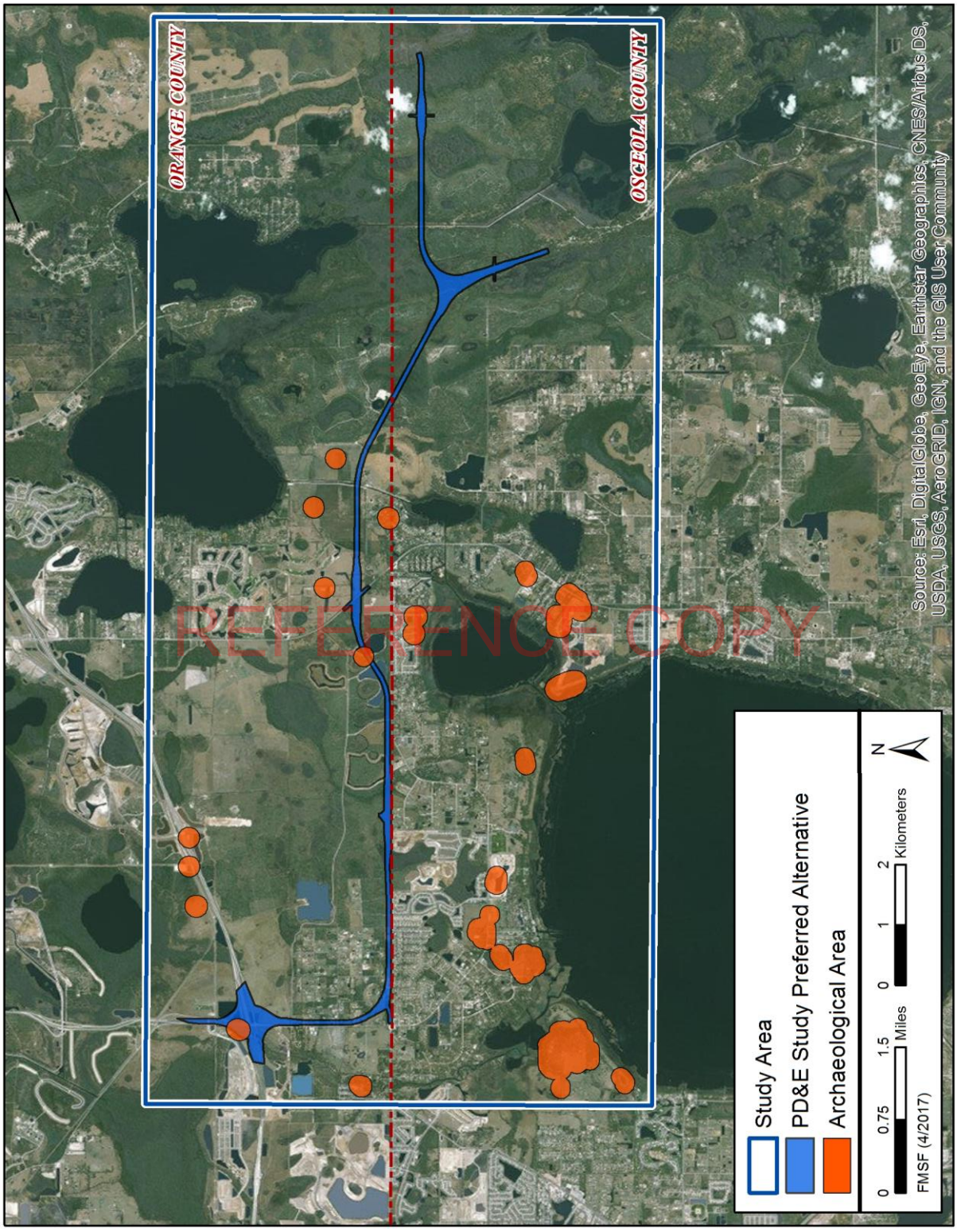

Figure 5. Previously noted archaeological areas within the Osceola Parkway Extension study area.

OSCEOLA PARKWAY EXTENSION STUDY AREA—UNRECORDED RESOURCES

Review of the Orange County Property Appraiser's GIS database indicates there are 66 parcels containing at least one historic (pre-1973) building within the current study area that have not been previously recorded. Within Osceola County, there are 95 parcels of historic age that have not been previously recorded. Descriptions of the property types range from single-family and mobile homes to mixed-use, public school land, warehouses, grazing land, orchard groves/citrus, and acreage not zoned for agricultural. **Figure 6** shows the location of parcels with potential historic structures within the Osceola Parkway Extension study area. SEARCH recommends that any of these structures that fall within the APE for the recommended alignment and ponds be field surveyed, documented with the FMSF, and evaluated with regard to NRHP eligibility.

Review of historic US Geologic Survey (USGS) quadrangle maps depict at least three potential historic resources that have not been previously recorded, including two gauging stations and a cemetery (**Figure 7**). There may be other historic structures that were not captured by the Property Appraiser that may need to be recorded. Additionally, there are paved roads and unimproved roads shown on the historic quadrangle maps. Once the recommended alignment and ponds are selected, should any of these unrecorded historic resources be located within the APE, they would need to be field surveyed, documented with the FMSF, and evaluated with regard to NRHP eligibility.

OSCEOLA PARKWAY EXTENSION STUDY AREA—EVALUATION OF SOIL DRAINAGE

The Osceola Parkway Extension study area consists of a majority of poorly and very poorly drained soils (**Table 2; Figure 8**). The portions of the project area with excessively drained soils are generally considered to have a high probability of encountering intact historic or prehistoric archaeological deposits, while the probability is moderate for well drained to somewhat poorly drained soils, and low for the remainder of the study area. However, several environmental variables in addition to soil drainage, including access to wetlands and marine resources and relative elevation, as well as the results of previously conducted surveys, help determine the potential for prehistoric archaeological sites to be present within the project area. Poorly drained soils are not ideal for prehistoric habitation, while well drained soils in proximity to a navigable water system may represent ideal conditions for prehistoric activities. Once a recommended alignment and ponds are selected, archaeological probability can be determined for areas of proposed ground-disturbing activity.

Table 2. Soil Drainage within the Osceola Parkway Extension Study Area.

Soil Drainage	Acres	Percent
Excessively Drained	360	1%
Moderately Well Drained	3,303	8.9%
Somewhat Poorly Drained	1,160	3.1%
Poorly Drained	16,343	43.9%
Very Poorly Drained	10,059	27.0%
Pits	7	>1%
Water	6,041	16.2%

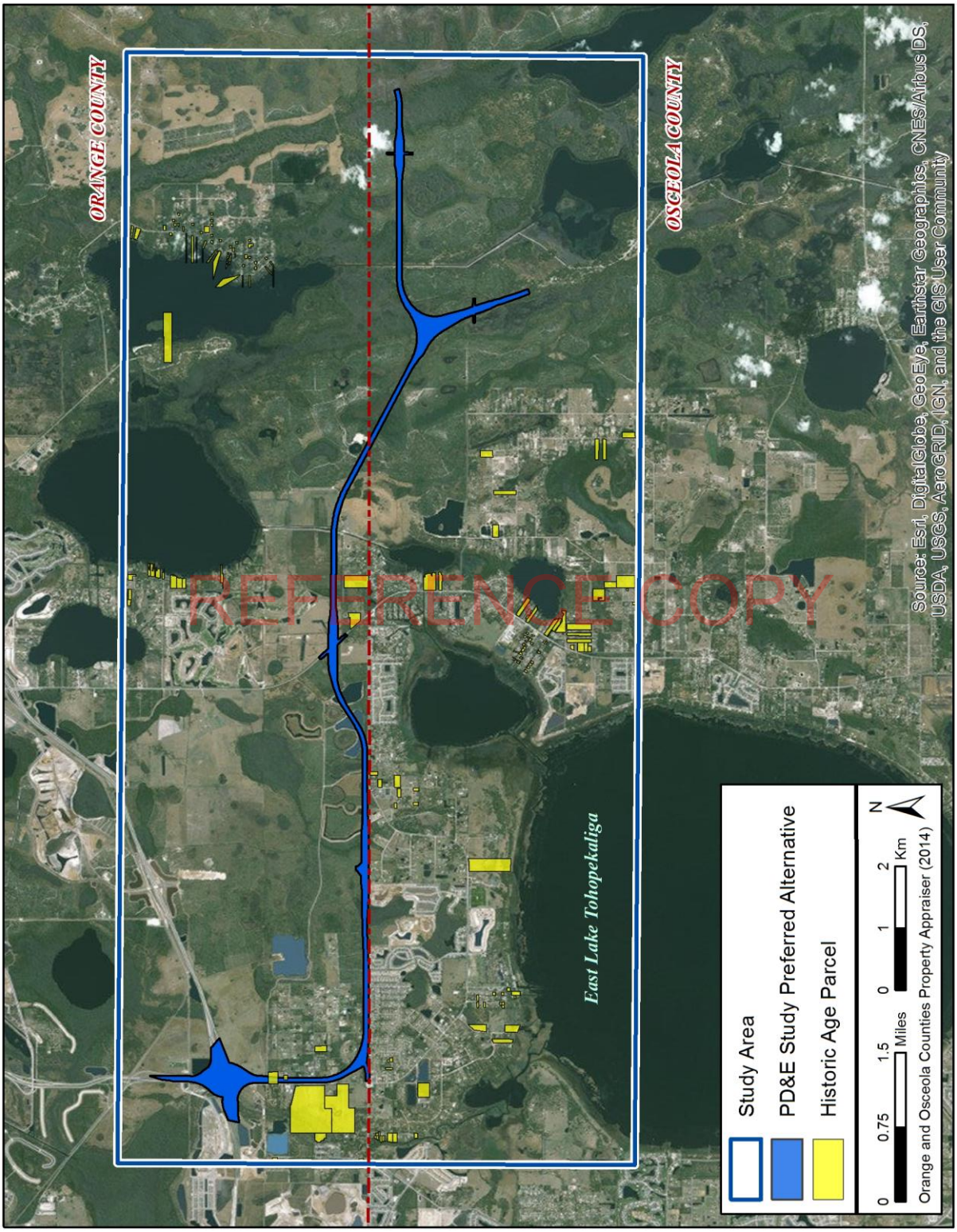

Figure 6. Parcels potentially containing unrecorded historic-age structure(s) within the Osceola Parkway Extension study area.

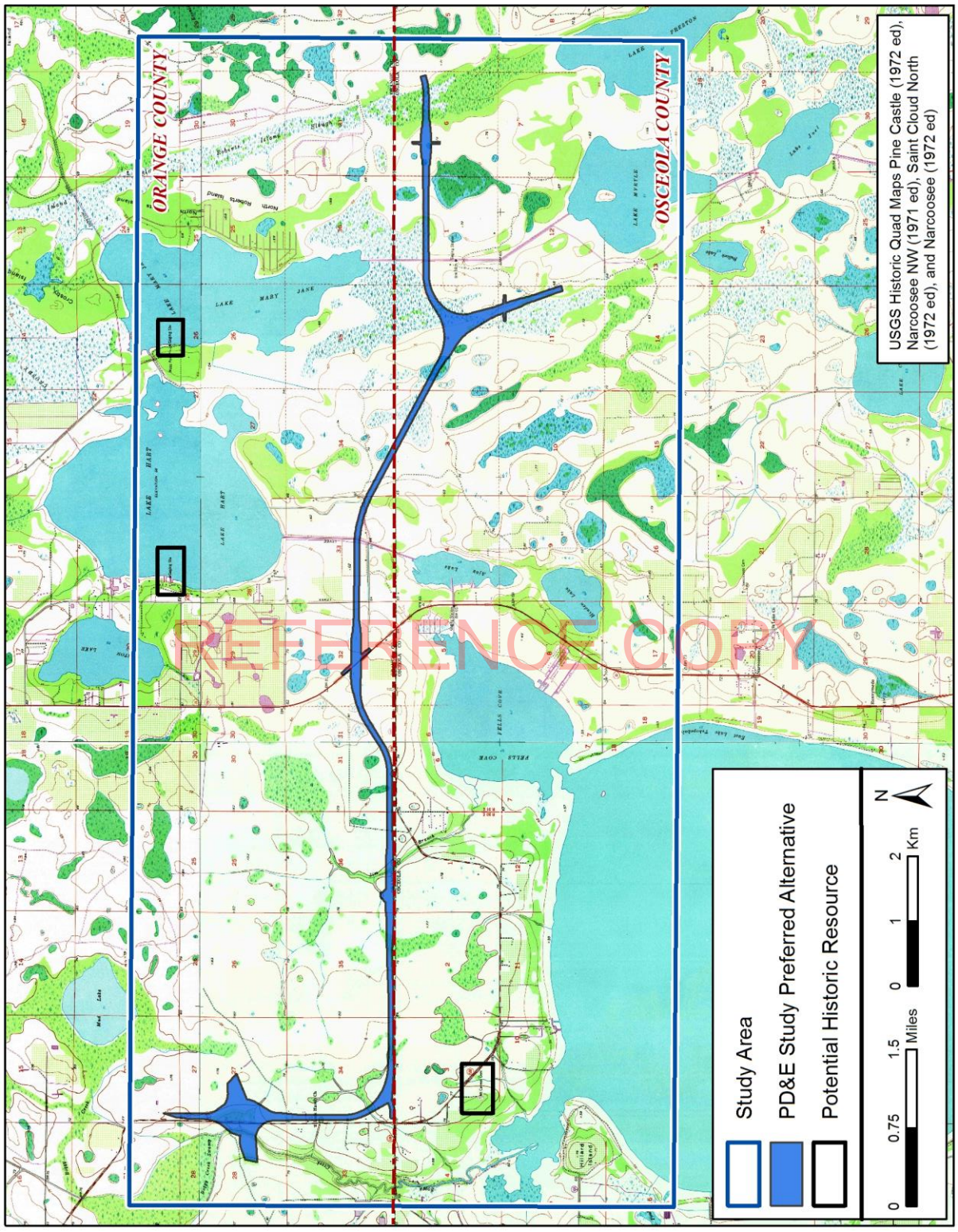

Figure 7. Other potential historic resources that are unrecorded within the Osceola Parkway Extension study area.

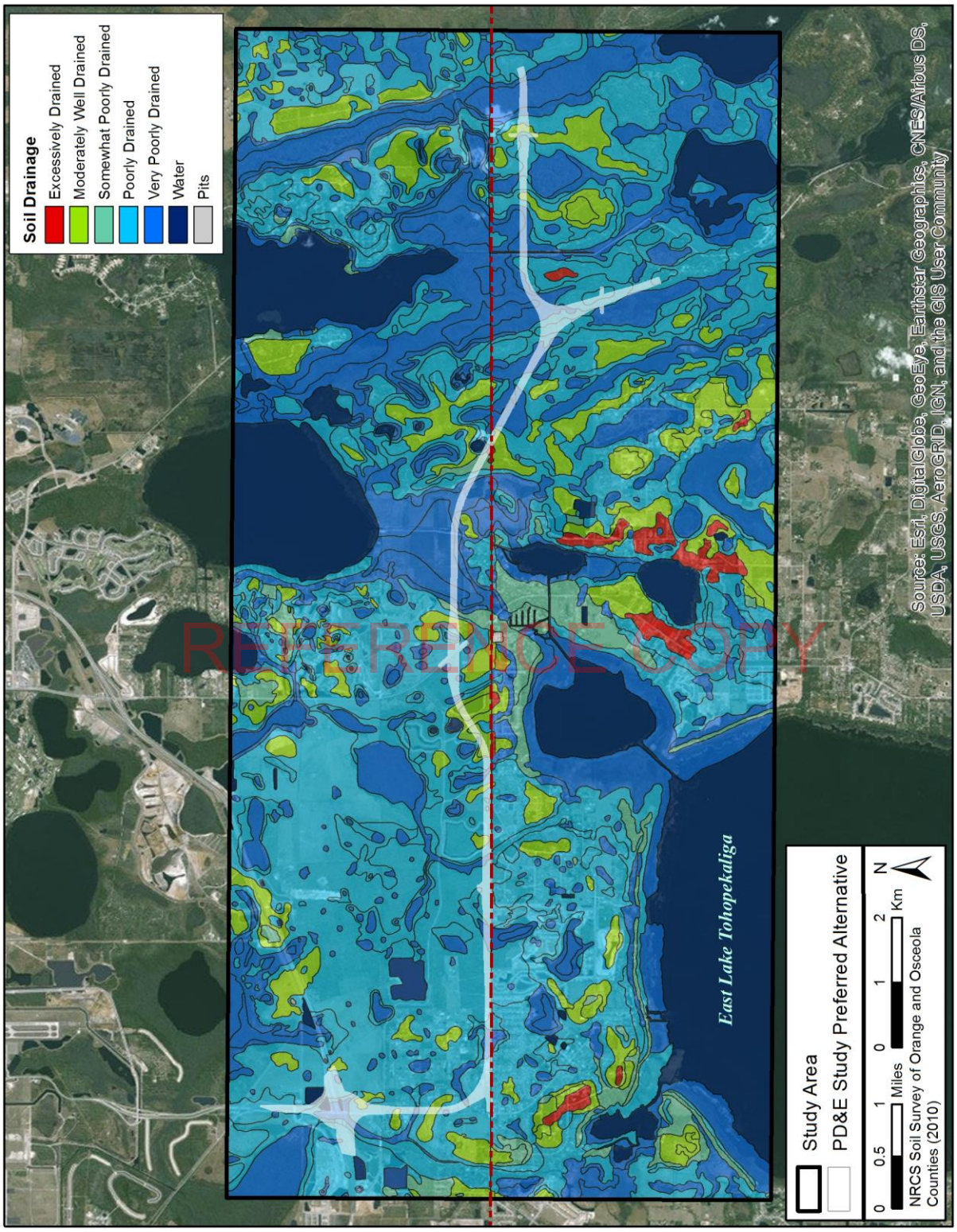

Figure 8. Soil drainage within the Osceola Parkway Extension study area.

RECOMMENDATIONS

Once the recommended roadway alignment has been developed and preferred pond locations have been selected, a cultural resource assessment, including archaeological and architectural history survey, should be conducted. The APE for the roadway and ponds should be subjected to subsurface testing at intervals according to the probability of identifying archaeological material. Unrecorded historic resources should be recorded and assessed. The identified historic structures and archaeological sites, if any, should be assessed for their potential eligibility for listing in the NRHP. The results of this evaluation should then be reviewed by the Florida SHPO for concurrence and possible comment.

REFERENCES CITED

Janus Research

2016 Cultural Resource Assessment Survey Osceola Parkway Extension from West of Boggy Creek Road to the Proposed Northeast Connector Expressway and Boggy Creek Road/SR 417 Access Road Project Development & Environment Study, Orange & Osceola Counties. Florida Master Site File Survey No. 23119. On File, Florida Division of Historical Resources, Tallahassee.

US Department of Agriculture, Natural Resource Conservation Service (USDA, NRCS)

2010 Soils Survey of Orange County. Electronic document, https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm, accessed July 21, 2017.

US Geological Survey (USGS)

1953 Narcoossee quadrangle, 1972 edition. Historical Topographic Map Collection. Electronic document, http://ngmdb.usgs.gov/topoview/viewer/, accessed July 21, 2017.

1953 Narcoossee NW quadrangle, 1971 edition. Historical Topographic Map Collection. Electronic document, http://ngmdb.usgs.gov/topoview/viewer/, accessed July 21, 2017.

1953 Pine Castle quadrangle, 1972 edition. Historical Topographic Map Collection. Electronic document, http://ngmdb.usgs.gov/topoview/viewer/, accessed July 21, 2017.

1953 Saint Cloud North quadrangle, 1972 edition. Historical Topographic Map Collection. Electronic document, http://ngmdb.usgs.gov/topoview/viewer/, accessed July 21, 2017.

1970 Narcoossee quadrangle. Electronic document, http://ngmdb.usgs.gov/topoview/viewer/, accessed July 21, 2017.

1980 Narcoossee NW quadrangle Electronic document, http://ngmdb.usgs.gov/topoview/viewer/, accessed July 21, 2017.

1985 Pine Castle quadrangle. Electronic document, http://ngmdb.usgs.gov/topoview/viewer/, accessed July 21, 2017.

1987 Saint Cloud North quadrangle. Electronic document, http://ngmdb.usgs.gov/topoview/viewer/, accessed July 21, 2017.

APPENDIX A

PREVIOUS CULTURAL RESOURCE SURVEYS WITHIN THE OSCEOLA PARKWAY EXTENSION STUDY AREA

FMSF No.	Title	Year	Reference
363	An Archaeological and Historical Survey of the Proposed Curtis H. Stanton Energy Center Railroad	1981	Daniel, Randy and DeLaFuente, Francisco
2158	An Archaeological, Architectural, and Historical Survey of the Lake Hart Development Property Orange County, Florida	1989	Simpson, Terrance L. and Torp, Lyle C.
2845	Cultural Resource Assessment Survey of the Orlando-Orange County Expressway Authority's Southern Connector, Orange County, Florida.	1991	Janus Research
3416	A Cultural Resource Assessment Survey of the Proposed Magnetic Levitation (MAG-LEV) Transportation Demonstration Project Corridor, Orange County, Florida	1992	Janus Research
5340	Cultural Resource Assessment Survey of the Poitras Property Borrow Pits Site, Orange and Osceola Counties, Florida	1998	Janus Research
5389	Cultural Resource Assessment Survey of the Greater Orlando Aviation Authority's (GOAA) South Terminal Complex Environmental Assessment (EA) in Orange County, Florida	1998	Janus Research
5519	A Cultural Resource Assessment Survey Fells Cove Development, Osceola County, Florida	1999	Deming, Joan, Elizabeth Horbath and Susan White
5840	Cultural Resources Assessment Survey of the Proposed Buccaneer Gas Pipeline, Florida [Volume 1: Final Report of Findings; Volume 2: Appendices]	2000	Estabrook, Richard W.
5866	Cultural Resource Survey and Assessment Narcoossee Project, Osceola County, Florida	2000	Dickinson, Martin F. and Lucy B. Wayne
5899	A Cultural Resource Assessment Survey Campus Crusade for Christ International - Proposed Addition, Orange County, Florida	2000	Almy, Marion and Lee Hutchinson
6440	A Cultural Resource Assessment Survey of the Proposed Lawson Property Development Site Located in Sections 16,20,21,28, & 29, Township 24 South, Range 30 East, Orange County, Florida	2001	Fillman-Richards, Jeanne and Storm L. Richards
6800	Cultural Resource Follow-up Surveys for Lines 500 and 600 (Supplemental Report 5)	2002	Janus Research
8706	A Cultural Resource Assessment Survey of the Proposed Lake Nona Central Development Site Located in Sections 13, 14, 23, 24, Township 24 South, Range 30 East, and Sections 18, 19, Township 24 S, Range 31 East, Orlando, Orange County, Florida	2003	Richards, Storm
9347	A Cultural Resource Survey of the Proposed Turnberry Reserve, Osceola County, Florida	2003	SEARCH
10051	A Phase I Cultural Resource Survey of the East Lake Cove Development Phases III-V, Osceola County, Florida	2004	SEARCH
10139	A Phase 1 Cultural Resource Study of the Northpoint Development Property, Osceola County, Florida	2004	SEARCH
10589	Reconnaissance Survey Raintree, Osceola County, Florida	2004	Wayne, Lucy B.
10846	A Phase 1 Cultural Resource Survey of the Northshore Village Subdivision, Osceola County, Florida	2004	SEARCH
10990	A Cultural Resource Assessment Survey Boggy Creek Road Widening from South of Osceola Parkway to East Boggy Creek Road in Osceola and Orange Counties, Florida	2004	Archaeological Consultants, Inc.
11023	A Cultural Resource Assessment Survey of the Proposed Toho Country Estates Development Site Located in Sections 17 & 18, Township 25 South, Range 31 East, Narcoossee, Osceola County, FL	2005	Richards, Storm L.
12747	A Cultural Resource Reconnaissance Survey of the Narcoossee Groves Tract Orange County, Florida	2006	Nash, Jennifer L. F. and Christopher T. Savage

FMSF No.	Title	Year	Reference
13635	An Archaeological and Historical Survey of Hilliard Isle Project Area in Osceola County, Florida	2004	Ambrosino, Meghan L.
15663	Cultural Resource Assessment Survey Lake Nona Land Company Properties (Lake Nona South Southlake Park Mass Grading; Lake Nona South West Grading, Phase I; and Western Retail Site) Orange County, Florida	2008	Archaeological Consultants, Inc.
15811	An Archaeological and Historical Survey of the Hilliard Isle Project Area in Osceola County, Florida	2007	Dixon, Anna, Skye W. Hughes, and Lucy D. Jones
16026	Cultural Resource Assessment Survey Narcoossee Road Segment III From North of Jack Brack Road to Boggy Creek Road, Osceola County, Florida	2008	Archaeological Consultants, Inc.
18154	Cultural Resources Reconnaissance Survey Boggy Creek Road Widening Project, Orange County, Florida	2011	Janus Research
20240	Cultural Resource Assessment Survey, Dwell at Lake Nona (Formerly Known as Lake Whippoorwill Landing), Orange County, Florida	2013	Almy, Marion, Katie Baar and Christine Newman
20241	Cultural Resource Assessment Survey, Lake Preserve Property, Orange County, Florida	2013	Archaeological Consultants, Inc.
20305	Technical Memorandum Cultural Resource Assessment Survey for the Greeneway Park Development of Regional Impact (DRI) Orange County, Florida	2013	Archaeological Consultants, Inc.
20596	Cultural Resource Assessment Survey, Hardman-Ward Road Property, Orange County, Florida	2013	Archaeological Consultants, Inc.
20779	Cultural Resource Assessment Survey, Clapp Simm Parcel, Orange County, Florida	2014	Archaeological Consultants, Inc.
20874	Cultural Resource Assessment Survey, Southern Oaks, Orange County, Florida	2014	Archaeological Consultants, Inc.
20925	Cultural Resource Assessment Survey Springhead Lake Property, Osceola County, Florida	2014	Archaeological Consultants, Inc.
20960	Cultural Resource Survey and Assessment, Lakeshore Project, Osceola County, Florida	2014	Dickinson, Martin F. and Lucy B. Wayne
20964	Cultural Resource Assessment Survey of the Hanover Reserve Property, Osceola County, Florida	2014	Archaeological Consultants, Inc.
22452	Cultural Resource Assessment Survey, The Farmer Parcel, Osceola County, Florida	2015	Archaeological Consultants, Inc.
23119	Cultural Resource Assessment Survey Osceola Parkway Extension from West of Boggy Creek Road to the Proposed Northeast Connector Expressway and Boggy Creek Road/SR 417 Access Road Project Development & Environment Study, Orange & Osceola Counties	2016	Janus Research
23186	Cultural Resources Assessment Survey of the New High School on Boggy Creek Road Project Area, Osceola County, Florida	2016	Mankowski, Joseph F.
23355	Cultural Resource Assessment Survey, Maitland Fruit Boggy Creek Property, Osceola County, Florida	2016	Archaeological Consultants, Inc.

Attachment C-18
SHPO Letter

2016-3184

FDOT

Florida Department of Transportation

RICK SCOTT
GOVERNOR

Florida's Turnpike Enterprise
P.O. Box 613069, Ocoee, FL 34761
407-532-3999

JIM BOXOLD
SECRETARY

July 28, 2016

Dr. Timothy A. Parsons
Director, Division of Historical Resources
R.A. Gray Building
500 South Bronough Street
Tallahassee, Florida 32399-0250

Re: Cultural Resource Assessment Survey for Osceola Parkway Extension from West of Boggy Creek Road to the Proposed Northeast Connector Expressway and Boggy Creek Road / SR 417 Access Road, Project Development and Environmental Study, Orange and Osceola Counties, Florida

Attention: Jason Aldridge, Compliance Review Supervisor

Dear Dr. Parsons:

On behalf of the Osceola County Expressway Authority (OCX), Florida Turnpike Enterprise is pleased to submit the enclosed final Cultural Resource Assessment Survey (CRAS) for Osceola Parkway Extension from West of Boggy Creek Road to the Proposed Northeast Connector Expressway and Boggy Creek Road / SR 417 Access Road Project Development & Environment (PD&E) Study in Orange and Osceola counties, Florida.

This survey complies with Chapter 267, *Florida Statutes*; the minimum field methods, data analysis, and reporting standards embodied in the Florida Division of Historical Resources' (FDHR) *Cultural Resource Management Standards and Operational Manual* (February 2003), and Chapter 1A-46 (*Archaeological and Historical Report Standards and Guidelines*), *Florida Administrative Code*. In addition, this report was prepared in conformity with standards set forth in Part 2, Chapter 12 (*Archaeological and Historic Resources*) of the FDOT *PD&E Manual* (revised, January 1999).

Principal Investigators meet the *Secretary of the Interior's Professional Qualification Standards* (48 FR 44716). Archaeological investigations were conducted under the direction of James P. Pepe, M.A. RPA. Historic resource investigations were conducted under the direction of Amy Groover Streelman, M.H.P.

The construction of the Osceola Parkway Extension is proposed, and Corridor B was selected as the Preferred Corridor. The project area was divided into three segments (Western, Central, and

East), where alternatives were developed for each of these segments. The proposed new four-lane expressway is approximately 12 miles long.

No newly or previously recorded archaeological sites were identified within the archaeological Area of Potential Effect (APE). Based on the presence of archaeological occurrences, archaeological testing within the Split Oak Forest will be necessary once the preferred alignment is chosen.

The historic resources survey resulted in the identification of nine historic resources within the APE. Of the nine, six were previously recorded (8OR9990, 8OR9991, 8OR9992, 8OR9993, 8OR9995, and 8OR10228) and three are newly recorded (8OR10291, 8OS2823, and 8OS2824). All of the identified historic resources within the APE are considered ineligible for listing in the National Register individually or as part of a historic district.

We kindly request that the cover letter and document are reviewed, and concurrence is provided by your office. This information is being provided in accordance with the provisions contained in the revised F.S. Chapter 267. If you have any questions regarding the subject project, please contact me at Martin.Horwitz@dot.state.fl.us or (407) 262-3022.

Sincerely,

Martin Horwitz,
Environmental Administrator
Florida Turnpike Enterprise

The Director, Florida Division of Historical Resources finds the attached cultural resources report complete and sufficient and ☒ concurs/ ☐ does not concur with the determinations of historic significance provided in this cover letter ~~and ☐ does ☐ does not find applicable the determinations of effects and adverse effects provided in this cover letter~~ for FDHR Project File Number 2016.3184.

Comments:

Further Archaeological Testing Required for Effects Finding RS: Split Oak Forest

J. Aldridge, Deputy SHPO

For Timothy A. Parsons, Ph.D.
Director, Florida Division of Historical Resources
State Historic Preservation Officer

8/17/2016
[DATE]

Attachment C-19
Census Data Map

	State	Orange County	Osceola County
MP	52%	57.34%	64.47%
PP	16.5%	17.34%	19.48%
PD	38.3%	8.67%	13.06%

Orlando International Airport
WETHERBEE RD
BOGGY CREEK
JEFF FUQUA BLVD
HEINTZELMEN BLVD
Lake Nona
Red Lake
Buck Lake
Mud Lake
Boggy Creek Swamp
SOUTHEAST ORLANDO LOOP TRAIL
MOSS PARK ROAD PATH
MOSS PARK RD
INNOVATION WAY TRAIL SOUTH
Crosby Island Marsh
TOLL 417
LAKE NONA BLVD
TAVISTOCK LAKES BLVD
LAUREATE BLVD
Laureate Park
NARCOOSSEE RD
Lake Whippoorwill
TYSON RD
Lake Hart
C-29
Lake Mary Jane
Sunbridge Pkwy
SPLIT OAK FOREST WILDLIFE & ENVIRONMENTAL TRAIL
Split Oak Forest Wildlife & Environmental Area
Jim Branch
WYNDHAM LAKES BLVD
BOGGY CREEK RD
C-29A
C-29B
Lake Ajay
ORANGE COUNTY
OSCEOLA COUNTY
OSCEOLA PARKWAY
BUENAVENTURA BLVD
SIMPSON RD
Austin-Tindall Regional Park
Fells Cove
CYRILS DR
Cyrils Dr Extension
C-30
ZUNI RD
ABSHER RD
Econlockhatchee River Swamp
Lake Myrtle
Lake Preston
Northeast Connector Expressway
Jack Brack Rd Extension
SUNGROVE LN
C-32B
East Lake Tohopekaliga
FORTUNE RD
JACK BRACK RD
FLORIDA'S TURNPIKE

MP 76.8%
PP 18.1%
PD 67.9%

MP 84%
PP 14.9%
PD 61.8%

MP 38.9%
PP 5.9%
PD 61.3%

MP 59.4%
PP 5.1%
PD 63.1%

MP 69.9%
PP 20.1%
PD 59.6%

MP 30.3%
PP 1.9%
PD 68.7%

MP 26.4%
PP 8.7%
PD 55.9%

MP 66.2%
PP 16.3%
PD 58%

MP 25.7%
PP 11.6%
PD 56.8%

1 0.5 0 1 Miles

Legend

- Study Area
- County Boundary
- RailRoad
- Orlando City Limits
- 2015 Census Blocks
- MP = % Minority Population
- PP = % Below Poverty Level
- PD = % Disability Status
- Planned Roads
- Planned Florida Greenways & Trails
- Existing Trails

Census Data Map

Osceola Parkway Extension Study for CFX in Orange and Osceola Counties

Last Updated: DRAFT20180227
Census_02272018
Source Data: FDOT APLUS 2016, FDOT GIS Roads,Florida Geographic Library, Google Earth, CH2M, ESRI, Orange and Osceola County, Central Florida Geographic Information DRI Interactive Mapping, FDEP, National Hydrography Data (NHD))US Census Bureau 2015 Census Block Groups

Attachment D
Traffic Analysis Data

Attachment D-1
Traffic and Safety Analysis
Technical Memorandum

FINAL

Traffic and Safety Analysis Technical Memorandum

Osceola Parkway Extension
Concept, Feasibility, and Mobility Study
Contract No.: 001248
Project Identification No.: 599-221
Orange and Osceola Counties, Florida

Prepared for

CENTRAL FLORIDA EXPRESSWAY AUTHORITY

March 2018

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1 Introduction

The Osceola Parkway Extension (OPE) Concept, Feasibility and Mobility Study is being undertaken by the Central Florida Expressway Authority (CFX) and covers a 9-mile corridor from approximately one mile west of the Simpson Road and Boggy Creek Road intersection to the proposed Northeast Connector Expressway. The project includes a north / south segment linking to State Road (SR) 417 (Central Florida Greeneway) in the vicinity of the Boggy Creek Road interchange. There is also a proposed 2-mile extension east of the Northeast Connector. The OPE project is a part of the larger Osceola County Expressway Authority (OCX) 2040 Master Plan (see **Figure 1**). As part of an interlocal agreement, CFX has incorporated portions of the OCX Master Plan 2040 into CFX's Visioning + 2040 Master Plan (CFX, 2016). Along with the 2017 OCX Project Development and Environmental (PD&E) report, similar studies have been conducted for other segments of the overall 2040 Master Plan corridor.

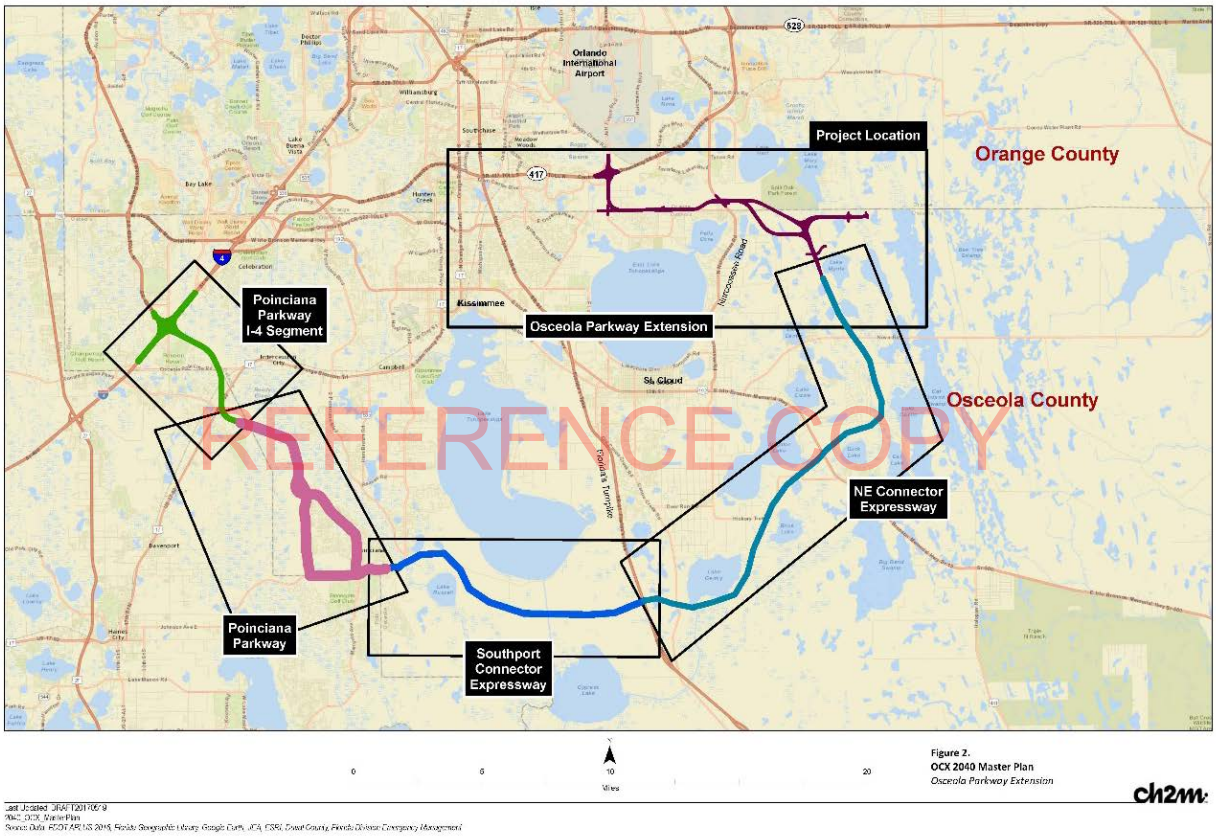


Figure 1: OCX 2040 Master Plan

This technical memorandum is to document the findings of a traffic and safety analysis performed for only the Osceola Parkway Extension portion of the overall 2017 OCX PD&E study corridor. This memorandum evaluates the traffic operational conditions and safety performance of each current alignment and also provides a recommendation for the numbers of lanes on freeway mainlines, frontage roads, interchange ramps, and crossing roads of the OPE project. The results from the traffic and safety analysis are for preliminary planning and feasibility study purposes. Calculations in the traffic analysis were based on the forecasted directional peak hour traffic volumes for the design year (2045) to meet the Level Of Service (LOS) standards. The safety analysis was based on a high-level comparison of relative safety performance for the proposed alignments using available roadway geometric information.

2 Project Location

Residential and commercial development has continued in southern Orange County and northern Osceola County over the last few decades. Multiple studies have been undertaken to address anticipated travel demand growth as these developments continue. The OPE is an approximately 9-mile facility that will traverse northern Osceola County near the Orange County line and would act as a major east-west corridor. It is intended to relieve congestion on local roads as well as on US 192 / Irlo Bronson Memorial Highway to the south and State Road 417 / Central Florida Greeneway to the north. (See **Figure 2**) Major developments such as Eagle Creek Village, Medical City, Southern Oaks, Sunbridge, Split Oak Estates, and the Northeast District are continuing along the corridor. As such, the precise alignment is subject to continuing negotiations with these major property owners as well as existing neighborhoods and adjacent smaller developments.

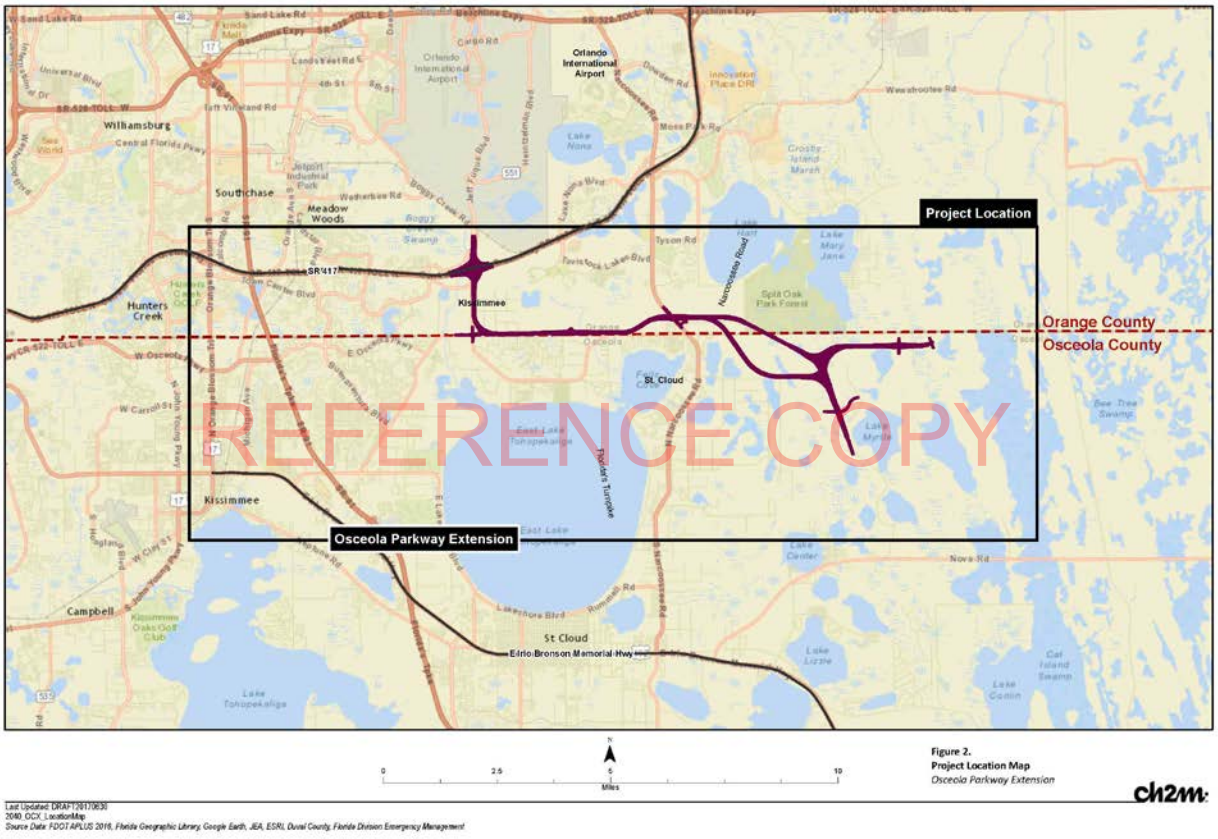


Figure 2: Project Location Map

3 Traffic Analysis

3.1 Analysis Methodology

Currently, the Osceola Parkway Extension is in the preliminary corridor evaluation and screening stage. The available design information applicable to traffic analysis of each of the alignments is limited to the following:

- high-level horizontal alignment concepts,
- standard cross sections: lane and shoulder widths,
- design speeds,

- locations of access points, and
- high-level interchange concepts.

The information available is not sufficient to perform detailed operational-level traffic analysis. Hence, the OPE freeway segments, frontage roads, ramp facilities, and crossing arterials were evaluated based on the high-level planning analysis method referenced in the Florida Department of Transportation (FDOT) 2013 Quality/Level of Service (Q/LOS) Handbook[1]. The method primarily uses capacities and generalized service volumes by numbers of lanes, facilities types, and area types to determine LOS.

The maximum acceptable capacity volumes for different facility types[2] in large urbanized areas are:

- Freeways: 2,100 vehicles per hour per lane (vphpl)
- Highways: 1,850 vphpl
- Arterials: 1,000 vphpl
- Ramp roadways: 1,900 vphpl

Table 1 presents FDOT's generalized service volumes for each LOS and facility in Florida's urbanized areas.

It should be noted that travel demand forecast results and the traffic analysis are based on very high-level design information and caution should be applied when using these results in the selection of a preferred alignment. When more detailed design information is available during the preliminary engineering stage, travel demand models should be rerun to generate more robust future volume projections. Detailed traffic operational analysis should be conducted using a more sophisticated analysis tool, such as microsimulation, to verify the system's performance.

3.2 Analysis Assumptions

The analysis is based on the following assumptions:

- The OPE will be a limited access facility with a posted speed limit of 65 mph.
- The OPE frontage roads will be an arterial facility with a posted speed limit of 45 mph.
- The designs will generally meet FDOT design standards with no significant design exceptions affecting large portions of any alignment. Basic features, such as lane widths, shoulder widths, etc., are consistent across all the designs.
- Based on the current design information, the Northeast Connector Expressway and the proposed system interchange will not be included in this analysis.
- Advisory speeds on all interchange ramps in this analysis will be 45 mph.
- All the freeway analysis to determine lane counts was conducted for basic freeway segments. Freeway diverge, merge and weave maneuvers were not considered, yet, due to the lack of design details.
- All ramps were analyzed to determine lane counts on ramp roadways. Determination of the numbers of turning lanes at terminal intersections was not included in this study.

[1] http://www.fdot.gov/planning/systems/programs/SM/los/pdfs/2013%20QLOS%20Handbook.pdf

[2] The maximum acceptable capacity volumes for freeways, highways and arterials are defined in Chapter 9 of FDOT's 2013 Q/LOS Handbook. The maximum capacity volume of ramp roadways is defined in Exhibit 13-10 of HCM 2010. Adjustments were applied to ramp capacities based on the proportions between HCM-defined and FDOT-defined freeway capacity.

Table 1: Generalized Peak Hour Directional Volumes for LOS C or D in Florida's Urbanized Areas[3]

Signalized Arterials – Class I (40 mph or higher posted speed limit)			
Lanes	**Median Type**	**LOS C**	**LOS D**
1	Undivided	830	880
2	Divided	1910	2000
3	Divided	2940	3020
4	Divided	3970	4040
Freeways			
Lanes	**Median Type**	**LOS C**	**LOS D**
2	Divided	3020	3660
3	Divided	4580	5500
4	Divided	6080	7320
5	Divided	7680	9220
6	Divided	10320	12060
Uninterrupted Flow Highways			
Lanes	**Median Type**	**LOS C**	**LOS D**
1	Undivided	840	1190
2	Divided	2560	3240
3	Divided	3840	4860
Interrupted Flow Signalized Arterials (Class I: 40 mph or Higher Speed Limit)			
Lanes	**Median Type**	**LOS C**	**LOS D**
1	Undivided	830	880
2	Divided	1910	2000
3	Divided	2940	3020
4	Divided	3970	4040

3.3 Level of Service Standard

The level of service (LOS) standard used in this analysis to determine the required numbers of lanes on the OPE facilities followed FDOT's LOS policy[4] released in April 2017. The policy states:

> *"The automobile mode level of service targets for the State Highway System during peak travel hours are 'D' in urbanized areas and 'C' outside urbanized areas."*

This criterion was used to determine the number of lanes required based on the directional design hour volumes (DDHV) on each facility.

3.4 Traffic Factors and Future Design Hourly Volumes

Travel demand modeling was conducted by CFX's traffic consultant, CDM Smith. They developed and provided the annual average daily traffic (AADT) for the design year (2045) for the different OPE

[3] Source: Table 7 in FDOT's 2013 Q/LOS Handbook.

[4] http://www.fdot.gov/planning/systems/programs/sm/los/pdfs/LOS_Policy_April_2017.pdf

alignments. The directional design hour volumes (DDHVs) were then derived from AADTs using the following equation:

$$DDHV = AADT_{Model} \cdot MOCF \cdot K \cdot D$$

where,

Model output conversion factor: MOCF = 0.98,

Planning analysis hour factor: K = 0.1,

Directional distribution factor: D = 0.6.

The values of these factors were determined by the traffic modeling team, based on local traffic patterns. Note that the AADT volumes are preliminary level forecasting and are subject to change.

3.5 OPE Alignments and Access Points

The OPE alignments are split into two segments, west and east, at Narcoossee Road. There are three alternative segments for the west: West 1A, West 1B, and West 2, and six alternative segments for the east: East 1, East 3, East 4A, East 4C, East 5, and East 6. The segments and access points are illustrated in **Figure 3**.

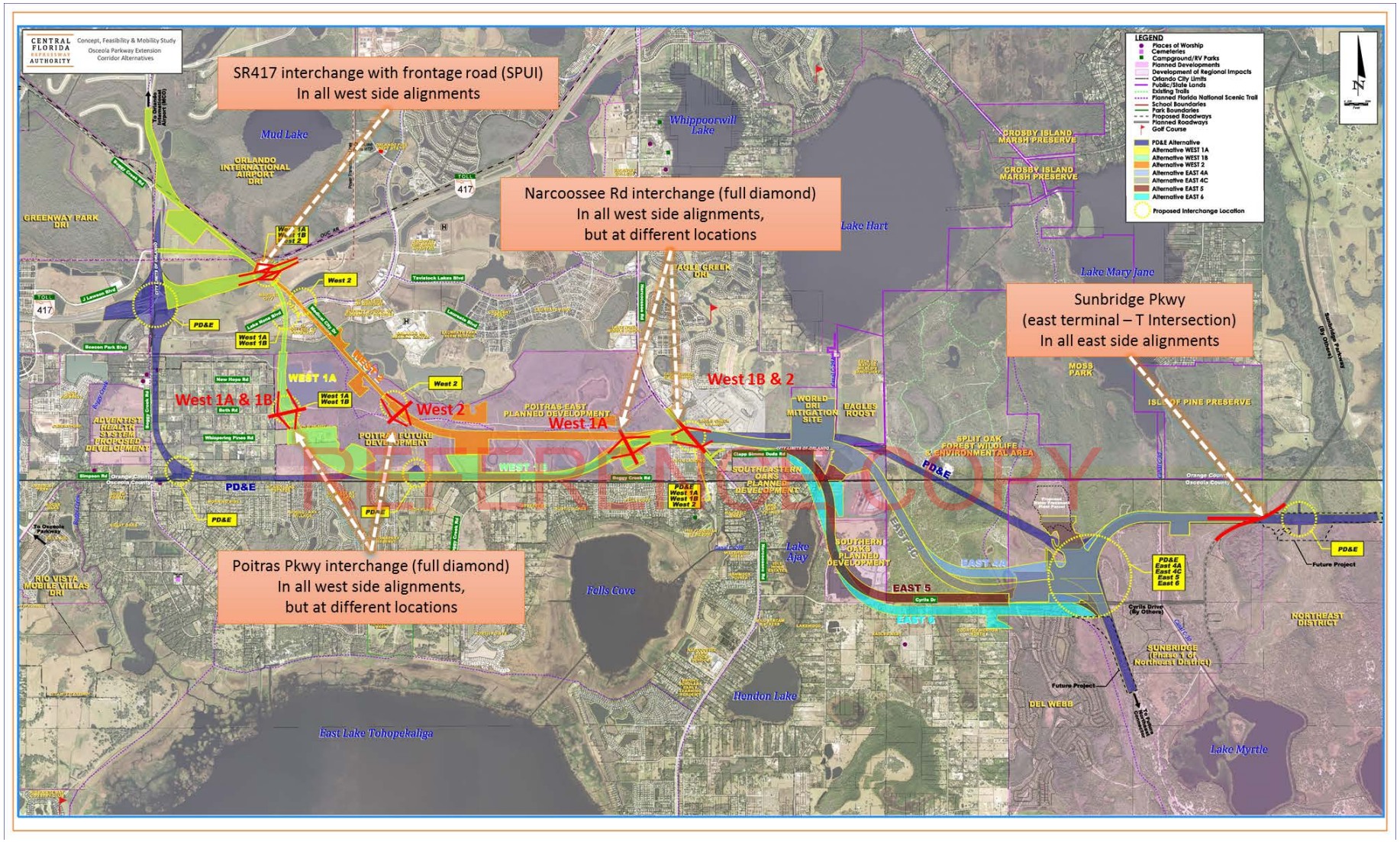


Figure 3: Osceola Parkway Extension Mainline Segments and Access Points

3.5.1 West Segments

Segment West 1A is shown as yellow in **Figure 1**. It includes the following elements and access points:

- Frontage roads parallel to elevated OPE direct airport connector between Poitras Parkway[5] and SR-417
- A single-point urban interchange (SPUI) connecting the frontage roads to SR-417
- A full diamond interchange at Poitras Parkway and the OPE frontage roads
- A full diamond interchange west of Narcoossee Road

The West 1B segment is shown as light green in Figure 1. The West 1B segment is identical to the West 1A segment except that it intersects with Narcoossee Road with a full diamond interchange.

The West 2 segment is shown as orange in **Figure 1**. The overall alignment of West 2 is north of the West 1A and West 1B segments. It has the same access points as West 1B except that the Poitras Parkway interchange is further east.

3.5.2 East Segments

All six east segments of OPE start from Narcoossee Road and end at a signalized "T" intersection with Sunbridge Parkway. Except for the geometric curvatures, there are few differences among the six east segments. Except for the East 3 segment, they all have the same access points. The East 3 segment provides direct access to Cyrils Drive which the others do not. At this stage, it is assumed that there will be no Northeast Connector Expressway and no system interchange in all east segments.

3.5.3 Combined Alignment Alternatives

Even though the six east segments have some differences, most of them are the same from a travel demand forecasting perspective. East 1, 4A, 4C, 5 and 6 segments all have the same access points and no other competing routes available for the same origin-destination pairs along the alignment. Therefore, except for the East 3 segment, the other five east segments will have the same traffic demand and traffic analysis results. To simplify the analysis, the three west segments and five east segments were combined into three combined alternatives:

- Alternative 1: Includes West 1A + East 1/4A/4C/5/6
- Alternative 2: Includes West 1B + East 1/4A/4C/5/6
- Alternative 3: Includes West 2 + East 1/4A/4C/5/6

Because the East 3 segment has direct access to Cyrils Drive, it is expected that the eastern segment of OPE and Sunbridge Parkway in this alignment would have different future travel demand from other East segments. Therefore, this segment should be considered separately. However, at the time of performing this study, the detailed forecasting information for East 3 at Sunbridge Parkway was not available from CDM Smith. Hence, the future demand on Sunbridge Parkway was estimated based on their projected mainline volumes on OPE approaching Sunbridge. Further analysis should be performed once the travel demand forecasting data is available.

3.6 Analysis Results

The AADTs, DDHVs and the number of lanes required to meet FDOT's standards and corresponding LOS for each facility under combined alternatives 1, 2 and 3 are presented in **Tables 2, 3, and 4**, respectively.

[5] Road name assigned to future roadway through the Poitras Property for modeling purposes

The 2045 AADTs and DDHVs on all three alignments only show slight differences. Thus, the analysis results are consistent among the three alignments.

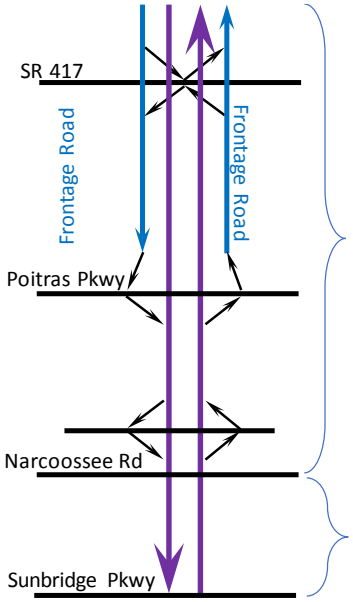
The key findings are:

- Required minimum number of lanes along the OPE mainline, frontage roads and ramps to achieve LOS C or better:
  - OPE freeway mainlines: two lanes each direction
  - OPE frontage roads: two lanes each direction
  - Ramps at the SR-417, Poitras Parkway and Narcoossee Road interchanges: one lane each direction[6]
- Required minimum number of lanes on cross roads to archive LOS D or better:
  - SR-417: four lanes each direction
  - Poitras Parkway: one lane each direction
  - Narcoossee Road: two lanes each direction[7]
  - Sunbridge Parkway:
    - In East 1/4A/4C/5/6 segments: three lanes each direction north of OPE, and four lanes each direction south of OPE
    - In East 3 segment: two lanes each direction

[6] Currently, the FDOT's 2013 Q/LOS Handbook does not define the maximum service volumes on ramp roads for LOS criteria. In this study, the numbers of lanes on ramps are determined by v/c ration of no more than 0.80.

[7] Narcoossee Road is currently three lanes each direction where the OPE crosses it and it continues as six lanes down to Boggy Creek Road. Therefore, the existing lane configuration is sufficient to maintain LOS C or better with OPE in 2045.

Table 2: Required Number of Lanes and LOS in Combined Alternative 1: West 1A + East 1/3/4A/4C/5/6

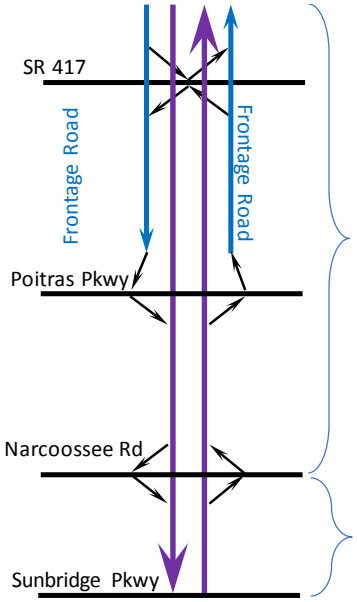


Facility	Location	Type	Design Speed	AADT	DDHV	Lanes per Direction	v/c	LOS
SR-417	Interchange with frontage road	Freeway	60	106,300	6,378	4	0.76	D
SR417 Interchange Ramps	West side ramps	Ramp	60	18,800	1,128	1	0.59	N.A.
SR417 Interchange Ramps	East side ramps	Ramp	60	7,100	426	1	0.22	N.A.
OPE Frontage Road	b/w Poitras and SR 417	Highway	45	37,000	2,220	2	0.60	C
OPE Mainline	b/w Airport and Poitras	Freeway	70	23,000	1,380	2	0.33	B
Poitras Pkwy	Interchange with OPE	Arterial	45	10,600	636	1	0.64	C
Poitras Interchange Ramps	North side ramps	Ramp	50	24,100	1,446	1	0.76	N.A.
Poitras Interchange Ramps	South side ramps	Ramp	50	21,100	1,266	1	0.67	N.A.
OPE Mainline	b/w Poitras and Narcoossee	Freeway	70	44,100	2,646	2	0.63	C
West of Narcoossee Rd	Interchange with OPE	Arterial	45	25,000	1,500	2	0.75	C
West of Narcoossee Rd Interchange Ramps	West side ramps	Ramp	50	17,100	1,026	1	0.54	N.A.
West of Narcoossee Rd Interchange Ramps	East side ramps	Ramp	50	17,900	1,074	1	0.57	N.A.
OPE Mainline	b/w Narcoossee and Sunbridge	Freeway	70	44,900	2,694	2	0.64	C
Sunbridge Pkwy	North of OPE	Arterial	45	35,300	2,118	3	0.71	C
Sunbridge Pkwy	South of OPE	Arterial	45	53,200	3,192	4	0.80	C
Sunbridge Pkwy (E3 alignment only)*		Arterial	45	23,000 ~ 33,000	1,380 ~ 1,980	2	0.69 ~ 0.99	C ~ D

*Detailed forecasting information on Sunbridge Parkway is not available for East 3 segment at the time of performing this analysis. Hence, the range of future demand on Sunbridge Parkway was estimated based on other dissimilar segments. A qualitative analysis was conducted based on these estimates for high-level planning purpose only. Further analysis will be performed once the travel demand forecasting data is available.

Note that the AADT volumes are preliminary level forecasting and are subject to change.

Table 3: Required Number of Lanes and LOS in Combined Alternative 2: West 1B + East 1/3/4A/4C/5/6

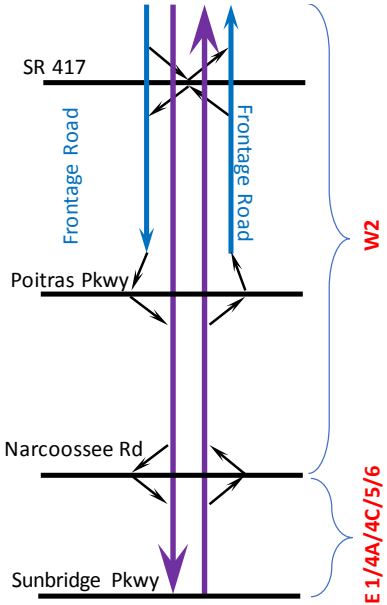


Facility	Location	Type	Design Speed	AADT	DDHV	Lanes per Direction	v/c	LOS
SR-417	Interchange with frontage road	Freeway	60	105,900	6,354	4	0.76	D
SR417 Interchange Ramps	West side ramps	Ramp	60	18,300	1,098	1	0.58	N.A.
SR417 Interchange Ramps	East side ramps	Ramp	60	6,700	402	1	0.21	N.A.
OPE Frontage Road	b/w Poitras and SR 417	Highway	45	36,500	2,190	2	0.59	C
OPE Mainline	b/w Airport and Poitras	Freeway	70	22,100	1,326	2	0.32	B
Poitras Pkwy	Interchange with OPE	Arterial	45	10,700	642	1	0.64	C
Poitras Interchange Ramps	North side ramps	Ramp	50	24,300	1,458	1	0.77	N.A.
Poitras Interchange Ramps	South side ramps	Ramp	50	21,400	1,284	1	0.68	N.A.
OPE Mainline	b/w Poitras and Narcoossee	Freeway	70	43,500	2,610	2	0.62	C
Narcoossee Rd	Interchange with OPE	Arterial	45	57,100	3,426	4	0.86	C
Narcoossee Interchange Ramps	West side ramps	Ramp	50	19,600	1,176	1	0.62	N.A.
Narcoossee Interchange Ramps	East side ramps	Ramp	50	19,300	1,158	1	0.61	N.A.
OPE Mainline	b/w Narcoossee and Sunbridge	Freeway	70	43,200	2,592	2	0.62	C
Sunbridge Pkwy	North of OPE	Arterial	45	36,000	2,160	3	0.72	C
Sunbridge Pkwy	South of OPE	Arterial	45	53,200	3,192	4	0.80	C
Sunbridge Pkwy (E3 alignment only)*		Arterial	45	23,700 ~ 33,700	1,422 ~ 2,000	2	0.71 ~ 1.00	C ~ D

*Detailed forecasting information on Sunbridge Parkway is not available for East 3 segment at the time of performing this analysis. Hence, the range of future demand on Sunbridge Parkway was estimated based on other dissimilar segments. A qualitative analysis was conducted based on these estimates for high-level planning purpose only. Further analysis will be performed once the travel demand forecasting data is available.

Note that the AADT volumes are preliminary level forecasting and are subject to change.

Table 4: Required Number of Lanes and LOS in Combined Alternative 3: West 2 + East 1/3/4A/4C/5/6



Facility	Location	Type	Design Speed	AADT	DDHV	Lanes per Direction	v/c	LOS
SR-417	Interchange with frontage road	Freeway	60	104,700	6,282	4	0.75	D
SR417 Interchange Ramps	West side ramps	Ramp	60	14,500	870	1	0.46	N.A.
SR417 Interchange Ramps	East side ramps	Ramp	60	3,800	228	1	0.12	N.A.
OPE Frontage Road	b/w Poitras and SR 417	Highway	45	33,800	2,028	2	0.55	C
OPE Mainline	b/w Airport and Poitras	Freeway	70	23,800	1,428	2	0.34	B
Poitras Pkwy	Interchange with OPE	Arterial	45	6,100	366	1	0.37	C
Poitras Interchange Ramps	North side ramps	Ramp	50	24,800	1,488	1	0.78	N.A.
Poitras Interchange Ramps	South side ramps	Ramp	50	12,400	744	1	0.39	N.A.
OPE Mainline	b/w Poitras and Narcoossee	Freeway	70	48,600	2,916	2	0.69	C
Narcoossee Rd	Interchange with OPE	Arterial	45	57,100	3,426	4	0.86	C
Narcoossee Interchange Ramps	West side ramps	Ramp	50	22,500	1,350	1	0.71	N.A.
Narcoossee Interchange Ramps	East side ramps	Ramp	50	17,500	1,050	1	0.55	N.A.
OPE Mainline	b/w Narcoossee and Sunbridge	Freeway	70	43,500	2,610	2	0.62	C
Sunbridge Pkwy	North of OPE	Arterial	45	35,500	2,130	3	0.71	C
Sunbridge Pkwy	South of OPE	Arterial	45	53,000	3,180	4	0.80	C
Sunbridge Pkwy (E3 alignment only)*		Arterial	45	22,200 ~ 32,200	1,380 ~ 1,980	2	0.67 ~ 0.97	C ~ D

W2

E 1/4A/4C/5/6

*Detailed forecasting information on Sunbridge Parkway is not available for East 3 segment at the time of performing this analysis. Hence, the range of future demand on Sunbridge Parkway was estimated based on other dissimilar segments. A qualitative analysis was conducted based on these estimates for high-level planning purpose only. Further analysis will be performed once the travel demand forecasting data is available.

Note that the AADT volumes are preliminary level forecasting and are subject to change.

4 Safety Analysis

4.1 Safety Analysis Methodology

Trends from the Highway Safety Manual (HSM) freeway models were used to develop a high-level comparison of relative safety performance for the proposed alignments of the Osceola Parkway Extension. The HSM bases estimates of average crash frequency on known roadway characteristics.

The Osceola Parkway Extension is at the preliminary corridor evaluation stage. Based on the level of detail available, only a few design characteristics are discernable and comparable for each alignment. These include: the radius of curvature for the horizontal curves, the number of access points/interchanges, and the estimated number of ramp terminal intersections. Higher predicted crash frequencies are associated with: a tighter (i.e. smaller) radius of curvature, a larger number of horizontal curves, a greater number of access points or interchanges, and a larger number of ramp terminal intersections.

Each of the segments has been evaluated individually (i.e. west or east) and as complete alignments (i.e. west plus east) considering the known geometric features. This safety evaluation assumes that the designs would generally meet standards and that basic features (e.g. lane widths, shoulder widths, number of through lanes, etc.) are consistent across all the designs.

4.2 Assumptions

The analysis is based on the following assumptions:

- Design of the new facility will be a limited access facility.
- The designs would generally meet standards with no significant design exceptions affecting large portions of any alignment.
- Basic features (e.g. lane widths, shoulder widths, number of through lanes, etc.) are consistent across all the designs.
- Traffic volumes are the same/similar for all alignments.
- Interchanges at Poitras Parkway and Narcoossee Road were assumed to be system to service in the West 1A, West 1B and West 2 segments.
- The diamond interchange configuration in the West 1A segment is just west of Narcoossee Road and in the West 1B segment, it is at Narcoossee Road.
- The interchange with the future Northeast Connector for the East 3 segment was assumed to be system to service and diamond configuration.
- Interchanges at SR-417 and to the future Northeast Connector were assumed to be system to system in segments West 1A, West 1B, West 2, East 1, East 4A, East 4C, East 5 and East 6.

4.3 West Segments

There are three alternative segments for Osceola Parkway west of Narcoossee Road: West 1A, West 1B, and West 2. **Table 5** summarizes the identified safety elements for the three segments. West 1A and West 1B are almost identical for the identified safety elements. Both have five curves, slight/moderate curvature, and five ramp terminal intersections. Two of the interchanges are the same with one having slightly different locations with each segment. Despite this, the safety impacts are expected to be similar given similar interchange designs. West 2 has only two horizontal curves with large radii and the same interchanges and ramp terminal intersections. Overall, the West 2 segment would have a slightly lower

estimated crash frequency than the West 1A or West 1B segments based on the identified safety elements.

Table 5: West Segments - Safety Elements Summary

Segment	Number of Curves	Average Curvature	Number of Interchanges	Number of Ramp Terminal Intersections
West 1A	5	Slight/Moderate	3	5
West 1B	5	Slight/Moderate	3	5
West 2	2	Slight	3	5

4.4 East Segments

There are six segments for Osceola Parkway east of Narcoossee Road: East 1, East 3, East 4A, East 4C, East 5, and East 6. **Table 6** summarizes the identified safety elements for each. All segments have four horizontal curves except East 1 and East 3 (which each have two) with varying degrees of curvature. East 3 has the gentlest curves on average while East 5 has the tightest curves on average, with the other segments having a moderate average horizontal curvature. All east segments have only one interchange and all have no ramp terminal intersections, except East 1 and East 3. Overall, East 1, East 3, East 4A, and East 4C would likely have similar safety performances as well as lower estimated crash frequencies than the other east segments based on the identified safety elements, mainly due to horizontal curvature or ramp terminal intersections.

Table 6: East Segments - Safety Elements Summary

Segment	Number of Curves	Average Curvature	Number of Interchanges	Number of Ramp Terminal Intersections
East 1	2	Slight	1	2
East 3	2	Slight	1	2
East 4A	4	Moderate	1	0
East 4C	4	Moderate	1	0
East 5	4	High	1	0
East 6	4	Moderate/High	1	0

4.5 Overall Alignments

For the safety analysis a combination of eight overall alignments were evaluated: West 1A & East 4C, West 1B & East 1, West 1B & East 3, West 1B & East 4A, West 1B & East 4C, West 1B & East 5, West 1B & East 6, and West 2 & East 4C. Based on several considerations, the alignments were separated into three tiers with alignments in Tier I having the lowest impact on safety performance and those in Tier III having the highest impact relative to the other alignments. These are summarized in **Table 7**.

Table 7: Alignments - Safety Elements Summary

Alignment	West of Narcoossee				East of Narcoossee				Tier
	Number of Curves	Average Curvature	Number of Interchanges	Number of Ramp Terminal Intersections	Number of Curves	Average Curvature	Number of Interchanges	Number of Ramp Terminal Intersections	
W1A-E4C	5	Moderate	3	5	4	Moderate	1	0	II
W1B-E1	5	Moderate	3	5	2	Slight/Moderate	1	2	I
W1B-E3	5	Moderate	3	5	2	Slight/Moderate	1	2	I
W1B-E4A	5	Moderate	3	5	4	Moderate	1	0	II
W1B-E4C	5	Moderate	3	5	4	Moderate	1	0	II
W1B-E5	5	Moderate	3	5	4	High	1	0	III
W1B-E6	5	Moderate	3	5	4	Moderate/High	1	0	III
W2-E4C	2	Slight	3	5	4	Moderate	1	0	I

The safety impact of the Tier I alignments is largely driven by fewer curves, with only slight or slight/moderate horizontal curvature, for both the west and east segments. Tier II alignments (including West 1B-East 4C) would have a moderate safety impact compared to the other alignments, primarily due to more horizontal curves and moderate curvature on the west and east segments, and more interchanges or ramp terminal intersections west of Narcoossee Road. Tier III alignments would have the highest relative safety impact due to sharper curvature in the east segments on top of features shared with other alignments.

4.6 Caveats and Clarifications

It must be noted that this safety analysis is based on very high-level design information and limited design characteristics. Caution should be applied when using the results of this analysis in the selection of a preferred alignment. Differences between alignments are unknown and detailed impacts cannot be fully assessed from this information. These evaluations represent comparative results to give perspective on the relative crash potential for each and cannot estimate order of magnitude differences in crash frequency or level of severity without more detailed design. It is possible that given more detail, the results could differ and that the relative impacts of the alignments could be more or less significant.

If the safety evaluation is to be used in selection of a preferred alternative, it is recommended that the safety analysis be refined with more detailed design information to provide a more accurate comparison of the alignments. However, given the amount of refinement that generally occurs throughout project development, it is recommended that detailed analysis only be performed for a preferred subset of alignment concepts and ideally only for the final preferred alternative. For projects such as Osceola Parkway Extension, where the purpose and need of the project is not primarily safety, HSM analysis will be most useful and cost effective in the refinement of the detailed design.

Attachment D-2
Critical Crash Rates for Orange County and Osceola County, FL

Florida Department of Transportation Critical Crash Rates for Orange County, FL

Printed from FDOT CARS database: May 14, 2018

Average Crash Rate	County	Crash Rate Category	To Which Road Applied
1.26702	Orange	Interstate Urban	
0	Orange	Interstate Rural	
0.48873	Orange	Toll Road Urban	
0.42605	Orange	Toll Road Rural	State Road 417
0	Orange	Urban Other Limited Access	
0	Orange	Rural Other Limited Access	
7.72909	Orange	Urban 2-3Ln 2Wy Divd Rasd	
5.40494	Orange	Urban 2-3Ln 2Wy Divd Pavd	
2.75394	Orange	Urban 2-3Ln 2Wy Undivd	Laureate Blvd.
0.08666	Orange	Suburban 2-3Ln 2Wy Divd Rasd	
2.25696	Orange	Suburban 2-3Ln 2Wy Divd Pavd	
0.35537	Orange	Suburban 2-3Ln 2Wy Undivd	
0.69357	Orange	Rural 2-3Ln 2Wy Divd Rasd	
0	Orange	Rural 2-3Ln 2Wy Divd Pavd	
0	Orange	Rural 2-3Ln 2Wy Undivd	Boggy Creek Road (Orange Co.)
2.71499	Orange	Urban 4-5Ln 2Wy Divd Rasd	Lake Nona Blvd.
4.83082	Orange	Urban 4-5Ln 2Wy Divd Pavd	
4.31359	Orange	Urban 4-5Ln 2Wy Undivd	
2.20907	Orange	Suburban 4-5Ln 2Wy Divd Rasd	
1.75775	Orange	Suburban 4-5Ln 2Wy Divd Pavd	
0.50795	Orange	Suburban 4-5Ln 2Wy Undivd	
0.59553	Orange	Rural 4-5Ln 2Wy Divd Rasd	
0	Orange	Rural 4-5Ln 2Wy Divd Pavd	
0	Orange	Rural 4-5Ln 2Wy Undivd	
4.3493	Orange	Urban 6+Ln 2Wy Divd Rasd	Narcoossee Road
4.64106	Orange	Urban 6+Ln 2Wy Divd Pavd	
0	Orange	Urban 6+Ln 2Wy Undivd	
3.8454	Orange	Suburban 6+Ln 2Wy Divd Rasd	
3.32929	Orange	Suburban 6+Ln 2Wy Divd Pavd	
0	Orange	Suburban 6+Ln 2Wy Undivd	
0	Orange	Rural 6+Ln 2Wy Divd Rasd	
0	Orange	Rural 6+Ln 2Wy Divd Pavd	
0	Orange	Rural 6+Ln 2Wy Undivd	
5.47404	Orange	Urban One Way	
1.75706	Orange	Suburban One Way	
1.96043	Orange	Not Coded	
0.43423	Orange	Toll Road Urban	
0.26564	Orange	Toll Road Rural	
0.65353	Orange	Not Coded	

Florida Department of Transportation Critical Crash Rates for Osceola County, FL

Printed from FDOT CARS database: May 14, 2018

Average Crash Rate	County	Crash Rate Category	To Which Road Applied
0.49397	Osceola	Interstate Urban	
0	Osceola	Interstate Rural	
0	Osceola	Toll Road Urban	
0	Osceola	Toll Road Rural	
0	Osceola	Urban Other Limited Access	
0	Osceola	Rural Other Limited Access	
0	Osceola	Urban 2-3Ln 2Wy Divd Rasd	
0	Osceola	Urban 2-3Ln 2Wy Divd Pavd	
0.09386	Osceola	Urban 2-3Ln 2Wy Undivd	
0.92783	Osceola	Suburban 2-3Ln 2Wy Divd Rasd	
0.78301	Osceola	Suburban 2-3Ln 2Wy Divd Pavd	
0.24045	Osceola	Suburban 2-3Ln 2Wy Undivd	
3.24324	Osceola	Rural 2-3Ln 2Wy Divd Rasd	
1.2229	Osceola	Rural 2-3Ln 2Wy Divd Pavd	
0.73082	Osceola	Rural 2-3Ln 2Wy Undivd	Simpson Road; Boggy Creek Road (Osceola County)
1.5944	Osceola	Urban 4-5Ln 2Wy Divd Rasd	
2.3047	Osceola	Urban 4-5Ln 2Wy Divd Pavd	
0	Osceola	Urban 4-5Ln 2Wy Undivd	
1.5335	Osceola	Suburban 4-5Ln 2Wy Divd Rasd	
1.96691	Osceola	Suburban 4-5Ln 2Wy Divd Pavd	
0	Osceola	Suburban 4-5Ln 2Wy Undivd	
0.83489	Osceola	Rural 4-5Ln 2Wy Divd Rasd	
0	Osceola	Rural 4-5Ln 2Wy Divd Pavd	
0	Osceola	Rural 4-5Ln 2Wy Undivd	
2.30325	Osceola	Urban 6+Ln 2Wy Divd Rasd	
2.28629	Osceola	Urban 6+Ln 2Wy Divd Pavd	
0	Osceola	Urban 6+Ln 2Wy Undivd	
1.6613	Osceola	Suburban 6+Ln 2Wy Divd Rasd	
0.64956	Osceola	Suburban 6+Ln 2Wy Divd Pavd	
0	Osceola	Suburban 6+Ln 2Wy Undivd	
0	Osceola	Rural 6+Ln 2Wy Divd Rasd	
0	Osceola	Rural 6+Ln 2Wy Divd Pavd	
0	Osceola	Rural 6+Ln 2Wy Undivd	
0	Osceola	Urban One Way	
0	Osceola	Suburban One Way	
0	Osceola	Rural One Way	
0	Osceola	Undefined	
1.20751	Osceola	Not Coded	
0.46113	Osceola	Not Coded	

Attachment E
Pond Sizing and Siting

SECOND DRAFT

Pond Sizing and Siting Technical Memorandum

Osceola Parkway Extension
Concept, Feasibility, and Mobility Study
Contract No.: 001248
Project Identification No.: 599-221
Orange and Osceola Counties, Florida

Prepared for

CENTRAL FLORIDA EXPRESSWAY AUTHORITY

April 2018

Prepared by

CH2M HILL, Inc.
225 E. Robinson Street
Suite 505
Orlando, FL 32801

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Acronyms and Abbreviations

CFX	Central Florida Expressway Authority
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
LOMR	Letter of Map Revision
OCX	Osceola County Expressway Authority
OFW	Outstanding Florida Waters
OPE	Osceola Parkway Extension
PD&E	Project Development and Environment
SFWMD	South Florida Water Management District
SOFWEA	Split Oak Forest Wildlife and Environmental Area
SR	State Road
TMDL	Total Maximum Daily Load
TP	Total Phosphorous

1. Introduction

This Osceola Parkway Extension (OPE) Feasibility Study is being undertaken by the Central Florida Expressway Authority (CFX) and covers a 9-mile corridor beginning approximately one mile west of the Simpson Road and Boggy Creek Road intersection and extending easterly to the proposed Northeast Connector Expressway. The project includes a north / south segment linking to State Road (SR) 417 (Central Florida GreeneWay) in the vicinity of the Boggy Creek Road interchange. There is also a proposed 2-mile extension east of the Northeast Connector. The OPE project is a part of the larger Osceola County Expressway Authority (OCX) 2040 Master Plan (see Figure 1). Along with the 2017 OCX Project Development and Environmental (PD&E) report, similar studies have been conducted for other segments of the overall 2040 Master Plan corridor.

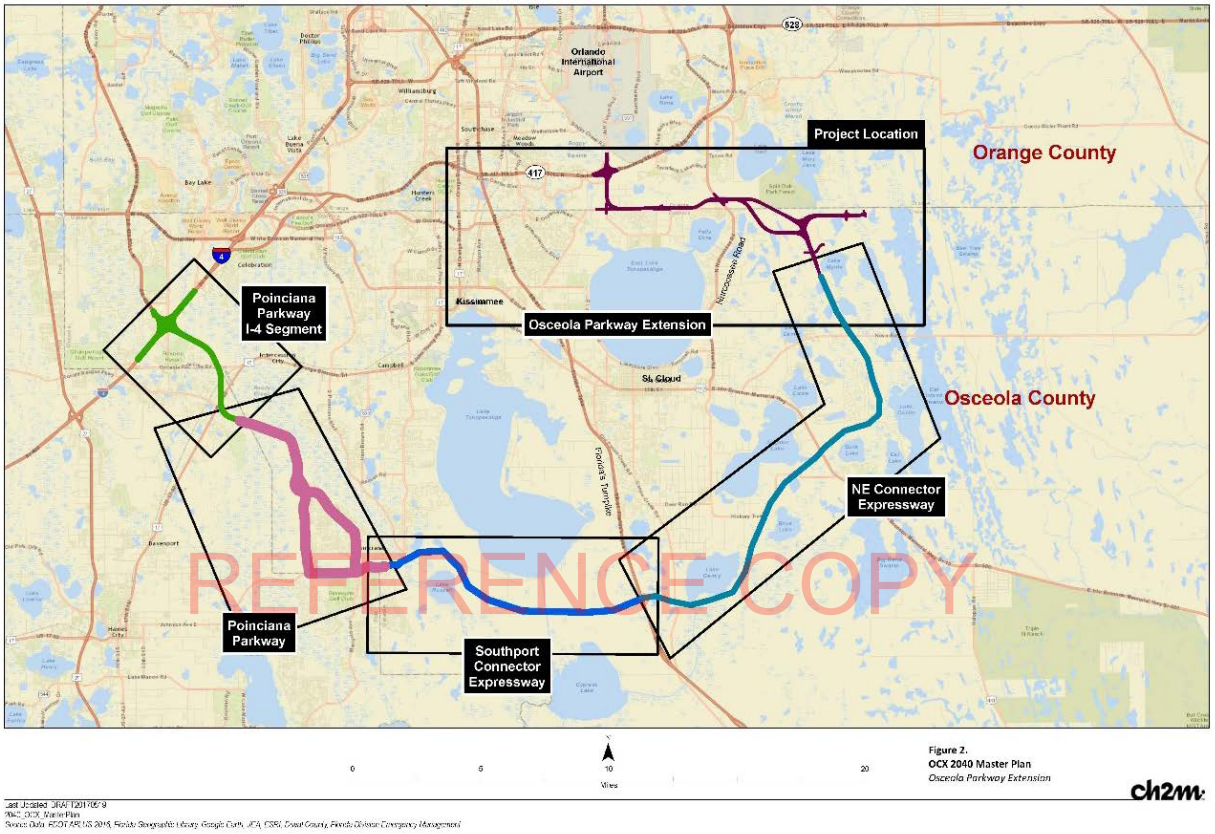


Figure 1: OCX 2040 Master Plan

The purpose of this Pond Sizing and Siting technical memorandum is to analyze and identify preliminary stormwater management and floodplain compensation sites for the OPE project. Analysis of stormwater management facilities for the project is governed by rules set forth by the South Florida Water Management District (SFWMD) and Florida Department of Transportation (FDOT). Potential stormwater management for water quality treatment and runoff attenuation were estimated assuming wet detention systems. Floodplain compensation estimates used the cup-for-cup-method. Within this report, the requirements, assumptions, and preliminary calculations based on FDOT and SFWMD requirements are presented in support of estimating the preliminary sizing of the pond facilities.

2. Project Location

Residential and commercial development has continued in southern Orange County and northern Osceola County over the last few decades. Multiple studies have addressed anticipated travel demand growth as these developments continue. The OPE is an approximately 9-mile facility that will traverse northern Osceola County near the Orange County line and would act as a major east-west corridor. It is intended to relieve congestion on local roads as well as on US 192 / Irlo Bronson Memorial Highway to the south and SR 417 / Central Florida GreeneWay to the north (see Figure 2). Constraints within the corridor include major

developments such as the Poitras Property, Eagle Creek Village, Southern Oaks and the Northeast District as well as environmental considerations such as the Split Oak Forest Wildlife and Environmental Area (SOFWEA).

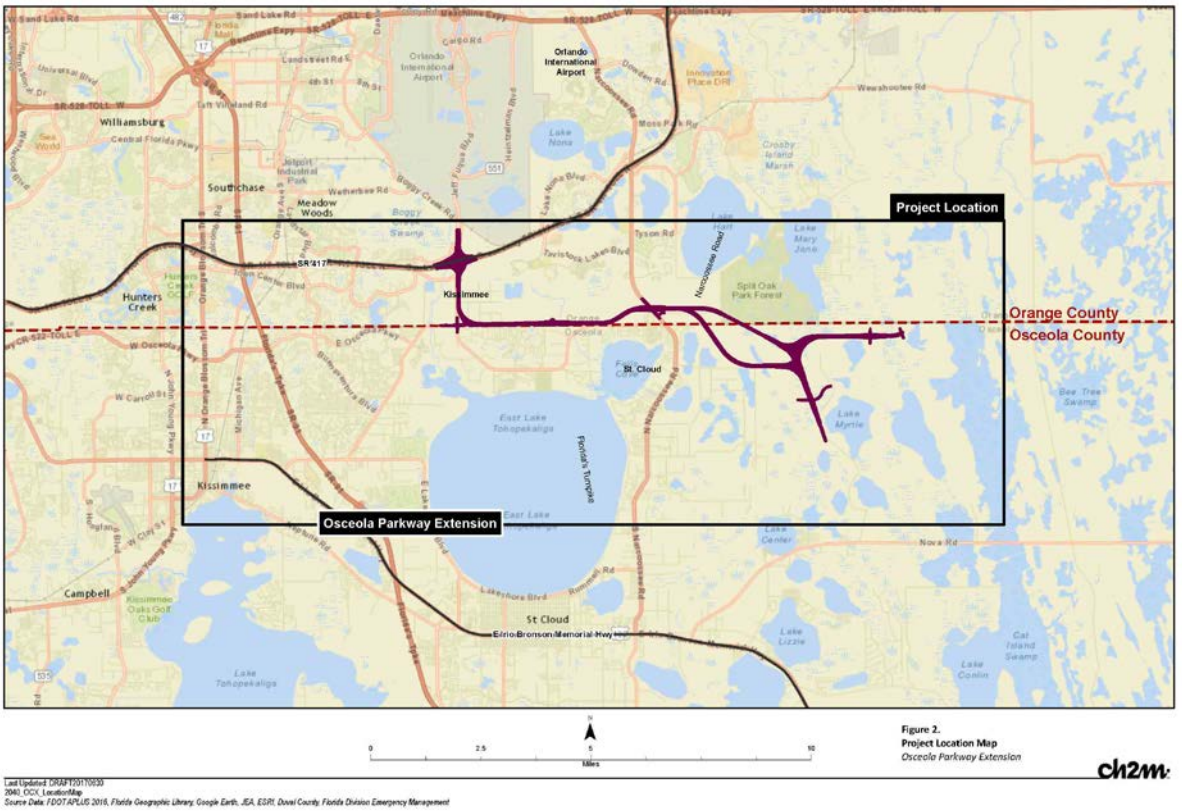


Figure 2: Project Location Map

3. Datum

All elevations used in calculations and maps within this document are based on the North American Vertical Datum of 1988 (NAVD) unless specified otherwise. Any existing calculations from as-built construction plans or other support data collected used in this analysis that is based on the National Geodetic Vertical Datum of 1929 (NGVD) were converted into NAVD using the following conversion equation:

NAVD = NGVD - 1.01’

Please refer to Appendix A - Datum for documentation.

4. Existing Conditions

The project is located within the Kissimmee River Watershed within the jurisdiction of SFWMD, and more specifically within the Lake Tohopekaliga basin. The existing basins are open basins which discharge to creeks, canals, wetlands, and ultimately to the adjacent receiving water bodies. Receiving water bodies for the western segment are Boggy Creek and Jim Branch, both of which ultimately outfall to East Lake Tohopekaliga (East Lake Toho). Receiving water bodies for the eastern segment are Ajay Lake and Lake Myrtle. Ajay Lake flows into Fells Cove and ultimately outfalls to East Lake Toho. Further east, Lake Myrtle ultimately outfalls to Alligator Lake.

The eastern segment of the project crosses the SFWMD C-29A and C-30 Canals. Canal C-29A connects Lake Hart (upstream) and flows downstream to Ajay Lake, Fells Cove and ultimately East Lake Tohopekaliga. Further east, the project corridor traverses a series of interconnected wetlands which ultimately outfall to Lake Myrtle. Discharge is expected to be conveyed in this segment through Canal C-30 downstream to Lake Myrtle. Further coordination with SFWMD will be necessary for desired discharge rates for the canals, and canal right of way permit requirements.

Though East Lake Toho and Alligator Lake are not classified as Outstanding Florida Waters (OFW), the Kissimmee River Watershed is a part of the greater Lake Okeechobee Basin and therefore is classified as an impaired waterbody subject to additional treatment requirements per SFWMD Environmental Resource Permit Applicant's Handbook Volume II. Lake Okeechobee has total phosphorous (TP) total maximum daily load (TMDL) requirements as part of the adopted Lake Okeechobee Basin Action Management Plan

The project corridor traverses SOFWEA, currently managed by the Florida Fish and Wildlife Conservation Commission (FFWCC) to enhance and preserve the habitat of the gopher tortoise and other wildlife and plants. SOFWEA was acquired with funds received through the FFWCC's Mitigation Park Program.

Currently along the western segment of the project corridor, roadside swales along Boggy Creek Road discharge into unnamed creeks or ditches that drain into Boggy Creek, a regulatory floodway. Hydraulic modeling and analysis to achieve a FEMA "No-Rise" certification may be necessary during the design phase of the project depending on the preferred alternative design.

Soils Survey

The soil surveys of Orange and Osceola Counties, Florida, published by the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) have been reviewed for the project vicinity. Please refer to Appendix B for Soils Map. The soils encountered are mostly Hydrologic Soil Group (HSG) A/D. For this study, conservative estimates of the seasonal high water table were used. The seasonal high water table was estimated to be at one (1) foot below the existing ground, allowing for 1 foot of treatment depth. Note that during the design phase, more detailed geotechnical investigation will be required to determine the seasonal high water table.

Water Body Identifications (WBID's)

Based on research through the Florida Department of Environmental Protection (FDEP) Map Direct tool, the project traverses through the following water body identifications (WBID's) from west to east:

- 3168B - Boggy Creek (impaired for fecal count)
- 3172A - Jim Branch
- 3172C - East Lake Tohopekaliga Drain (impaired for failing linear vegetative survey)
- 3171E - Hart Branch
- 3174F - Lake Center Outlet

Though these WBID's are not impaired for nutrients, there currently exists a Nutrient Reduction Plan for Lake Tohopekaliga thus requiring pollutant loading analysis during a later design phase. As mentioned above, the project outfalls into Kissimmee River and is a part of the Lake Okeechobee basin, therefore requiring additional treatment. Please refer to Figure 3 for Water Body Identifications (WBID's) within the project limits.

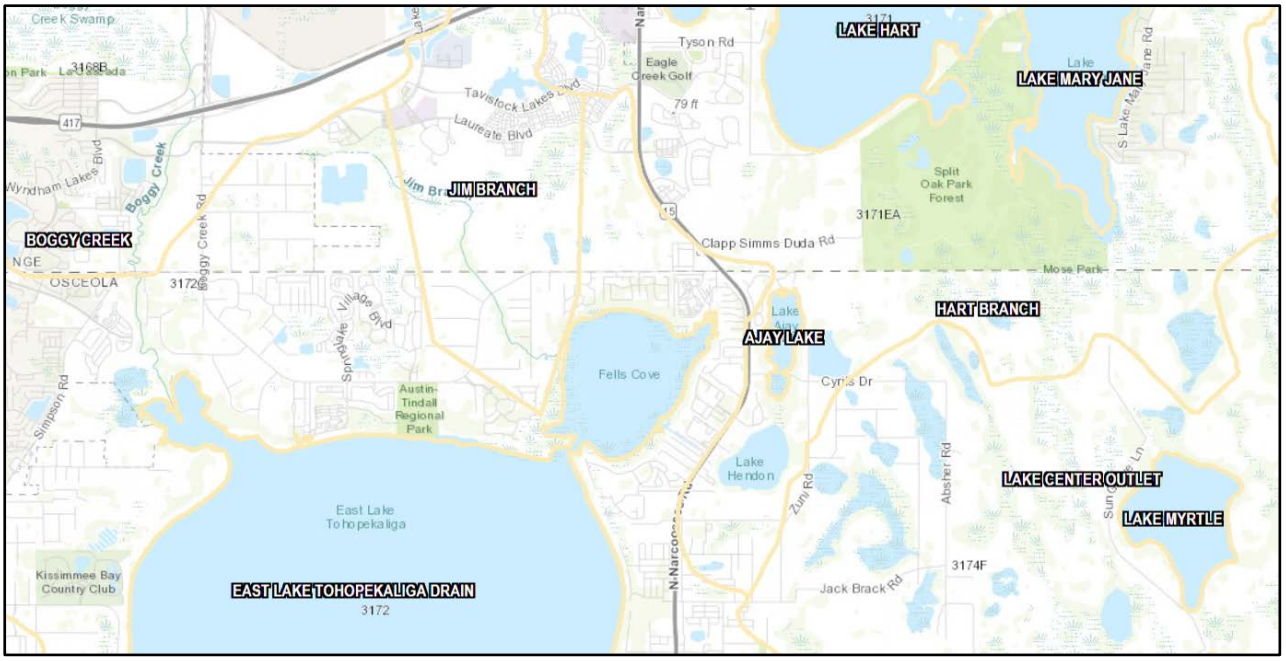


Figure 3: Water Body Identifications (WBID's)

5. Proposed Conditions

The proposed drainage considerations for this analysis include maintaining the existing drainage patterns, and routing runoff to potential stormwater management facilities. The project is divided into "western" and "eastern" segments where the corridor crosses Narcoossee Road. There are three roadway alternatives proposed for the western segment and nine alternatives proposed for the eastern segment, with preferred alternatives to be selected at a later phase.

Cross drainage features (pipes or bridges) are expected for the existing channelized or concentrated flows such as creeks (Jim Branch) or ditches. Parallel ditches are expected to be handled within the proposed right-of-way width, if needed. A separate offsite parallel ditch may not be required because FDOT and SFWMD now allow for offsite and onsite to be commingled without an increase to pond volumes. Any offsite areas draining towards the right-of-way will be assumed to be bypassed as part of this study, and further investigated if the project moves into more detailed study phases and design.

Pond right-of-way areas have been estimated for each of the proposed roadway drainage basins along the project limits. The analysis estimates right-of-way needs using a volumetric analysis, which accounts for both water quality treatment and water quantity for runoff attenuation. Avoidance of constraints such as floodplains and existing wetlands were considered in the pond sites to the greatest extent possible. Extra care is given to avoid uneconomic remainders.

There are proposed stormwater ponds utilizing existing borrow pits which are part of the Tavistock Poitras property (existing SFWMD Permit No. is 48-00063-S). Additional coordination should take place for potential Joint Use / Regional Treatment ponds with adjacent major property owners, Tavistock and the Greater Orlando Aviation Authority. Offsite contributing areas to the existing borrow pit will need to be accounted for in proposed stormwater ponds in this area as a part of later study phases.

6. Proposed Typical Sections

For the pond sizing calculations within this study, the typical sections assume an eight-lane Ultimate buildout for the Osceola Parkway Extension containing eight (8) through lanes at 12' width, two (2) inside paved shoulders at 12' width, and two (2) outside paved shoulders at 12' width for a total of 144' width of impervious pavement. Typical section assumptions were also made for 1-Lane Ramp, 2-Lane Frontage Road, and Direct Airport Connector Lanes. A table summarizing the assumptions can be found in Appendix C - Typical Section Assumptions.

7. Design Criteria

In addition to FDOT design requirements, construction of stormwater facilities estimated in this document will require the issuance of an Environmental Resource Permit (ERP) from the SFWMD. This section outlines the criteria requirements to meet water quality and quantity based on the SFWMD and FDOT stormwater regulation standards. The design criteria are from the 2018 FDOT Drainage Manual, 2018 FDOT Drainage Design Guide, and the SFWMD Permit Information Manual.

The stormwater runoff will be routed to proposed stormwater ponds for water quality treatment and attenuation purposes via roadside ditches. The ponds were sized to accommodate the proposed roadway and pervious areas within the right-of-way area. Runoff from offsite areas were not used in treatment or attenuation estimations.

All basins within the project are considered open basins. Wet detention systems are analyzed to provide water quality improvements, as well as water quantity attenuation for the project runoff. Wet detention is assumed based on the high water table prevalent throughout the project limits.

Due to the preliminary level of this analysis, the topic was discussed during a project progress meeting on January 4th, 2018. The decision was to proceed with pond sizing using the stacked attenuation plus treatment volumes, which is reflected in the calculation example within the 2018 FDOT Drainage Design Guide. The required treatment, attenuation, and preliminary pond sizing calculations are summarized in Appendix D - Pond Sizing Calculations. Exhibits detailing stormwater management and floodplain compensation pond sites are found in Exhibit A - Stormwater Management Exhibits. See Appendix F - Correspondence for meeting and correspondence documentation.

The following design criteria apply:

Water Quantity / Attenuation – Open Basins

SFWMD uses the local government requirements if available. While the project crosses from Orange County to Osceola County, the Orange County 25-year/24-hour storm will provide a reasonable attenuation estimate. The SFWMD rainfall is 8.6" based on nearby permits, which is slightly higher than other publications. The pond area is included in the basin area for attenuation. SFWMD does not have a freeboard requirement.

FDOT has a critical duration requirement. FDOT requires a 1-foot freeboard to allow for grading variations during construction. This freeboard was included in the calculations. Typically, the 24 hour duration is often the critical storm for open basins and was used in this analysis.

Water Quality / Treatment – Wet Detention

Treatment: The treatment volume estimate is based on the wet detention pond requirement plus an additional 50% because the project discharges to an impaired waterbody (Lake Okeechobee). Wet detention requirements are the greater of:

- 1" over the Project Area, which does not include the pond water surface area per 4.2.2(c) SFWMD Vol II
- 2.5" over the Impervious Area, which does not include the pond water surface area.

8. Design Methodology

The design methodology is as follows:

- Based on SFWMD and FDOT stormwater regulations, the requirements to meet water quality (treatment) and water quantity (attenuation) criteria were determined as described in Section 7.
- Area of right-of-way needs were calculated based on a 1-foot treatment/attenuation depth, 1-foot freeboard, stacked attenuation plus treatment volumes, 1:4 side slopes, and 20’ maintenance berm.
- Based on available Geographic Information System (GIS) data, vacant, undeveloped parcels were identified outside of the proposed rights-of-way. The parcels were then evaluated to avoid wetland

and floodplain impacts to the greatest extent possible, except when the option would mean residential or business impacts. Pond sites were evaluated to determine physical (residential/commercial relocations, utility impacts, potential contamination), environmental (wetland/habitat, public lands), and hydrologic impacts in order to determine the best sites, and to modify sites to minimize impacts. Extra care was given to ensure we were not showing uneconomic remainders.

Note that the recommendations were based on pond sizes determined from preliminary data, reasonable engineering judgment, and assumptions. Pond size requirements may change during further study or design phases as more detailed information on seasonal high-water table, wetland hydrologic information, and roadway profile become available. Additionally, future pond configuration must comply with the new FDOT "Highway Beautification Policy" to enhance proposed stormwater ponds as a more natural landscape.

The required treatment, attenuation, and preliminary pond sizing calculations are summarized in Appendix D - Pond Sizing Calculations. Exhibits detailing stormwater management and floodplain compensation pond sites can be found in Exhibit A - Stormwater Management Exhibits.

9. Floodplain Compensation

The project limits are within the Federal Emergency Management Agency's (FEMA) FIRM Panel No's 12095C0650F, 12095C0675F, 12097C0085G, 12097C0105G and 12097C0110G. The major floodplain impacts are associated with Boggy Creek, Jim Branch, Lake Myrtle and Lake Preston. In areas where FEMA mapping or Letter of Map Revision (LOMR) data was unavailable, an overlay of the USDA Quad Maps was used for determination of elevations for Flood Zone A.

The 100-year floodplain is identified by FEMA as being either of two floodplain zones types:

- Zone AE – Base flood elevation (BFE) determined (quantified).
- Zone A – No base flood elevation determined (approximated).

A review of FEMA's FIRM maps for the project indicates that portions of the project lie in the 100-year floodplain, within flood zones AE (elevations range from 63 to 80 NAVD), and A.

Currently along the western segment of the project corridor, roadside swales along Boggy Creek Road discharge into unnamed creeks or ditches that drain into Boggy Creek, a FEMA-designated regulatory floodway. Hydraulic modeling and analysis to achieve a FEMA "No-Rise" certification may be necessary during the design phase of the project depending on the preferred alternative design.

Efforts to address floodplain impacts were made to comply with FDOT's drainage design standards, as well as SFWMD's procedures to achieve results that will not increase flood elevations and/or limits. Impacts have been avoided or minimized as best as possible.

In this study, the compensation for potential floodplain impacts were sized based on a cup-for-cup basis. Seasonal high groundwater was assumed to be one (1) foot below existing ground, therefore compensation depth is one (1) foot. No significant historic basin storage was observed outside of the floodplain areas. Compensation requirements may be reduced with determination of more accurate seasonal high groundwater elevations and modeling to better estimate flood elevations if the project progresses to a future design phase.

The Floodplain Impact and Compensation calculations are summarized in Appendix E - Floodplain Compensation Calculations. Exhibits detailing stormwater management and floodplain compensation pond sites are found in Exhibit A - Stormwater Management Exhibits.

10. Summary

This Pond Sizing and Siting technical memorandum analyzed and identified preliminary stormwater management and floodplain compensation sites for the OPE project. The analysis of the stormwater management facilities for the project is governed by the rules set forth by the SFWMD and FDOT. Stormwater management for water quality treatment and runoff attenuation were estimated using wet detention ponds. Floodplain compensation estimates used the cup-for-cup-method. Within this report, the

requirements, assumptions, and preliminary calculations based on FDOT and SFWMD requirements are presented to support in estimating the preliminary sizing of the pond facilities for the project. The estimated required treatment and attenuation volumes and total pond size areas for each alternative is summarized in Table 1 below. The estimated floodplain impact volumes and compensation pond areas are summarized in Table 2 below.

Table 1: Summary of Total Required Treatment and Attenuation Volume and Preliminary Pond Areas

Alternative	Total Required Treatment + Attenuation Volume (AF)	Total Required Preliminary Pond Area (AC)
West 1A	80.59	94.03
West 1B	78.95	92.21
West 2	69.42	83.07
East 1	109.65	131.23
East 2	127.16	148.89
East 3	88.04	107.90
East 4A	97.11	116.48
East 4B	102.96	122.81
East 4C	102.23	122.00
East 5	100.26	119.86
East 6	106.43	126.29
East 7	94.75	113.84

Table 2: Summary of Total Floodplain Impact Volumes and Floodplain Compensation Pond Areas

Alternative	Total Floodplain Impact Volume (AF)	Total Required Floodplain Compensation Areas (AC)
West 1A	31.55	34.48
West 1B	31.65	34.59
West 2	23.95	27.76
East 1	95.90	137.99
East 2	155.90	170.51
East 3	119.30	132.04
East 4A	127.00	130.43
East 4B	128.23	142.36
East 4C	133.23	147.06
East 5	124.20	138.29
East 6	130.10	142.60
East 7	113.40	125.53

Exhibit A

Stormwater Management Exhibits

N

0 400 2000
Feet

NO FLOODPLAIN IMPACTS, MATCH EXISTING ROAD

MUD LAKE

BOGGY CREEK WBID: 3168A

POND W1A-1

FPC-W1A-1

SR 417

JIM BRANCH WBID: 3172A

HART BRANCH WBID: 3171E

LAKE WHIPPOORWILL

LAKE HART

BOGGY CREEK

LAKE NONA BLVD

POND W1A-2B

POND W1A-2A

FPC-W1A-2

POND W1A-3

NARCOOSSEE ROAD

CANAL C-29A

POND W1A-4

ORANGE COUNTY
OSCEOLA COUNTY

BOGGY CREEK RD

EAST LAKE TOHOPEKALIGA DRAIN WBID: 3172C

EAST LAKE TOHOPEKALIGA DRAIN WBID: 3172C

JIM BRANCH

FLOW TO BE MAINTAINED FOR OFFSITE TRIBUTARIES CROSSING FOR ONSITE TO POND

LAKE AJAY

FELLS COVE

CYRILLS DR

LEGEND

- FLOODPLAIN IMPACT AREA
- FLOODPLAIN COMPENSATION POND
- FEMA 100 YEAR FLOODPLAIN
- PROPOSED STORMWATER POND
- ALTERNATIVE LIMITS
- WATER BODY IDENTIFICATIONS (WBID'S)
- BASIN LIMITS
- CROSS DRAIN

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

OSCEOLA PARKWAY EXTENSION
Concept, Feasibility, and Mobility Study

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

$USER$ $DATE$ $TIME$ $FILE$

ALTERNATIVE WEST 1A
STORMWATER MANAGEMENT

SHEET NO.

N

0 400 2000
Feet

NO FLOODPLAIN IMPACTS, MATCH EXISTING ROAD

MUD LAKE

BOGGY CREEK WBID: 3168A

POND W1B-1

FPC-W1B-1

SR 417

JIM BRANCH WBID: 3172A

HART BRANCH WBID: 3171E

LAKE WHIPPOORWILL

LAKE HART

BOGGY CREEK

LAKE NONA BLVD

POND W1B-2B

POND W1B-2A

FPC-W1B-2

POND W1B-3

NARCOOSSEE ROAD

CANAL C-29A

POND W1B-4

ORANGE COUNTY
OSCEOLA COUNTY

BOGGY CREEK RD

EAST LAKE TOHOPEKALIGA DRAIN WBID: 3172C

JIM BRANCH

FLOW TO BE MAINTAINED FOR OFFSITE TRIBUTARIES. CROSSING FOR ONSITE TO POND.

EAST LAKE TOHOPEKALIGA DRAIN WBID: 3172C

LAKE AJAY

FELLS COVE

CYRILLIS DR

LEGEND

- FLOODPLAIN IMPACT AREA
- FLOODPLAIN COMPENSATION POND
- FEMA 100 YEAR FLOODPLAIN
- PROPOSED STORMWATER POND
- ALTERNATIVE LIMITS
- WATER BODY IDENTIFICATIONS (WBID'S)
- BASIN LIMITS
- CROSS DRAIN

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

OSCEOLA PARKWAY EXTENSION
Concept, Feasibility, and Mobility Study

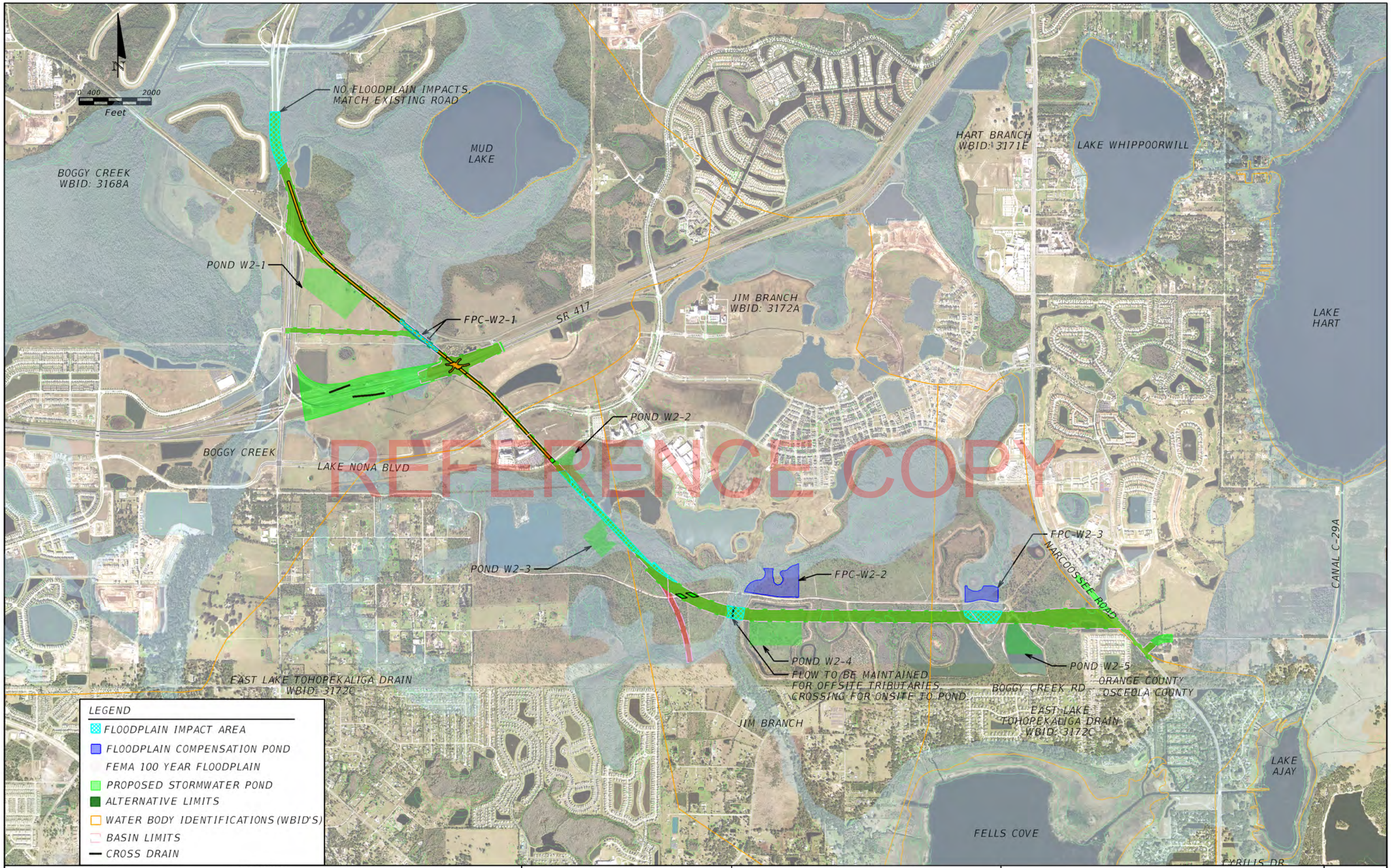
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE WEST 1B STORMWATER MANAGEMENT

SHEET NO.

$USER$ $DATE$ $TIME$ $FILE$



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

OSCEOLA PARKWAY EXTENSION
Concept, Feasibility, and Mobility Study

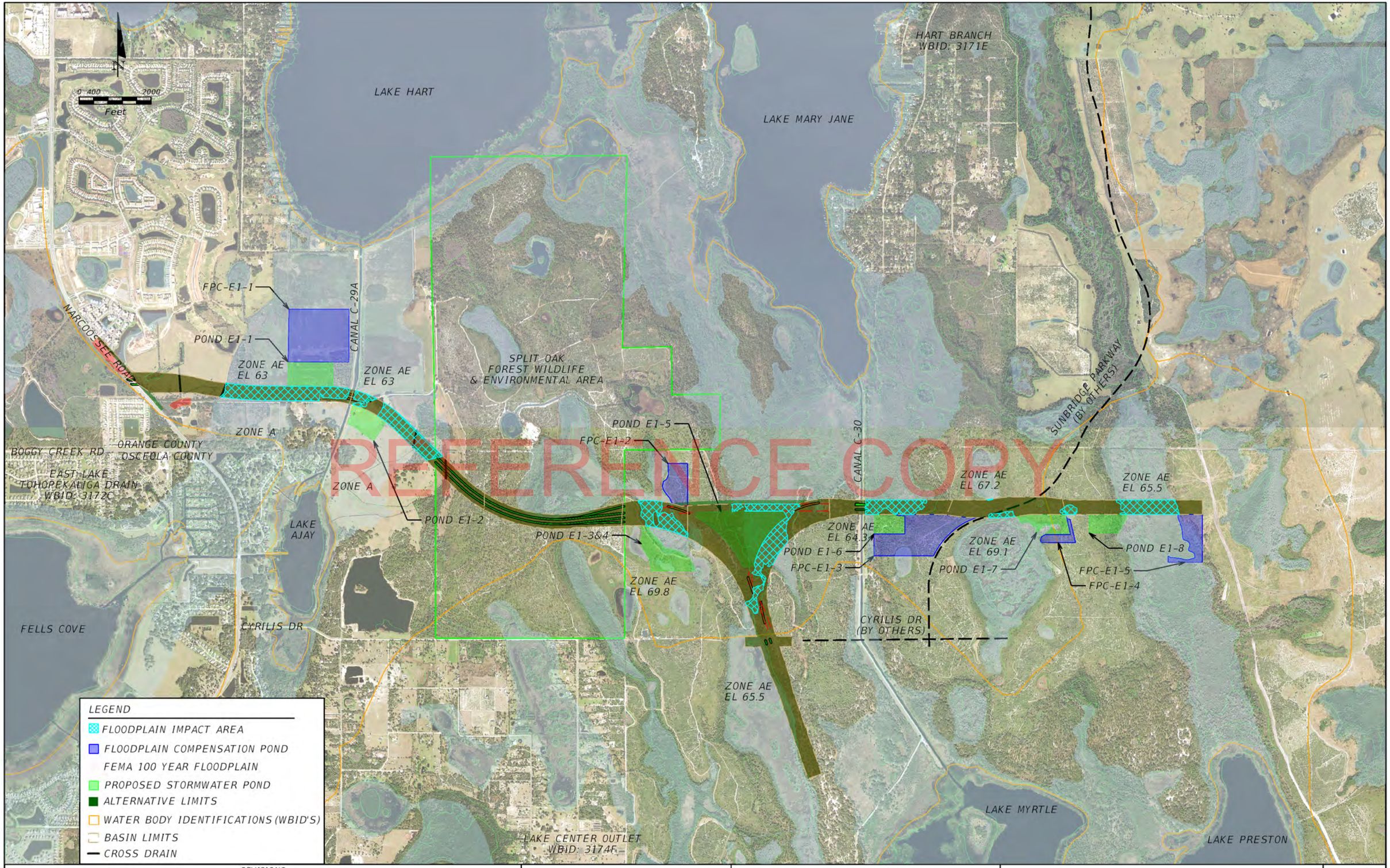
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

$USER$ $DATE$ $TIME$ $FILE$

ALTERNATIVE WEST 2 STORMWATER MANAGEMENT

SHEET NO.



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

OSCEOLA PARKWAY EXTENSION
Concept, Feasibility, and Mobility Study

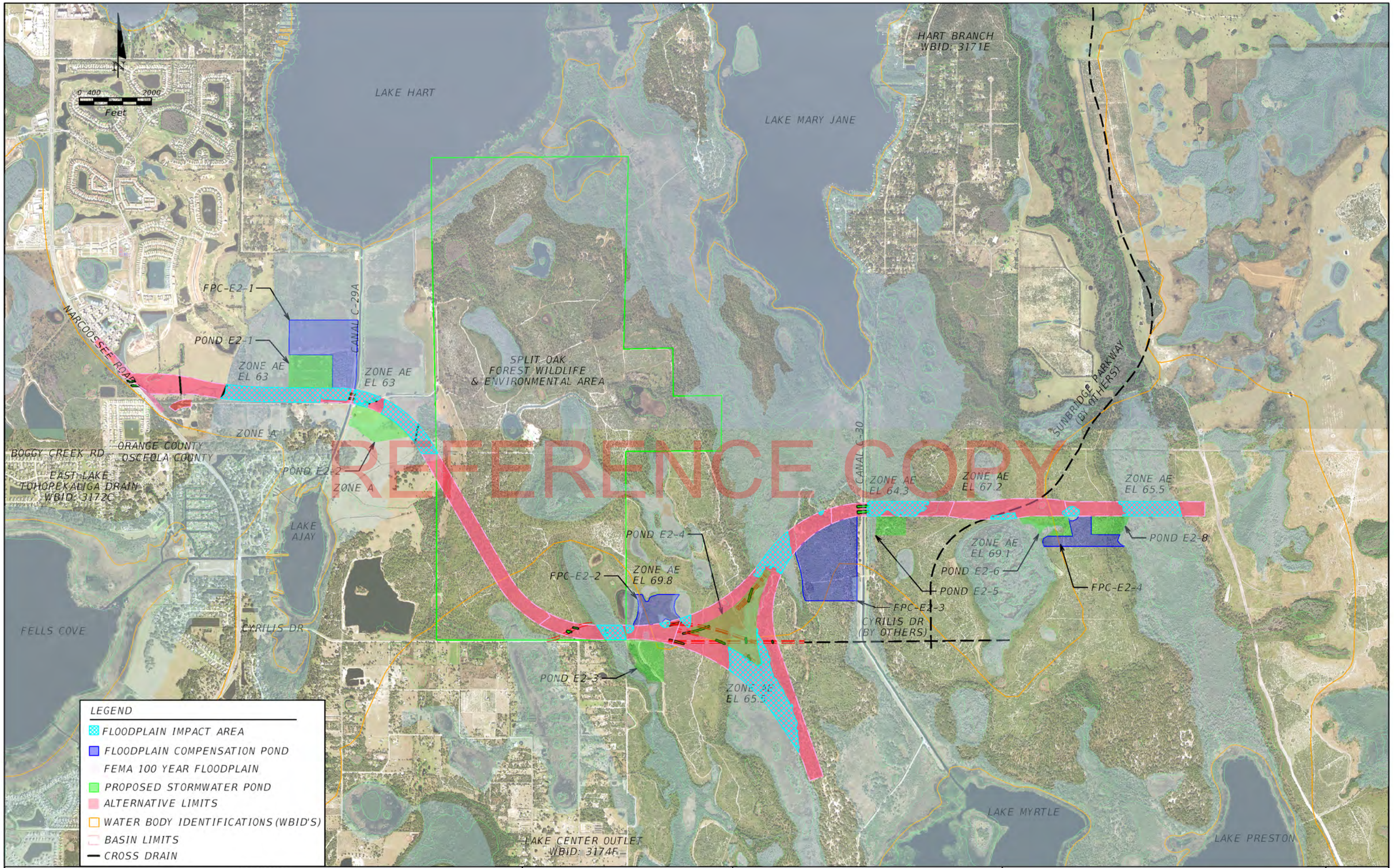
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE EAST 1
STORMWATER MANAGEMENT

SHEET NO.

$USER$ $DATE$ $TIME$ $FILE$



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

OSCEOLA PARKWAY EXTENSION
Concept, Feasibility, and Mobility Study

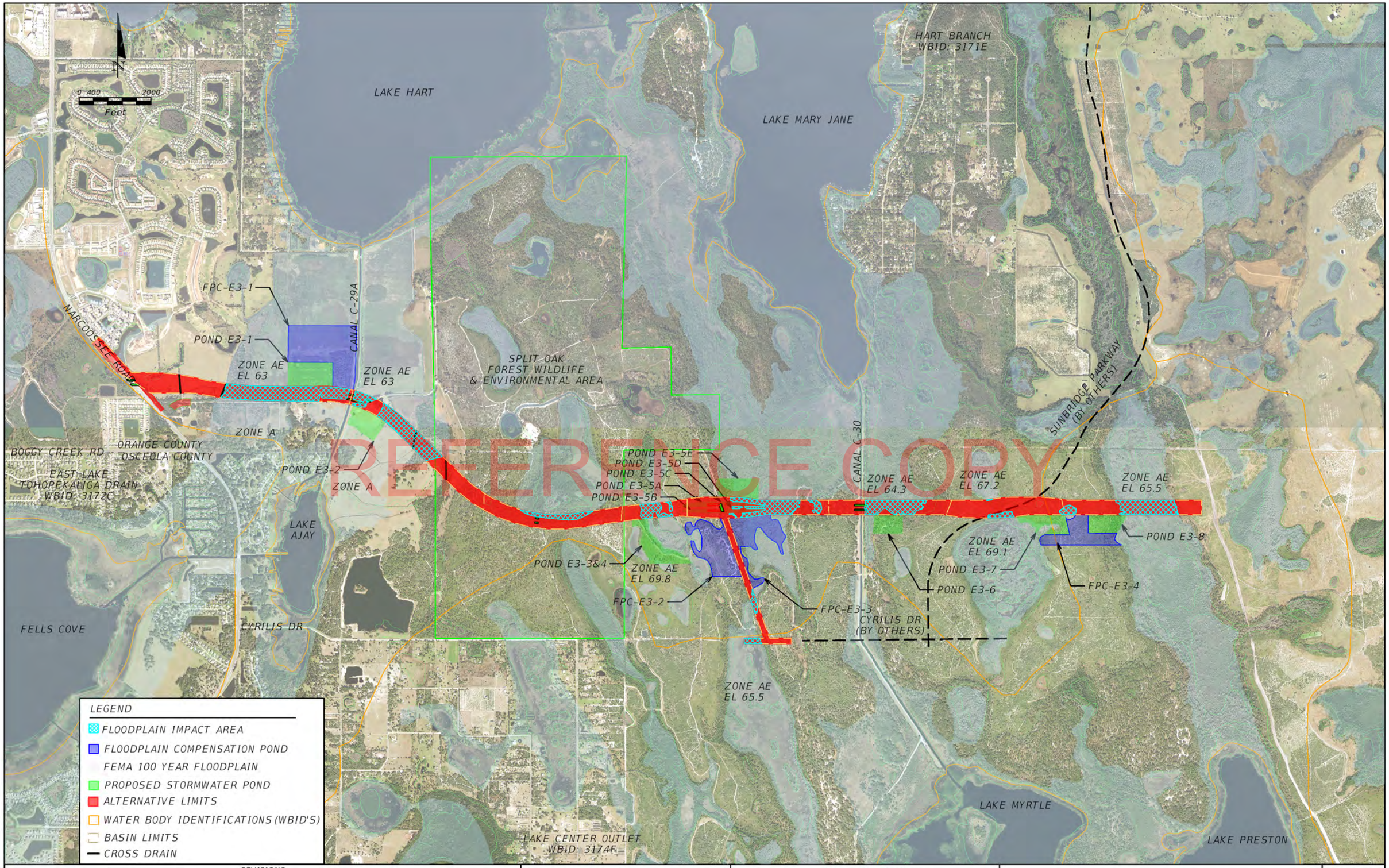
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

$USER$ $DATE$ $TIME$ $FILE$

ALTERNATIVE EAST 2
STORMWATER MANAGEMENT

SHEET NO.



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

OSCEOLA PARKWAY EXTENSION
Concept, Feasibility, and Mobility Study

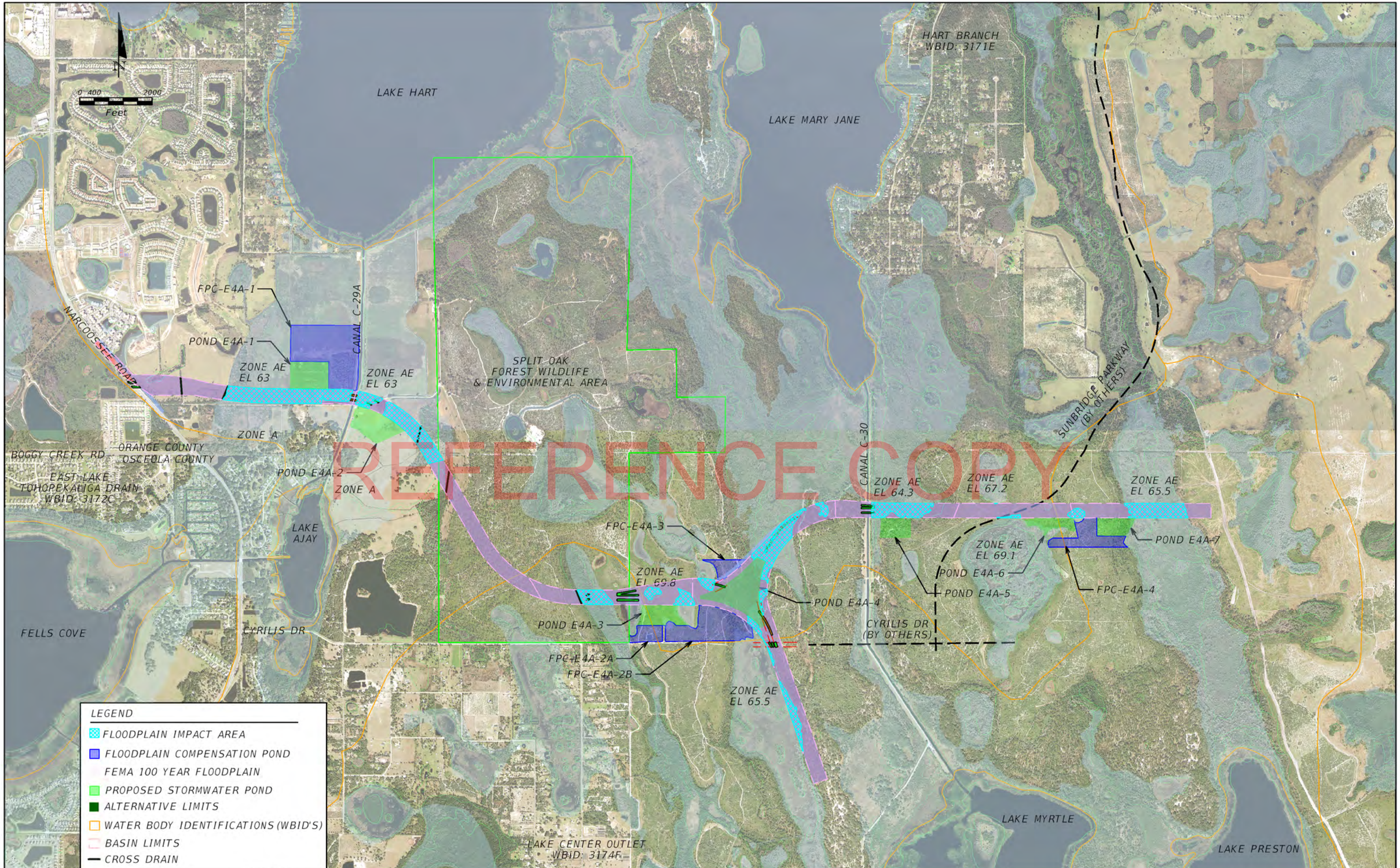
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE EAST 3
STORMWATER MANAGEMENT

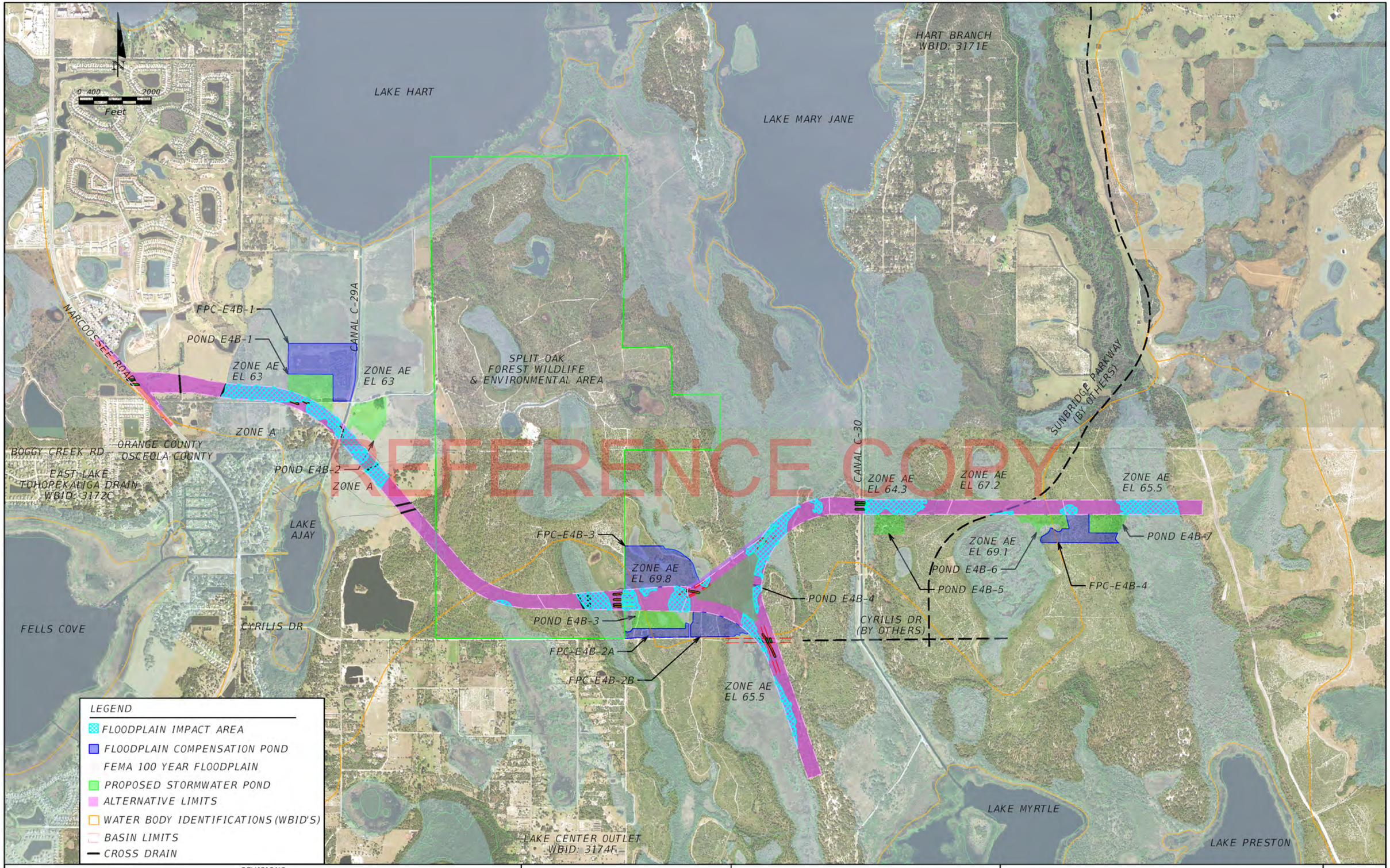
SHEET NO.

$USER$ $DATE$ $TIME$ $FILE$



REVISIONS				OSCEOLA PARKWAY EXTENSION Concept, Feasibility, and Mobility Study	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			ALTERNATIVE EAST 4A STORMWATER MANAGEMENT	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		

$USERS $DATES $TIMES $FILES



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

OSCEOLA PARKWAY EXTENSION
Concept, Feasibility, and Mobility Study

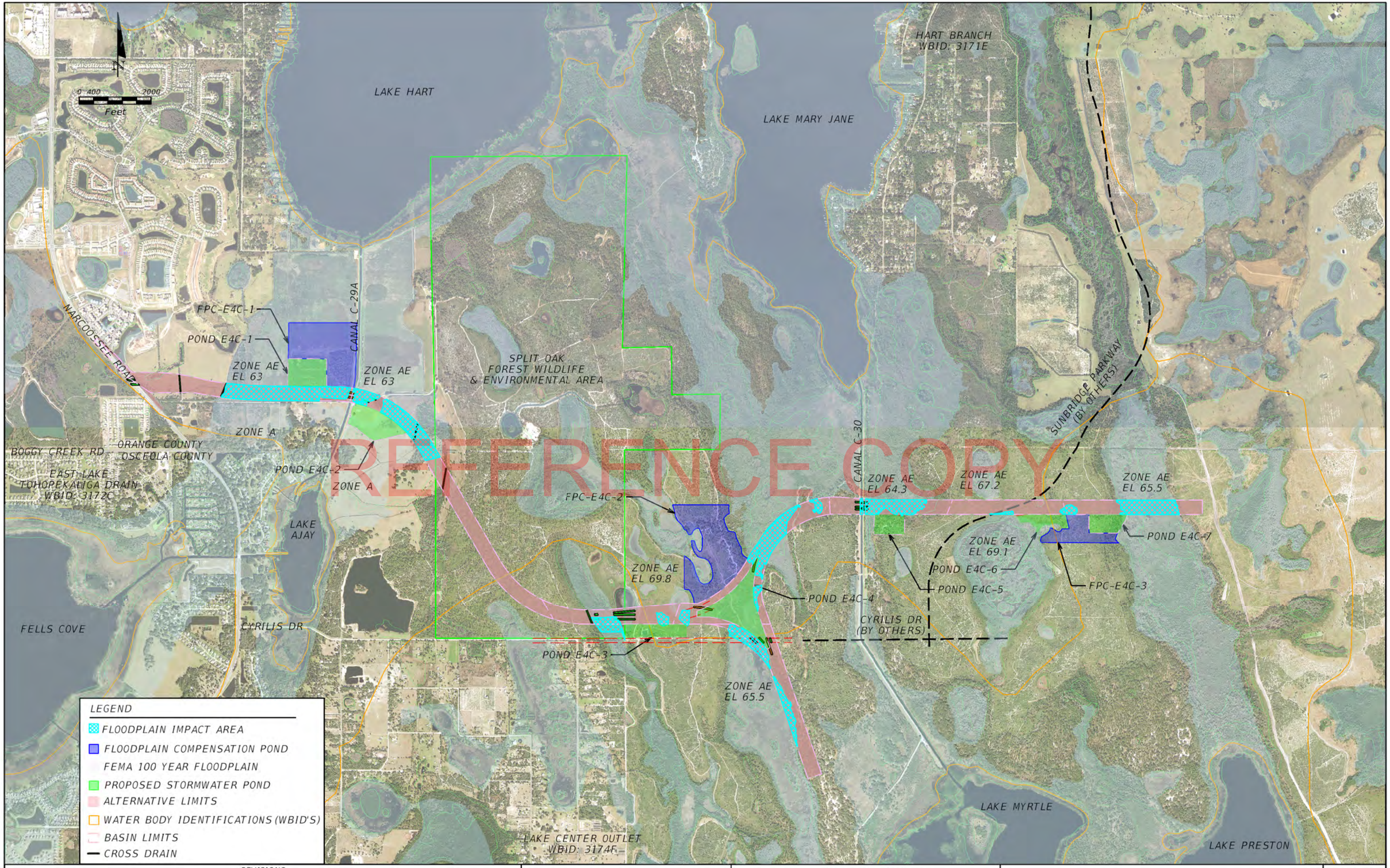
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE EAST 4B STORMWATER MANAGEMENT

SHEET NO.

$USER$ $DATE$ $TIME$ $FILE$



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

OSCEOLA PARKWAY EXTENSION
Concept, Feasibility, and Mobility Study

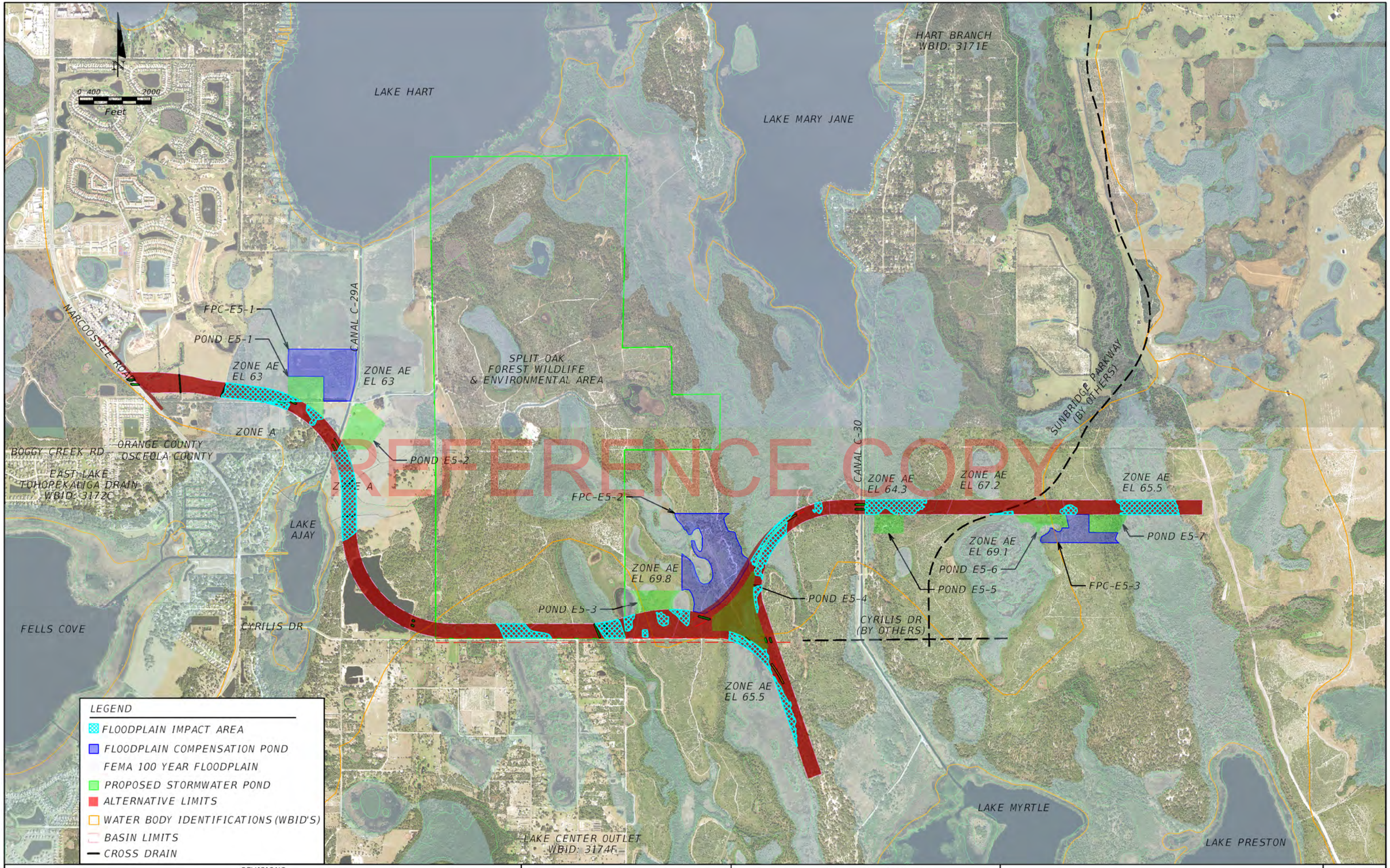
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

$USER$ $DATE$ $TIME$ $FILE$

ALTERNATIVE EAST 4C
STORMWATER MANAGEMENT

SHEET NO.



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

OSCEOLA PARKWAY EXTENSION
Concept, Feasibility, and Mobility Study

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE EAST 5 STORMWATER MANAGEMENT

SHEET NO.

$USER$ $DATE$ $TIME$ $FILE$

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

OSCEOLA PARKWAY EXTENSION
Concept, Feasibility, and Mobility Study

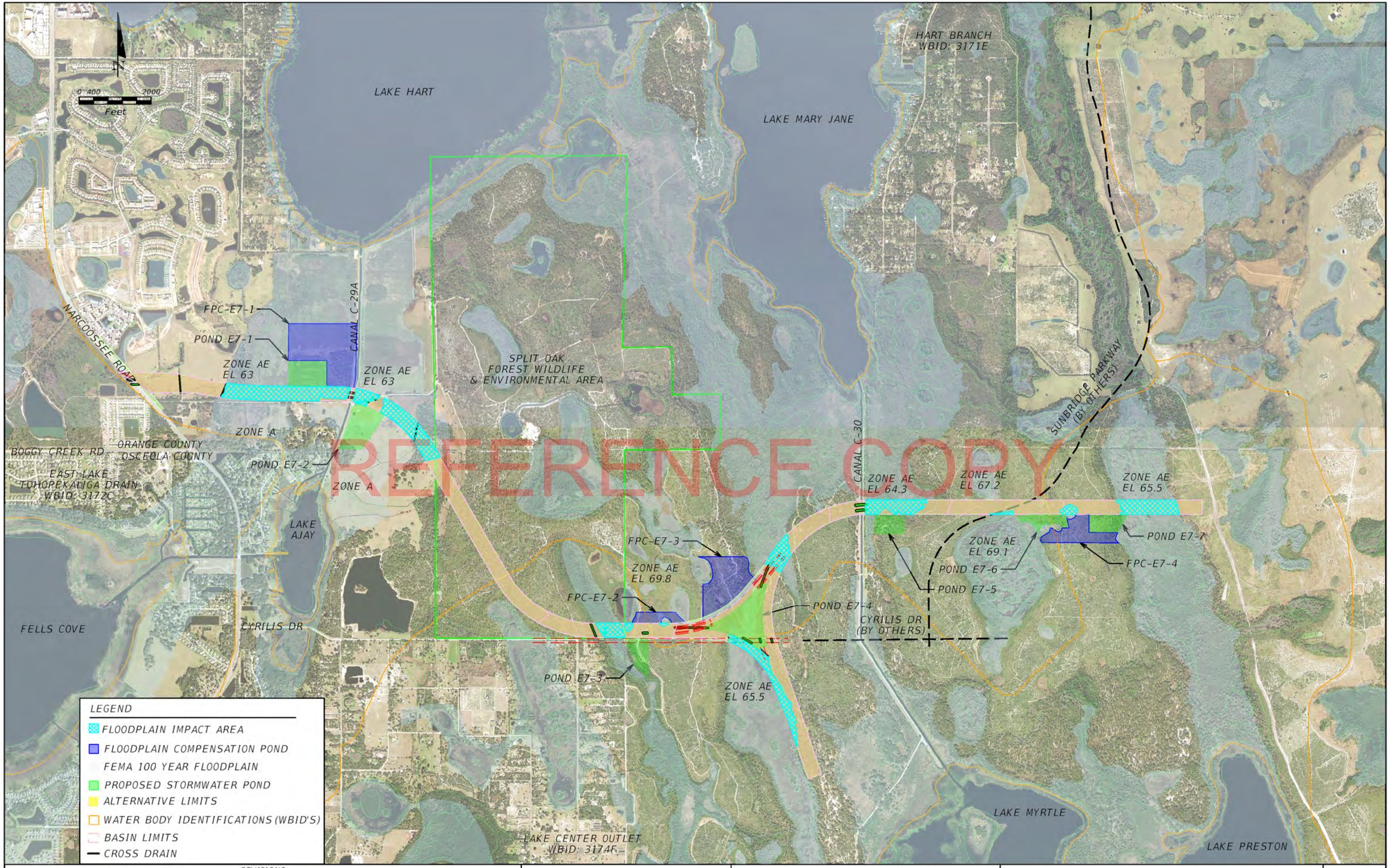
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE EAST 6
STORMWATER MANAGEMENT

SHEET NO.

$USERS $DATES $TIMES $FILES



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

OSCEOLA PARKWAY EXTENSION
Concept, Feasibility, and Mobility Study

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE EAST 7 STORMWATER MANAGEMENT

SHEET NO.

$USER$ $DATE$ $TIME$ $FILE$

APPENDIX A

Datum

Questions concerning the VERTCON process may be mailed to NGS

Latitude: 28 21 21.230

Longitude: 081 14 29.870

NGVD 29 height: 87.00 FT

NGVD = NAVD + 1.01'
NAVD = NGVD - 1.01'

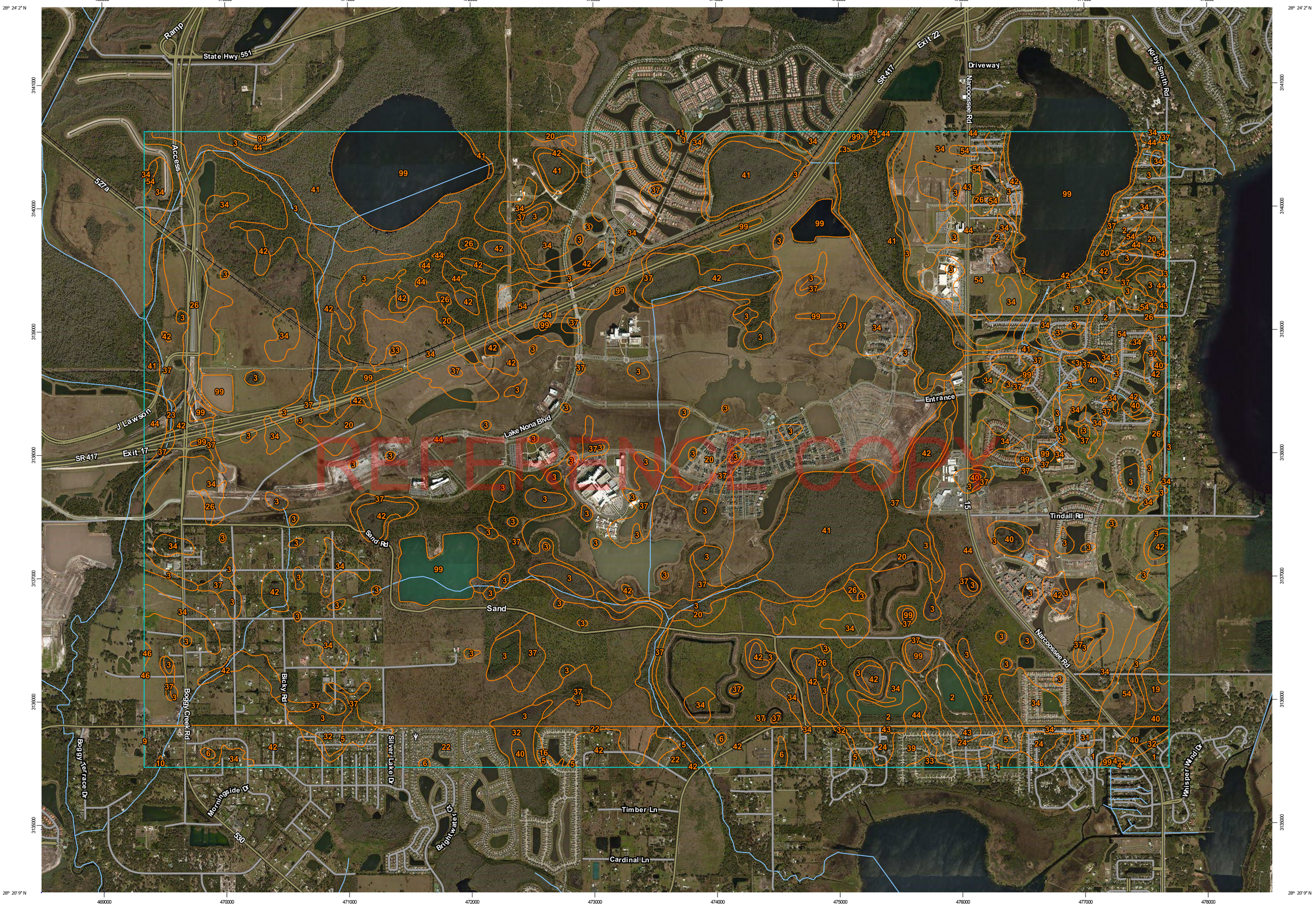
Datum shift(NAVD 88 minus NGVD 29): -1.010 feet

Converted to NAVD 88 height: 85.990 feet

*Datum Location: Near the intersection of Narcoossee Road and Boggy Creek Road.

APPENDIX B

Soils Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County, Florida
Survey Area Data: Version 14, Oct 6, 2017

Soil Survey Area: Osceola County, Florida
Survey Area Data: Version 14, Oct 6, 2017

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 8, 2010—Feb 20, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

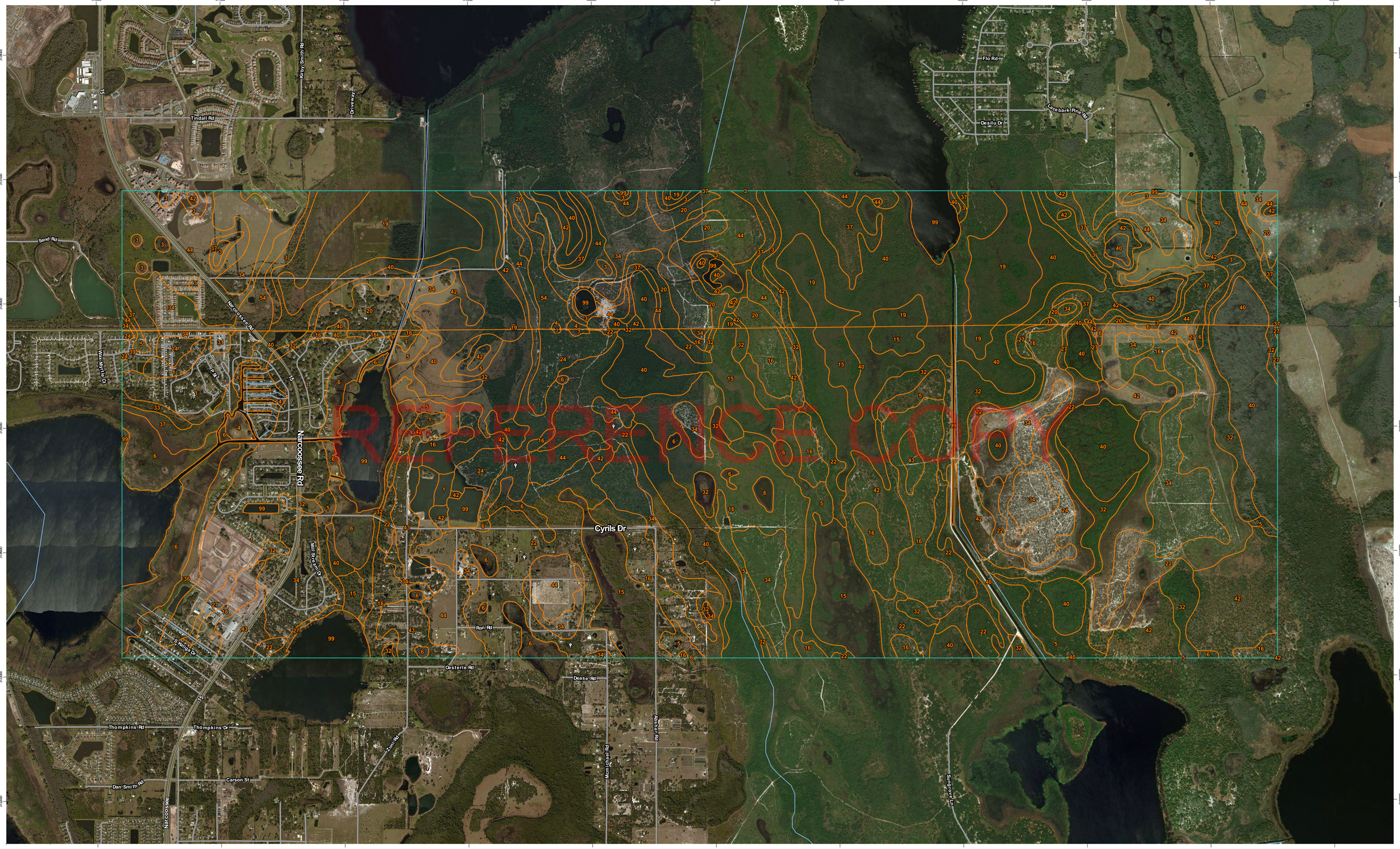
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2	Archbold fine sand, 0 to 5 percent slopes	74.7	0.7%
3	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	868.6	8.1%
19	Hontoon muck, frequently ponded, 0 to 1 percent slopes	11.9	0.1%
20	Immokalee fine sand	221.6	2.1%
23	Malabar fine sand	3.4	0.0%
26	Ona fine sand, 0 to 2 percent slopes	152.9	1.4%
33	Pits	1.3	0.0%
34	Pomello fine sand, 0 to 5 percent slopes	914.5	8.6%
37	St. Johns fine sand	634.1	5.9%
40	Samsula muck, frequently ponded, 0 to 1 percent slopes	44.3	0.4%
41	Samsula-Hontoon-Basinger association, depressional	596.8	5.6%
42	Sanibel muck	424.6	4.0%
43	Seffner fine sand, 0 to 2 percent slopes	17.9	0.2%
44	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	5,283.7	49.5%
46	Tavares fine sand, 0 to 5 percent slopes	1.9	0.0%
54	Zolfo fine sand, 0 to 2 percent slopes	149.4	1.4%
99	Water	572.5	5.4%
Subtotals for Soil Survey Area		**9,974.1**	**93.5%**
Totals for Area of Interest		**10,663.9**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Adamsville sand, 0 to 2 percent slopes	38.9	0.4%
4	Arents, 0 to 5 percent slopes	3.0	0.0%
5	Basinger fine sand, 0 to 2 percent slopes	37.4	0.4%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6	Basinger fine sand, depressional, 0 to 1 percent slopes	23.1	0.2%
9	Cassia fine sand, 0 to 2 percent slopes	0.0	0.0%
10	Delray loamy fine sand, depressional	1.2	0.0%
16	Immokalee fine sand, 0 to 2 percent slopes	5.5	0.1%
22	Myakka fine sand, 0 to 2 percent slopes	120.0	1.1%
24	Narcoossee fine sand, 0 to 2 percent slopes	42.8	0.4%
31	Pits	6.1	0.1%
32	Placid fine sand, frequently ponded, 0 to 1 percent slopes	34.8	0.3%
33	Placid variant fine sand	7.3	0.1%
34	Pomello fine sand, 0 to 5 percent slopes	16.2	0.2%
39	Riviera fine sand, frequently ponded, 0 to 1 percent slopes	58.1	0.5%
40	Samsula muck, frequently ponded, 0 to 1 percent slopes	20.4	0.2%
42	Smyrna fine sand, 0 to 2 percent slopes	263.9	2.5%
43	St. Lucie fine sand, 0 to 5 percent slopes	10.0	0.1%
99	Water	1.0	0.0%
Subtotals for Soil Survey Area		**689.8**	**6.5%**
Totals for Area of Interest		**10,663.9**	**100.0%**

Soil Map—Orange County, Florida, and Osceola County, Florida
(Osceola Parkway Extension - East)



Map Scale: 1:14,000 if printed on D landscape (34" x 22") sheet.
Meters 0 200 400 800 1200
Feet 0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County, Florida
Survey Area Data: Version 14, Oct 6, 2017

Soil Survey Area: Osceola County, Florida
Survey Area Data: Version 14, Oct 6, 2017

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 8, 2010—Mar 17, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	143.8	1.7%
4	Candler fine sand, 0 to 5 percent slopes	2.9	0.0%
19	Hontoon muck, frequently ponded, 0 to 1 percent slopes	339.5	3.9%
20	Immokalee fine sand	175.4	2.0%
34	Pomello fine sand, 0 to 5 percent slopes	270.2	3.1%
37	St. Johns fine sand	169.0	1.9%
40	Samsula muck, frequently ponded, 0 to 1 percent slopes	647.8	7.5%
42	Sanibel muck	236.6	2.7%
44	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	445.7	5.1%
54	Zolfo fine sand, 0 to 2 percent slopes	64.6	0.7%
99	Water	56.3	0.6%
Subtotals for Soil Survey Area		**2,551.7**	**29.4%**
Totals for Area of Interest		**8,685.2**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Adamsville sand, 0 to 2 percent slopes	377.7	4.3%
4	Arents, 0 to 5 percent slopes	43.4	0.5%
5	Basinger fine sand, 0 to 2 percent slopes	297.6	3.4%
6	Basinger fine sand, depressional, 0 to 1 percent slopes	337.8	3.9%
7	Candler sand, 0 to 5 percent slopes	2.2	0.0%
15	Hontoon muck, frequently ponded, 0 to 1 percent slopes	366.7	4.2%
16	Immokalee fine sand, 0 to 2 percent slopes	775.3	8.9%
19	Malabar fine sand, 0 to 2 percent slopes	11.5	0.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
22	Myakka fine sand, 0 to 2 percent slopes	800.8	9.2%
24	Narcoossee fine sand, 0 to 2 percent slopes	148.5	1.7%
27	Ona fine sand, 0 to 2 percent slopes	42.0	0.5%
31	Pits	6.1	0.1%
32	Placid fine sand, frequently ponded, 0 to 1 percent slopes	404.2	4.7%
33	Placid variant fine sand	10.8	0.1%
34	Pomello fine sand, 0 to 5 percent slopes	524.9	6.0%
36	Pompano fine sand, 0 to 2 percent slopes	70.5	0.8%
37	Pompano fine sand, frequently ponded, 0 to 1 percent slopes	36.6	0.4%
39	Riviera fine sand, frequently ponded, 0 to 1 percent slopes	14.9	0.2%
40	Samsula muck, frequently ponded, 0 to 1 percent slopes	784.8	9.0%
42	Smyrna fine sand, 0 to 2 percent slopes	495.7	5.7%
43	St. Lucie fine sand, 0 to 5 percent slopes	138.4	1.6%
44	Tavares fine sand, 0 to 5 percent slopes	163.1	1.9%
99	Water	280.2	3.2%
Subtotals for Soil Survey Area		**6,133.5**	**70.6%**
Totals for Area of Interest		**8,685.2**	**100.0%**

APPENDIX C

Typical Section Assumptions

JACOBS ch2m

Typical Section Assumptions

1) Eight-Lane Ultimate Build-Out

a) Through Lanes Width (8 at 12' each)	96.00	
b) Inside Paved Shoulders (2 at 12' each)	24.00	PPM Table 2.3.1 (10')*
c) Outside Paved Shoulders (2 at 12' each)	24.00	PPM Table 2.3.1 (10')*
Total 8-Lane Ultimate Build-Out Impervious Width	**144.00**	*average" to cover bridges, etc.

2) 1-Lane Ramp (all ramps assumed 1-Lane pending traffic projections)

a) Through Lane Width (1 at 15' each)	15.00	PPM Table 2.1.3
b) Inside Paved Shoulders (1 at 2' each)	2.00	PPM Table 2.3.1
c) Outside Paved Shoulders (1 at 4' each)	4.00	PPM Table 2.3.1
Total 1-Lane Ramp Impervious Width	**21.00**	

3) 2-Lane Frontage Road (only used in West Alternatives and East 2)

a) Through Lane Width (2 in each direction at 12')	48.00	
b) Inside Curb and Gutter (1 in each direction at 2')	4.00	
c) Bike Lane (1 in each direction at 4')	8.00	
d) Outside Curb and Gutter (1 in each direction at 2')	4.00	
Total 2-Lane Frontage Road Impervious Width	**64.00**	

4) Direct Airport Connector (elevated bridge section, from Jeff Fuqua Blvd. to Laureate Blvd.)

a) Through Lane Widths (1 in each direction at 15')	30.00	PPM Table 2.1.3
b) Inside Paved Shoulders (1 in each direction at 6')	12.00	PPM Table 2.3.1
c) Outside Paved Shoulders (1 in each direction at 10')	20.00	PPM Table 2.3.1
d) Median barrier wall	2.00	
e) Outside Bridge Rails (1 in each direction at 2')	4.00	
Total Direct Airport Connector Impervious Width	**68.00**	

Note: Assumed Direct Airport Connector contribution to impervious area	0.333	Direct Airport Connector will overlap frontage roads below

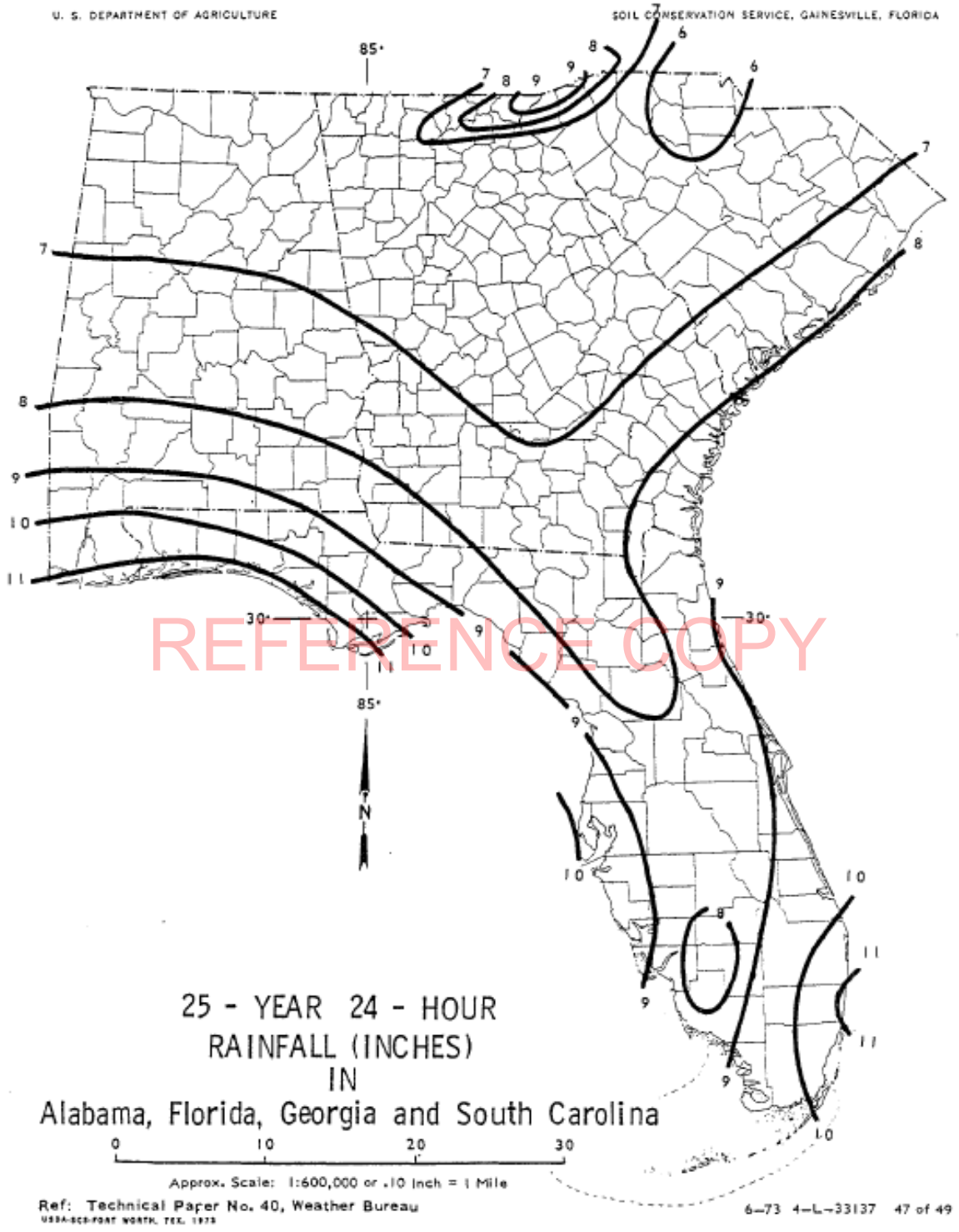
Legend

Assumed Criteria Used In Subsequent Tabs

APPENDIX D

Pond Sizing Calculations

Rainfall Source:



Orange County, 25 year - 24 hour Storm Event Distribution, **P = 8.6 inches**

Source: SFWMD, ERP Applicant's Handbook Volume II, Section 5.7.2 Rainfall

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study | **CALCULATED BY:** R.Q.Ly | **DATE:** 1/3/17

SUBJECT: Sample Calculation | **CHECKED BY:** A.L.Windom | **DATE:** 1/4/17

Alternative: East 4A Basin 1

Water Quantity - Attenuation Volume Calculations - Open Basin

Soil Storage, S=1000/CN - 10

Runoff, R (IN)=(P-0.2S)^2/(P+0.8S)

Rainfall, P (IN) =

P, SFWMD 25 year - 24 hr Storm Event (IN)* = 8.6

P, FDOT 100 year - 24 hr Storm Event (IN) = 10.6

*SFWMD: Orange County 25yr/24 hr Storm Event Distribution for projects within Orange County

Pre-Development Conditions

Existing Runoff CN	CN	Area
Smyrna Fine Sand (A/D), Pervious	80	65.28
Existing Pavement - Impervious	98	0
Existing Pond Area - Pervious	80	14.5

Total Basin Area = 79.78

Weighted CN = 80.00

Soil Storage, S = 1000/CN - 10 = 2.50

Runoff, R (IN)

R, 25 year - 24 hr Storm Event (IN) = 6.19

R, 100 year - 24 hr Storm Event (IN) = 8.10

Post-Development Conditions

Proposed Runoff CN	CN	Area
Smyrna Fine Sand (A/D), Pervious	80	42.973
Proposed Pavement - Ultimate 8 Lane - Impervious	98	22.307
Proposed Pond NWL - Impervious	100	14.5

Total Basin Area = 79.78

Weighted CN = 88.67

Soil Storage, S = 1000/CN - 10 = 1.28

Runoff, R (IN)

R, 25 year - 24 hr Storm Event (IN) = 7.24

R, 100 year - 24 hr Storm Event (IN) = 9.21

Required Attenuation Volume (AF) = Post - Pre Runoff

Volume, SFWMD 25 year - 24 hr Storm Event (AF) = 6.96

Volume, FDOT 100 year - 24 hr Storm Event (AF) = **7.39**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study | **CALCULATED BY:** R.Q.Ly | **DATE:** 1/3/17

SUBJECT: Sample Calculation | **CHECKED BY:** A.L.Windom | **DATE:** 1/4/17

Alternative: East 4A Basin 1

Water Quality - Treatment Volume Calculations

SFWMD Jurisdiction - Wet Detention - Open Basin

Outfalls into Impaired Waters: Yes - Okeechobee Basin

Project Area = Total Basin Area-Pond Parcel (AC) =	50.78
Total Impervious Area (AC) =	22.31
Treatment Volume is Greater of:	
1" over Total Basin Area =	4.23
2.5" over Impervious Area =	4.65
Greater Volume Governs =	4.65
Add 50% Additional Treatment Volume for Discharge to Impaired Waters (Okeechobee Basin) =	2.32
Total Treatment Volume Required (AF):	**6.97**

Volume for Pond Sizing Calculations

Total Volume for Preliminary Pond Sizing, Attenuation plus Treatment Volume (AF) =	**14.36**

Pond Sizing Calculations

Assume H, Treatment Depth (FT) (NWL is 1' Below Grade) =	1
For FDOT Ponds, W = 2L and Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$	
Required Treatment and Antenuation Volume (AF) =	14.36
Therefore, L (FT)=	559
and W (FT) =	1118
Add Side Slopes Length (FT), 1:4 slope, 2 ft depth, 2 sides =	16
Add 20 ft Maintenance Berm on 2 sides =	40
Add Tie-Down Slopes, 1:4 slope, 2 ft depth, 2 sides =	16
Including Berm and Top Slopes, L (FT) =	631
Including Berm and Top Slopes, W (FT) =	1190

Preliminary Pond Area Required (AC):	**17.25**
Total Basin Area (AC):	79.78
Pond Area % of Total Basin Area:	21.6%

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative West 1A **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description		Basin			
		W1A-1	W1A-2	W1A-3	W1A-4
Water Quantity - Attenuation Volume Calculations					
P, SFWMD 25 year - 24 hr Storm Event (IN) =	8.6				
P, FDOT 100 year - 24 hr Storm Event (IN) =	10.6				
Pre-Development Conditions					
Existing Runoff CN	**CN**	**Area (AC)**			
Smyrna Fine Sand (A/D), Pervious	80	93.68	76.87	74.19	47.40
Existing Pavement - Impervious	98	0	0	0	0
Existing Pond - Pervious	80	28.5	21.5	19.5	11
Total Basin Area =		122.18	98.37	93.69	58.40
Weighted CN =		80.00	80.00	80.00	80.00
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$					
Soil Storage, S = 1000/CN - 10 =		2.50	2.50	2.50	2.50
R, 25 year - 24 hr Storm Event (IN) =		6.19	6.19	6.19	6.19
R, 100 year - 24 hr Storm Event (IN) =		8.10	8.10	8.10	8.10
Post-Development Conditions	**Width (FT)**	**Length (FT)**			
Ultimate 8 Lane Osceola Parkway Extension	144.00	8996	9533	9140	3448
Ultimate 8 Lane Northeast Connector	144.00	0	0	0	0
1 Lane Ramp	21.00	18066	4360	492	5810
2 Lane Frontage Ramp	64.00	0	0	0	0
Direct Airport Connector (33% Contribution)	68.00	12055	0	0	0
Total Proposed Pavement Impervious Area (AC) =		44.66	33.62	30.45	14.20
Proposed Runoff CN	**CN**	**Area (AC)**			
Smyrna Fine Sand (A/D), Pervious	80	49.02	43.25	43.74	33.20
Proposed Pavement - Ultimate 8 Lane	98	44.66	33.62	30.45	14.20
Proposed Pond NWL - Impervious	100	28.5	21.5	19.5	11
Total Basin Area		122.18	98.37	93.69	58.40
Weighted CN		91.24	90.52	90.01	88.14
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$					
Soil Storage, S = 1000/CN - 10 =		0.96	1.05	1.11	1.35
R, 25 year - 24 hr Storm Event (IN) =		7.55	7.46	7.40	7.17
R, 100 year - 24 hr Storm Event (IN) =		9.53	9.44	9.38	9.14
Attenuation Volume Estimate = Pre-Post Runoff					
Volume, 25 year - 24 hr Storm Event (AF) =		13.82	10.41	9.44	4.79
Volume, 100 year - 24 hr Storm Event (AF) =		**14.60**	**11.01**	**9.99**	**5.08**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study | **CALCULATED BY:** R.Q.Ly | **DATE:** 1/3/17

SUBJECT: Alternative West 1A | **CHECKED BY:** A.L.Windom | **DATE:** 1/4/17

Description	Basin			
	W1A-1	W1A-2	W1A-3	W1A-4
Water Quality - Treatment Volume Estimate				
SFWMD, Wet Detention, Outfall to Impaired Waters: Yes - Okeechobee Basin				
Project Area = Total Basin Area-Pond Parcel (AC) =	93.68	76.87	74.19	47.40
Total Impervious Area (AC) =	44.66	33.62	30.45	14.20
Treatment Volume is Greater of:				
1" over Total Basin Area =	7.81	6.41	6.18	3.95
2.5" over Impervious Area =	9.30	7.00	6.34	2.96
Greater Volume Governing:	9.30	7.00	6.34	3.95
50% Additional Treatment Volume Additional for Discharge to Impaired Waters =	4.65	3.50	3.17	1.98
Total Treatment Volume Estimate (AF):	**13.96**	**10.50**	**9.52**	**5.93**
Volume for Pond Sizing Calculations				
Total of Attenuation plus Treatment Volume (AF):	28.55	21.52	19.51	11.01
Total Volume for Preliminary Pond Sizing (AF):	**28.55**	**21.52**	**19.51**	**11.01**
Preliminary Pond Sizing Calculations Assume control elevation 1-ft below ground plus 1-ft freeboard and pond W=2L				
Assume H, Treatment Depth (FT) =	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$				
Therefore, L (FT)=	789	685	652	490
and W (FT) =	1577	1369	1304	979
Side Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16
20 ft Maintenance Berm, 2 sides (FT) =	40	40	40	40
Tie-Down Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16
Including Berm and Top Slopes, L (FT) =	861	757	724	562
Including Berm and Top Slopes, W (FT) =	1649	1441	1376	1051
Preliminary Pond Area Required:	**32.58**	**25.03**	**22.86**	**13.56**
Total Basin Area:	122.18	98.37	93.69	58.40
Pond Area % of Total Basin Area:	26.7%	25.4%	24.4%	23.2%

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative West 1B **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description		Basin			
		W1B-1	W1B-2	W1B-3	W1B-4
Water Quantity - Attenuation Volume Calculations					
P, SFWMD 25 year - 24 hr Storm Event (IN) =	8.6				
P, FDOT 100 year - 24 hr Storm Event (IN) =	10.6				
Pre-Development Conditions					
Existing Runoff CN	**CN**	**Area (AC)**			
Smyrna Fine Sand (A/D), Pervious	80	93.68	76.87	70.92	37.22
Existing Pavement - Impervious	98	0	0	0	0
Existing Pond - Pervious	80	28.5	21.5	19.5	9.4
Total Basin Area =		122.18	98.37	90.42	46.62
Weighted CN =		80.00	80.00	80.00	80.00
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$					
Soil Storage, S = 1000/CN - 10 =		2.50	2.50	2.50	2.50
R, 25 year - 24 hr Storm Event (IN) =		6.19	6.19	6.19	6.19
R, 100 year - 24 hr Storm Event (IN) =		8.10	8.10	8.10	8.10
Post-Development Conditions	**Width (FT)**	**Length (FT)**			
Ultimate 8 Lane Osceola Parkway Extension	144.00	8996	9533	9140	3448
Ultimate 8 Lane Northeast Connector	144.00	0	0	0	0
1 Lane Ramp	21.00	18066	4360	492	5810
2 Lane Frontage Ramp	64.00	0	0	0	0
Direct Airport Connector (33% Contribution)	68.00	12055	0	0	0
Total Proposed Pavement Impervious Area (AC) =		44.66	33.62	30.45	14.20
Proposed Runoff CN	**CN**	**Area (AC)**			
Smyrna Fine Sand (A/D), Pervious	80	49.02	43.25	40.47	23.02
Proposed Pavement - Ultimate 8 Lane	98	44.66	33.62	30.45	14.20
Proposed Pond NWL - Impervious	100	28.5	21.5	19.5	9.4
Total Basin Area		122.18	98.37	90.42	46.62
Weighted CN		91.24	90.52	90.38	89.51
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$					
Soil Storage, S = 1000/CN - 10 =		0.96	1.05	1.06	1.17
R, 25 year - 24 hr Storm Event (IN) =		7.55	7.46	7.44	7.34
R, 100 year - 24 hr Storm Event (IN) =		9.53	9.44	9.42	9.31
Attenuation Volume Estimate = Pre-Post Runoff					
Volume, 25 year - 24 hr Storm Event (AF) =		13.82	10.41	9.44	4.46
Volume, 100 year - 24 hr Storm Event (AF) =		**14.60**	**11.01**	**9.98**	**4.73**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative West 1B **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description	Basin			
	W1B-1	W1B-2	W1B-3	W1B-4
Water Quality - Treatment Volume Estimate				
SFWMD, Wet Detention, Outfall to Impaired Waters: Yes - Okeechobee Basin				
Project Area = Total Basin Area-Pond Parcel (AC) =	93.68	76.87	70.92	37.22
Total Impervious Area (AC) =	44.66	33.62	30.45	14.20
Treatment Volume is Greater of:				
1" over Total Basin Area =	7.81	6.41	5.91	3.10
2.5" over Impervious Area =	9.30	7.00	6.34	2.96
Greater Volume Governing:	9.30	7.00	6.34	3.10
50% Additional Treatment Volume Additional for Discharge to Impaired Waters =	4.65	3.50	3.17	1.55
Total Treatment Volume Estimate (AF):	**13.96**	**10.50**	**9.52**	**4.65**
Volume for Pond Sizing Calculations				
Total of Attenuation plus Treatment Volume (AF):	28.55	21.52	19.50	9.38
Total Volume for Preliminary Pond Sizing (AF):	**28.55**	**21.52**	**19.50**	**9.38**
Preliminary Pond Sizing Calculations Assume control elevation 1-ft below ground plus 1-ft freeboard and pond W=2L				
Assume H, Treatment Depth (FT) =	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$				
Therefore, L (FT)=	789	685	652	452
and W (FT) =	1577	1369	1303	904
Side Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16
20 ft Maintenance Berm, 2 sides (FT) =	40	40	40	40
Tie-Down Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16
Including Berm and Top Slopes, L (FT) =	861	757	724	524
Including Berm and Top Slopes, W (FT) =	1649	1441	1375	976
Preliminary Pond Area Required:	**32.58**	**25.03**	**22.85**	**11.74**
Total Basin Area:	122.18	98.37	90.42	46.62
Pond Area % of Total Basin Area:	26.7%	25.4%	25.3%	25.2%

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study | **CALCULATED BY:** R.Q.Ly | **DATE:** 1/3/17

SUBJECT: Alternative West 2 | **CHECKED BY:** A.L.Windom | **DATE:** 1/4/17

Description		Basin				
		W2-1	W2-2	W2-3	W2-4	W2-5
Water Quantity - Attenuation Volume Calculations						
P, SFWMD 25 year - 24 hr Storm Event (IN) =	8.6					
P, FDOT 100 year - 24 hr Storm Event (IN) =	10.6					
Pre-Development Conditions						
Existing Runoff CN	**CN**	**Area (AC)**				
Smyrna Fine Sand (A/D), Pervious	80	92.96	7.88	15.35	74.76	44.42
Existing Pavement - Impervious	98	0	0	0	0	0
Existing Pond - Pervious	80	26.9	4.7	8.2	19.4	9
Total Basin Area =		119.86	12.58	23.55	94.16	53.42
Weighted CN =		80.00	80.00	80.00	80.00	80.00
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$						
Soil Storage, S = 1000/CN - 10 =		2.50	2.50	2.50	2.50	2.50
R, 25 year - 24 hr Storm Event (IN) =		6.19	6.19	6.19	6.19	6.19
R, 100 year - 24 hr Storm Event (IN) =		8.10	8.10	8.10	8.10	8.10
Post-Development Conditions	**Width (FT)**	**Length (FT)**				
Ultimate 8 Lane Osceola Parkway Extension	144.00	8805	2290	3385	8750	3868
Ultimate 8 Lane Northeast Connector	144.00	0	0	0	0	0
1 Lane Ramp	21.00	17696	0	3850	0	4530
2 Lane Frontage Ramp	64.00	0	0	0	0	0
Direct Airport Connector (33% Contribution)	68.00	8900	0	0	0	0
Total Proposed Pavement Impervious Area (AC) =		42.22	7.57	13.05	28.93	14.97
Proposed Runoff CN	**CN**	**Area (AC)**				
Smyrna Fine Sand (A/D), Pervious	80	50.74	0.31	2.30	45.83	29.45
Proposed Pavement - Ultimate 8 Lane	98	42.22	7.57	13.05	28.93	14.97
Proposed Pond NWL - Impervious	100	26.9	4.7	8.2	19.4	9
Total Basin Area		119.86	12.58	23.55	94.16	53.42
Weighted CN		90.83	98.30	96.94	89.65	88.41
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$						
Soil Storage, S = 1000/CN - 10 =		1.01	0.17	0.32	1.15	1.31
R, 25 year - 24 hr Storm Event (IN) =		7.50	8.40	8.23	7.35	7.21
R, 100 year - 24 hr Storm Event (IN) =		9.48	10.40	10.23	9.33	9.17
Attenuation Volume Estimate = Pre-Post Runoff						
Volume, 25 year - 24 hr Storm Event (AF) =		13.06	2.31	4.01	9.14	4.52
Volume, 100 year - 24 hr Storm Event (AF) =		**13.80**	**2.41**	**4.19**	**9.68**	**4.80**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study | **CALCULATED BY:** R.Q.Ly | **DATE:** 1/3/17

SUBJECT: Alternative West 2 | **CHECKED BY:** A.L.Windom | **DATE:** 1/4/17

Description	Basin				
	W2-1	W2-2	W2-3	W2-4	W2-5
Water Quality - Treatment Volume Estimate					
SFWMD, Wet Detention, Outfall to Impaired Waters: Yes - Okeechobee Basin					
Project Area = Total Basin Area-Pond Parcel (AC) =	92.96	7.88	15.35	74.76	44.42
Total Impervious Area (AC) =	42.22	7.57	13.05	28.93	14.97
Treatment Volume is Greater of:					
1" over Total Basin Area =	7.75	0.66	1.28	6.23	3.70
2.5" over Impervious Area =	8.80	1.58	2.72	6.03	3.12
Greater Volume Governing:	8.80	1.58	2.72	6.23	3.70
50% Additional Treatment Volume Additional for Discharge to Impaired Waters =	4.40	0.79	1.36	3.12	1.85
Total Treatment Volume Estimate (AF):	**13.19**	**2.37**	**4.08**	**9.35**	**5.55**
Volume for Pond Sizing Calculations					
Total of Attenuation plus Treatment Volume (AF):	27.00	4.78	8.26	19.03	10.36
Total Volume for Preliminary Pond Sizing (AF):	**27.00**	**4.78**	**8.26**	**19.03**	**10.36**
Preliminary Pond Sizing Calculations Assume control elevation 1-ft below ground plus 1-ft freeboard and pond W=2L					
Assume H, Treatment Depth (FT) =	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$					
Therefore, L (FT)=	767	323	424	644	475
and W (FT) =	1534	645	849	1288	950
Side Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16
20 ft Maintenance Berm, 2 sides (FT) =	40	40	40	40	40
Tie-Down Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16
Including Berm and Top Slopes, L (FT) =	839	395	496	716	547
Including Berm and Top Slopes, W (FT) =	1606	717	921	1360	1022
Preliminary Pond Area Required:	**30.92**	**6.49**	**10.49**	**22.34**	**12.83**
Total Basin Area:	119.86	12.58	23.55	94.16	53.42
Pond Area % of Total Basin Area:	25.8%	51.6%	44.5%	23.7%	24.0%

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 1 **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description		Basin							
		E1-1	E1-2	E1-3	E1-4	E1-5	E1-6	E1-7	E1-8
Water Quantity - Attenuation Volume Calculations									
P, SFWMD 25 year - 24 hr Storm Event (IN) =	8.6								
P, FDOT 100 year - 24 hr Storm Event (IN) =	10.6								
Pre-Development Conditions									
Existing Runoff CN	**CN**	**Area (AC)**							
Smyrna Fine Sand (A/D), Pervious	80	69.08	43.64	39.25	30.57	193.08	32.20	36.07	35.48
Existing Pavement - Impervious	98	0	0	0	0	0	0	0	0
Existing Pond Area - Pervious	80	16.4	10.8	9.8	6.8	40	8.1	8.9	8.8
Total Basin Area =		85.48	54.44	49.05	37.37	233.08	40.30	44.97	44.28
Weighted CN =		80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$									
Soil Storage, S = 1000/CN - 10 =		2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
R, 25 year - 24 hr Storm Event (IN) =		6.19	6.19	6.19	6.19	6.19	6.19	6.19	6.19
R, 100 year - 24 hr Storm Event (IN) =		8.10	8.10	8.10	8.10	8.10	8.10	8.10	8.10
Post-Development Conditions	**Width (FT)**	**Length (FT)**							
Ultimate 8 Lane Osceola Parkway Extension	144.00	6124	4753	3956	1830	3948	3357	3189	3858
Ultimate 8 Lane Northeast Connector	144.00	0	0	0	0	4825	0	0	0
1 Lane Ramp	21.00	4319	0	2821	3722	18963	2541	4865	363
2 Lane Frontage Ramp	64.00	0	0	0	0	0	0	0	0
Direct Airport Connector (33% Contribution)	68.00	0	0	0	0	0	0	0	0
Total Proposed Pavement Impervious Area (AC) =		22.33	15.71	14.44	7.84	38.14	12.32	12.89	12.93
Proposed Runoff CN	**CN**	**Area (AC)**							
Smyrna Fine Sand (A/D), Pervious	80	46.75	27.93	24.81	22.73	154.94	19.88	23.18	22.55
Proposed Pavement - Ultimate 8 Lane	98	22.33	15.71	14.44	7.84	38.14	12.32	12.89	12.93
Proposed Pond NWL - Impervious	100	16.4	10.8	9.8	6.8	40	8.1	8.9	8.8
Total Basin Area		85.48	54.44	49.05	37.37	233.08	40.30	44.97	44.28
Weighted CN		88.54	89.16	89.29	87.42	86.38	89.52	89.12	89.23
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$									
Soil Storage, S = 1000/CN - 10 =		1.29	1.22	1.20	1.44	1.58	1.17	1.22	1.21
R, 25 year - 24 hr Storm Event (IN) =		7.22	7.30	7.31	7.09	6.96	7.34	7.29	7.30
R, 100 year - 24 hr Storm Event (IN) =		9.19	9.27	9.29	9.05	8.92	9.31	9.26	9.28
Attenuation Volume Estimate = Pre-Post Runoff									
Volume, 25 year - 24 hr Storm Event (AF) =		7.34	5.02	4.59	2.79	14.96	3.86	4.12	4.11
Volume, 100 year - 24 hr Storm Event (AF) =		**7.80**	**5.32**	**4.86**	**2.97**	**15.95**	**4.09**	**4.37**	**4.36**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 1 **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description	Basin							
	E1-1	E1-2	E1-3	E1-4	E1-5	E1-6	E1-7	E1-8
Water Quality - Treatment Volume Estimate								
SFWMD, Wet Detention, Outfall to Impaired Waters: Yes - Okeechobee Basin								
Project Area = Total Basin Area-Pond Parcel (AC) =	69.08	43.64	39.25	30.57	193.08	32.20	36.07	35.48
Total Impervious Area (AC) =	22.33	15.71	14.44	7.84	38.14	12.32	12.89	12.93
Treatment Volume is Greater of:								
1" over Total Basin Area =	5.76	3.64	3.27	2.55	16.09	2.68	3.01	2.96
2.5" over Impervious Area =	4.65	3.27	3.01	1.63	7.95	2.57	2.68	2.69
Greater Volume Governing:	5.76	3.64	3.27	2.55	16.09	2.68	3.01	2.96
50% Additional Treatment Volume Additional for Discharge to Impaired Waters =	2.88	1.82	1.64	1.27	8.05	1.34	1.50	1.48
Total Treatment Volume Estimate (AF):	**8.64**	**5.46**	**4.91**	**3.82**	**24.14**	**4.03**	**4.51**	**4.44**
Volume for Pond Sizing Calculations								
Total of Attenuation plus Treatment Volume (AF):	16.43	10.78	9.77	6.79	40.09	8.12	8.88	8.80
Total Volume for Preliminary Pond Sizing (AF):	**16.43**	**10.78**	**9.77**	**6.79**	**40.09**	**8.12**	**8.88**	**8.80**
Preliminary Pond Sizing Calculations Assume control elevation 1-ft below ground plus 1-ft freeboard and pond W=2L								
Assume H, Treatment Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$								
Therefore, L (FT)=	598	484	461	385	934	420	440	438
and W (FT) =	1196	969	923	769	1869	841	880	875
Side Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16	16
20 ft Maintenance Berm, 2 sides (FT) =	40	40	40	40	40	40	40	40
Tie-Down Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16	16
Including Berm and Top Slopes, L (FT) =	670	556	533	457	1006	492	512	510
Including Berm and Top Slopes, W (FT) =	1268	1041	995	841	1941	913	952	947
Preliminary Pond Area Required:	**19.52**	**13.30**	**12.17**	**8.81**	**44.84**	**10.32**	**11.18**	**11.08**
Total Basin Area:	85.48	54.44	49.05	37.37	233.08	40.30	44.97	44.28
Pond Area % of Total Basin Area:	22.8%	24.4%	24.8%	23.6%	19.2%	25.6%	24.9%	25.0%

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study | **CALCULATED BY:** R.Q.Ly | **DATE:** 1/3/17

SUBJECT: Alternative East 2 | **CHECKED BY:** A.L.Windom | **DATE:** 1/4/17

Description		Basin						
		E2-1	E2-2	E2-3	E2-4	E2-5	E2-6	E2-7
Water Quantity - Attenuation Volume Calculations								
P, SFWMD 25 year - 24 hr Storm Event (IN) =	8.6							
P, FDOT 100 year - 24 hr Storm Event (IN) =	10.6							
Pre-Development Conditions								
Existing Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	65.46	77.66	36.49	206.06	30.39	35.86	35.46
Existing Pavement - Impervious	98	0	0	0	0	0	0	0
Existing Pond Area - Pervious	80	22	19.2	17.3	43	7.95	8.85	8.8
Total Basin Area =		87.46	96.86	53.79	249.06	38.34	44.71	44.26
Weighted CN =		80.00	80.00	80.00	80.00	80.00	80.00	80.00
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		2.50	2.50	2.50	2.50	2.50	2.50	2.50
R, 25 year - 24 hr Storm Event (IN) =		6.19	6.19	6.19	6.19	6.19	6.19	6.19
R, 100 year - 24 hr Storm Event (IN) =		8.10	8.10	8.10	8.10	8.10	8.10	8.10
Post-Development Conditions	**Width (FT)**	**Length (FT)**						
Ultimate 8 Lane Osceola Parkway Extension	144.00	6131	8470	3698	5553	3370	3190	3858
Ultimate 8 Lane Northeast Connector	144.00	4319	0	0	250	0	0	0
1 Lane Ramp	21.00	0	0	4439	28169	2632	4859	366
2 Lane Frontage Ramp	64.00	0	0	8826	5843	0	0	0
Direct Airport Connector (33% Contribution)	68.00	0	0	0	0	0	0	0
Total Proposed Pavement Impervious Area (AC) =		34.55	28.00	27.33	41.35	12.41	12.89	12.93
Proposed Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	30.91	49.66	9.16	164.71	17.98	22.97	22.53
Proposed Pavement - Ultimate 8 Lane	98	34.55	28.00	27.33	41.35	12.41	12.89	12.93
Proposed Pond NWL - Impervious	100	22	19.2	17.3	43	7.95	8.85	8.8
Total Basin Area		87.46	96.86	53.79	249.06	38.34	44.71	44.26
Weighted CN		92.14	89.17	95.58	86.44	89.97	89.15	89.24
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		0.85	1.21	0.46	1.57	1.11	1.22	1.21
R, 25 year - 24 hr Storm Event (IN) =		7.65	7.30	8.07	6.97	7.39	7.29	7.30
R, 100 year - 24 hr Storm Event (IN) =		9.64	9.27	10.06	8.93	9.37	9.27	9.28
Attenuation Volume Estimate = Pre-Post Runoff								
Volume, 25 year - 24 hr Storm Event (AF) =		10.68	8.93	8.42	16.14	3.85	4.11	4.11
Volume, 100 year - 24 hr Storm Event (AF) =		**11.26**	**9.47**	**8.82**	**17.21**	**4.07**	**4.36**	**4.36**

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PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 2 **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description	Basin						
	E2-1	E2-2	E2-3	E2-4	E2-5	E2-6	E2-7
Water Quality - Treatment Volume Estimate							
SFWMD, Wet Detention, Outfall to Impaired Waters: Yes - Okeechobee Basin							
Project Area = Total Basin Area-Pond Parcel (AC) =	65.46	77.66	36.49	206.06	30.39	35.86	35.46
Total Impervious Area (AC) =	34.55	28.00	27.33	41.35	12.41	12.89	12.93
Treatment Volume is Greater of:							
1" over Total Basin Area =	5.46	6.47	3.04	17.17	2.53	2.99	2.96
2.5" over Impervious Area =	7.20	5.83	5.69	8.61	2.59	2.68	2.69
Greater Volume Governing:	7.20	6.47	5.69	17.17	2.59	2.99	2.96
50% Additional Treatment Volume Additional for Discharge to Impaired Waters =	3.60	3.24	2.85	8.59	1.29	1.49	1.48
Total Treatment Volume Estimate (AF):	**10.80**	**9.71**	**8.54**	**25.76**	**3.88**	**4.48**	**4.43**
Volume for Pond Sizing Calculations							
Total of Attenuation plus Treatment Volume (AF):	22.06	19.18	17.36	42.97	7.95	8.85	8.79
Total Volume for Preliminary Pond Sizing (AF):	**22.06**	**19.18**	**17.36**	**42.97**	**7.95**	**8.85**	**8.79**
Preliminary Pond Sizing Calculations Assume control elevation 1-ft below ground plus 1-ft freeboard and pond W=2L							
Assume H, Treatment Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$							
Therefore, L (FT)=	693	646	615	967	416	439	438
and W (FT) =	1386	1293	1230	1935	832	878	875
Side Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
20 ft Maintenance Berm, 2 sides (FT) =	40	40	40	40	40	40	40
Tie-Down Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
Including Berm and Top Slopes, L (FT) =	765	718	687	1039	488	511	510
Including Berm and Top Slopes, W (FT) =	1458	1365	1302	2007	904	950	947
Preliminary Pond Area Required:	**25.61**	**22.51**	**20.53**	**47.88**	**10.13**	**11.14**	**11.08**
Total Basin Area:	87.46	96.86	53.79	249.06	38.34	44.71	44.26
Pond Area % of Total Basin Area:	29.3%	23.2%	38.2%	19.2%	26.4%	24.9%	25.0%

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PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 3 **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description		Basin							
		E3-1	E3-2	E3-3	E3-4	E3-5	E3-6	E3-7	E3-8
Water Quantity - Attenuation Volume Calculations									
P, SFWMD 25 year - 24 hr Storm Event (IN) =	8.6								
P, FDOT 100 year - 24 hr Storm Event (IN) =	10.6								
Pre-Development Conditions									
Existing Runoff CN	**CN**	**Area (AC)**							
Smyrna Fine Sand (A/D), Pervious	80	69.10	43.63	36.41	17.20	59.74	30.82	36.07	35.48
Existing Pavement - Impervious	98	0	0	0	0	0	0	0	0
Existing Pond Area - Pervious	80	16.4	10.8	9	4.4	22.1	7.65	8.9	8.8
Total Basin Area =		85.50	54.43	45.41	21.60	81.84	38.47	44.97	44.28
Weighted CN =		80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$									
Soil Storage, S = 1000/CN - 10 =		2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
R, 25 year - 24 hr Storm Event (IN) =		6.19	6.19	6.19	6.19	6.19	6.19	6.19	6.19
R, 100 year - 24 hr Storm Event (IN) =		8.10	8.10	8.10	8.10	8.10	8.10	8.10	8.10
Post-Development Conditions	**Width (FT)**	**Length (FT)**							
Ultimate 8 Lane Osceola Parkway Extension	144.00	6124	4752	3964	1826	3947	3357	3189	3858
Ultimate 8 Lane Northeast Connector	144.00	0	0	0	0	5878	0	0	0
1 Lane Ramp	21.00	4319	0	0	1357	4677	296	4865	363
2 Lane Frontage Ramp	64.00	0	0	0	0	0	0	0	0
Direct Airport Connector (33% Contribution)	68.00	0	0	0	0	0	0	0	0
Total Proposed Pavement Impervious Area (AC) =		22.33	15.71	13.10	6.69	34.73	11.24	12.89	12.93
Proposed Runoff CN	**CN**	**Area (AC)**							
Smyrna Fine Sand (A/D), Pervious	80	46.77	27.92	23.31	10.51	25.01	19.58	23.18	22.55
Proposed Pavement - Ultimate 8 Lane	98	22.33	15.71	13.10	6.69	34.73	11.24	12.89	12.93
Proposed Pond NWL - Impervious	100	16.4	10.8	9	4.4	22.1	7.65	8.9	8.8
Total Basin Area		85.50	54.43	45.41	21.60	81.84	38.47	44.97	44.28
Weighted CN		88.54	89.16	89.16	89.65	93.04	89.24	89.12	89.23
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$									
Soil Storage, S = 1000/CN - 10 =		1.29	1.22	1.22	1.15	0.75	1.21	1.22	1.21
R, 25 year - 24 hr Storm Event (IN) =		7.22	7.30	7.30	7.35	7.76	7.30	7.29	7.30
R, 100 year - 24 hr Storm Event (IN) =		9.19	9.27	9.27	9.33	9.75	9.28	9.26	9.28
Attenuation Volume Estimate = Pre-Post Runoff									
Volume, 25 year - 24 hr Storm Event (AF) =		7.34	5.02	4.18	2.10	10.73	3.57	4.12	4.11
Volume, 100 year - 24 hr Storm Event (AF) =		**7.80**	**5.32**	**4.44**	**2.22**	**11.30**	**3.79**	**4.37**	**4.36**

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PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 3 **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description	Basin							
	E3-1	E3-2	E3-3	E3-4	E3-5	E3-6	E3-7	E3-8
Water Quality - Treatment Volume Estimate								
SFWMD, Wet Detention, Outfall to Impaired Waters: Yes - Okeechobee Basin								
Project Area = Total Basin Area-Pond Parcel (AC) =	69.10	43.63	36.41	17.20	59.74	30.82	36.07	35.48
Total Impervious Area (AC) =	22.33	15.71	13.10	6.69	34.73	11.24	12.89	12.93
Treatment Volume is Greater of:								
1" over Total Basin Area =	5.76	3.64	3.03	1.43	4.98	2.57	3.01	2.96
2.5" over Impervious Area =	4.65	3.27	2.73	1.39	7.24	2.34	2.68	2.69
Greater Volume Governing:	5.76	3.64	3.03	1.43	7.24	2.57	3.01	2.96
50% Additional Treatment Volume Additional for Discharge to Impaired Waters =	2.88	1.82	1.52	0.72	3.62	1.28	1.50	1.48
Total Treatment Volume Estimate (AF):	**8.64**	**5.45**	**4.55**	**2.15**	**10.85**	**3.85**	**4.51**	**4.44**
Volume for Pond Sizing Calculations								
Total of Attenuation plus Treatment Volume (AF):	16.43	10.78	8.99	4.37	22.15	7.64	8.88	8.80
Total Volume for Preliminary Pond Sizing (AF):	**16.43**	**10.78**	**8.99**	**4.37**	**22.15**	**7.64**	**8.88**	**8.80**
Preliminary Pond Sizing Calculations Assume control elevation 1-ft below ground plus 1-ft freeboard and pond W=2L								
Assume H, Treatment Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$								
Therefore, L (FT)=	598	484	442	309	695	408	440	438
and W (FT) =	1197	969	885	617	1389	816	880	875
Side Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16	16
20 ft Maintenance Berm, 2 sides (FT) =	40	40	40	40	40	40	40	40
Tie-Down Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16	16
Including Berm and Top Slopes, L (FT) =	670	556	514	381	767	480	512	510
Including Berm and Top Slopes, W (FT) =	1269	1041	957	689	1461	888	952	947
Preliminary Pond Area Required:	**19.52**	**13.30**	**11.30**	**6.02**	**25.71**	**9.79**	**11.18**	**11.08**
Total Basin Area:	85.50	54.43	45.41	21.60	81.84	38.47	44.97	44.28
Pond Area % of Total Basin Area:	22.8%	24.4%	24.9%	27.9%	31.4%	25.4%	24.9%	25.0%

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PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 4A **CHECKED BY:** A.L.Windom **DATE:** 1/8/17

Description		Basin						
		E4A-1	E4A-2	E4A-3	E4A-4	E4A-5	E4A-6	E4A-7
Water Quantity - Attenuation Volume Calculations								
P, SFWMD 25 year - 24 hr Storm Event (IN) =	8.6							
P, FDOT 100 year - 24 hr Storm Event (IN) =	10.6							
Pre-Development Conditions								
Existing Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	65.28	69.07	48.84	131.82	32.31	29.26	35.42
Existing Pavement - Impervious	98	0	0	0	0	0	0	0
Existing Pond Area - Pervious	80	14.35	16	10.95	25.75	8.25	6.75	8.2
Total Basin Area =		79.63	85.07	59.79	157.57	40.56	36.01	43.62
Weighted CN =		80.00	80.00	80.00	80.00	80.00	80.00	80.00
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		2.50	2.50	2.50	2.50	2.50	2.50	2.50
R, 25 year - 24 hr Storm Event (IN) =		6.19	6.19	6.19	6.19	6.19	6.19	6.19
R, 100 year - 24 hr Storm Event (IN) =		8.10	8.10	8.10	8.10	8.10	8.10	8.10
Post-Development Conditions	**Width (FT)**	**Length (FT)**						
Ultimate 8 Lane Osceola Parkway Extension	144.00	6132	7532	4379	4694	3359	3186	3858
Ultimate 8 Lane Northeast Connector	144.00	0	0	0	3936	0	0	0
1 Lane Ramp	21.00	4319	0	5414	16256	3772	0	0
2 Lane Frontage Ramp	64.00	0	0	0	0	0	0	0
Direct Airport Connector (33% Contribution)	68.00	0	0	0	0	0	0	0
Total Proposed Pavement Impervious Area (AC) =		22.35	24.90	17.09	36.37	12.92	10.53	12.75
Proposed Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	42.93	44.17	31.75	95.45	19.39	18.73	22.67
Proposed Pavement - Ultimate 8 Lane	98	22.35	24.90	17.09	36.37	12.92	10.53	12.75
Proposed Pond NWL - Impervious	100	14.35	16	10.95	25.75	8.25	6.75	8.2
Total Basin Area		79.63	85.07	59.79	157.57	40.56	36.01	43.62
Weighted CN		88.66	89.03	88.81	87.42	89.80	89.01	89.02
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		1.28	1.23	1.26	1.44	1.14	1.23	1.23
R, 25 year - 24 hr Storm Event (IN) =		7.23	7.28	7.25	7.09	7.37	7.28	7.28
R, 100 year - 24 hr Storm Event (IN) =		9.21	9.25	9.22	9.05	9.35	9.25	9.25
Attenuation Volume Estimate = Pre-Post Runoff								
Volume, 25 year - 24 hr Storm Event (AF) =		6.94	7.73	5.30	11.77	4.00	3.27	3.96
Volume, 100 year - 24 hr Storm Event (AF) =		**7.36**	**8.20**	**5.62**	**12.52**	**4.24**	**3.46**	**4.20**

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PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 4A **CHECKED BY:** A.L.Windom **DATE:** 1/8/17

Description	Basin						
	E4A-1	E4A-2	E4A-3	E4A-4	E4A-5	E4A-6	E4A-7
Water Quality - Treatment Volume Estimate							
SFWMD, Wet Detention, Outfall to Impaired Waters: Yes - Okeechobee Basin							
Project Area = Total Basin Area-Pond Parcel (AC) =	65.28	69.07	48.84	131.82	32.31	29.26	35.42
Total Impervious Area (AC) =	22.35	24.90	17.09	36.37	12.92	10.53	12.75
Treatment Volume is Greater of:							
1" over Total Basin Area =	5.44	5.76	4.07	10.99	2.69	2.44	2.95
2.5" over Impervious Area =	4.66	5.19	3.56	7.58	2.69	2.19	2.66
Greater Volume Governing:	5.44	5.76	4.07	10.99	2.69	2.44	2.95
50% Additional Treatment Volume Additional for Discharge to Impaired Waters =	2.72	2.88	2.04	5.49	1.35	1.22	1.48
Total Treatment Volume Estimate (AF):	**8.16**	**8.63**	**6.11**	**16.48**	**4.04**	**3.66**	**4.43**
Volume for Pond Sizing Calculations							
Total of Attenuation plus Treatment Volume (AF):	15.52	16.83	11.73	29.00	8.28	7.12	8.63
Total Volume for Preliminary Pond Sizing (AF):	**15.52**	**16.83**	**11.73**	**29.00**	**8.28**	**7.12**	**8.63**
Preliminary Pond Sizing Calculations Assume control elevation 1-ft below ground plus 1-ft freeboard and pond W=2L							
Assume H, Treatment Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$							
Therefore, L (FT)=	581	605	505	795	425	394	433
and W (FT) =	1163	1211	1011	1589	849	788	867
Side Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
20 ft Maintenance Berm, 2 sides (FT) =	40	40	40	40	40	40	40
Tie-Down Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
Including Berm and Top Slopes, L (FT) =	653	677	577	867	497	466	505
Including Berm and Top Slopes, W (FT) =	1235	1283	1083	1661	921	860	939
Preliminary Pond Area Required:	**18.52**	**19.95**	**14.35**	**33.06**	**10.50**	**9.19**	**10.90**
Total Basin Area:	79.63	85.07	59.79	157.57	40.56	36.01	43.62
Pond Area % of Total Basin Area:	23.3%	23.5%	24.0%	21.0%	25.9%	25.5%	25.0%

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 4B **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description		Basin						
		E4B-1	E4B-2	E4B-3	E4B-4	E4B-5	E4B-6	E4B-7
Water Quantity - Attenuation Volume Calculations								
P, SFWMD 25 year - 24 hr Storm Event (IN) =	8.6							
P, FDOT 100 year - 24 hr Storm Event (IN) =	10.6							
Pre-Development Conditions								
Existing Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	75.40	69.40	50.60	144.90	32.30	29.30	35.40
Existing Pavement - Impervious	98	0	0	0	0	0	0	0
Existing Pond Area - Pervious	80	17.5	17.1	12.25	31.8	8.25	7.2	8.7
Total Basin Area =		92.90	86.50	62.85	176.70	40.55	36.50	44.10
Weighted CN =		80.00	80.00	80.00	80.00	80.00	80.00	80.00
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		2.50	2.50	2.50	2.50	2.50	2.50	2.50
R, 25 year - 24 hr Storm Event (IN) =		6.19	6.19	6.19	6.19	6.19	6.19	6.19
R, 100 year - 24 hr Storm Event (IN) =		8.10	8.10	8.10	8.10	8.10	8.10	8.10
Post-Development Conditions	**Width (FT)**	**Length (FT)**						
Ultimate 8 Lane Osceola Parkway Extension	144.00	6156	7562	4112	4662	3360	3186	3858
Ultimate 8 Lane Northeast Connector	144.00	0	0	0	3445	0	0	0
1 Lane Ramp	21.00	4319	0	7859	18867	3773	0	0
2 Lane Frontage Ramp	64.00	0	0	0	0	0	0	0
Direct Airport Connector (33% Contribution)	68.00	0	0	0	0	0	0	0
Total Proposed Pavement Impervious Area (AC) =		22.43	25.00	17.38	35.90	12.93	10.53	12.75
Proposed Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	52.97	44.40	33.22	109.00	19.37	18.77	22.65
Proposed Pavement - Ultimate 8 Lane	98	22.43	25.00	17.38	35.90	12.93	10.53	12.75
Proposed Pond NWL - Impervious	100	17.5	17.1	12.25	31.8	8.25	7.2	8.7
Total Basin Area		92.90	86.50	62.85	176.70	40.55	36.50	44.10
Weighted CN		88.11	89.16	88.88	87.26	89.81	89.14	89.15
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		1.35	1.22	1.25	1.46	1.13	1.22	1.22
R, 25 year - 24 hr Storm Event (IN) =		7.17	7.29	7.26	7.07	7.37	7.29	7.29
R, 100 year - 24 hr Storm Event (IN) =		9.14	9.27	9.23	9.03	9.35	9.27	9.27
Attenuation Volume Estimate = Pre-Post Runoff								
Volume, 25 year - 24 hr Storm Event (AF) =		7.58	7.97	5.61	12.90	4.00	3.36	4.06
Volume, 100 year - 24 hr Storm Event (AF) =		**8.06**	**8.45**	**5.96**	**13.73**	**4.24**	**3.56**	**4.31**

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PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 4B **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description	Basin						
	E4B-1	E4B-2	E4B-3	E4B-4	E4B-5	E4B-6	E4B-7
Water Quality - Treatment Volume Estimate							
SFWMD, Wet Detention, Outfall to Impaired Waters: Yes - Okeechobee Basin							
Project Area = Total Basin Area-Pond Parcel (AC) =	75.40	69.40	50.60	144.90	32.30	29.30	35.40
Total Impervious Area (AC) =	22.43	25.00	17.38	35.90	12.93	10.53	12.75
Treatment Volume is Greater of:							
1" over Total Basin Area =	6.28	5.78	4.22	12.08	2.69	2.44	2.95
2.5" over Impervious Area =	4.67	5.21	3.62	7.48	2.69	2.19	2.66
Greater Volume Governing:	6.28	5.78	4.22	12.08	2.69	2.44	2.95
50% Additional Treatment Volume Additional for Discharge to Impaired Waters =	3.14	2.89	2.11	6.04	1.35	1.22	1.48
Total Treatment Volume Estimate (AF):	**9.43**	**8.68**	**6.33**	**18.11**	**4.04**	**3.66**	**4.43**
Volume for Pond Sizing Calculations							
Total of Attenuation plus Treatment Volume (AF):	17.48	17.12	12.28	31.84	8.28	7.22	8.73
Total Volume for Preliminary Pond Sizing (AF):	**17.48**	**17.12**	**12.28**	**31.84**	**8.28**	**7.22**	**8.73**
Preliminary Pond Sizing Calculations Assume control elevation 1-ft below ground plus 1-ft freeboard and pond W=2L							
Assume H, Treatment Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$							
Therefore, L (FT)=	617	611	517	833	425	397	436
and W (FT) =	1234	1221	1034	1666	849	793	872
Side Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
20 ft Maintenance Berm, 2 sides (FT) =	40	40	40	40	40	40	40
Tie-Down Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
Including Berm and Top Slopes, L (FT) =	689	683	589	905	497	469	508
Including Berm and Top Slopes, W (FT) =	1306	1293	1106	1738	921	865	944
Preliminary Pond Area Required:	**20.66**	**20.27**	**14.96**	**36.09**	**10.50**	**9.31**	**11.01**
Total Basin Area:	92.90	86.50	62.85	176.70	40.55	36.50	44.10
Pond Area % of Total Basin Area:	22.2%	23.4%	23.8%	20.4%	25.9%	25.5%	25.0%

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PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 4C **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description		Basin						
		E4C-1	E4C-2	E4C-3	E4C-4	E4C-5	E4C-6	E4C-7
Water Quantity - Attenuation Volume Calculations								
P, SFWMD 25 year - 24 hr Storm Event (IN) =	8.6							
P, FDOT 100 year - 24 hr Storm Event (IN) =	10.6							
Pre-Development Conditions								
Existing Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	65.28	75.02	48.27	144.54	32.34	29.31	35.46
Existing Pavement - Impervious	98	0	0	0	0	0	0	0
Existing Pond Area - Pervious	80	15.8	18.5	11.9	31.8	8.25	7.2	8.7
Total Basin Area =		81.08	93.52	60.17	176.34	40.59	36.51	44.16
Weighted CN =		80.00	80.00	80.00	80.00	80.00	80.00	80.00
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		2.50	2.50	2.50	2.50	2.50	2.50	2.50
R, 25 year - 24 hr Storm Event (IN) =		6.19	6.19	6.19	6.19	6.19	6.19	6.19
R, 100 year - 24 hr Storm Event (IN) =		8.10	8.10	8.10	8.10	8.10	8.10	8.10
Post-Development Conditions	**Width (FT)**	**Length (FT)**						
Ultimate 8 Lane Osceola Parkway Extension	144.00	6130	8179	4137	4662	3360	3186	3858
Ultimate 8 Lane Northeast Connector	144.00	0	0	0	3445	0	0	0
1 Lane Ramp	21.00	4319	0	7204	18593	3773	0	0
2 Lane Frontage Ramp	64.00	0	0	0	0	0	0	0
Direct Airport Connector (33% Contribution)	68.00	0	0	0	0	0	0	0
Total Proposed Pavement Impervious Area (AC) =		22.35	27.04	17.15	35.76	12.93	10.53	12.75
Proposed Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	42.93	47.98	31.12	108.78	19.41	18.78	22.71
Proposed Pavement - Ultimate 8 Lane	98	22.35	27.04	17.15	35.76	12.93	10.53	12.75
Proposed Pond NWL - Impervious	100	15.8	18.5	11.9	31.8	8.25	7.2	8.7
Total Basin Area		81.08	93.52	60.17	176.34	40.59	36.51	44.16
Weighted CN		88.86	89.16	89.09	87.26	89.80	89.14	89.14
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		1.25	1.22	1.23	1.46	1.14	1.22	1.22
R, 25 year - 24 hr Storm Event (IN) =		7.26	7.30	7.29	7.07	7.37	7.29	7.29
R, 100 year - 24 hr Storm Event (IN) =		9.23	9.27	9.26	9.03	9.35	9.27	9.27
Attenuation Volume Estimate = Pre-Post Runoff								
Volume, 25 year - 24 hr Storm Event (AF) =		7.23	8.62	5.50	12.88	4.00	3.36	4.06
Volume, 100 year - 24 hr Storm Event (AF) =		**7.67**	**9.14**	**5.83**	**13.71**	**4.24**	**3.56**	**4.31**

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PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 4C **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description	Basin						
	E4C-1	E4C-2	E4C-3	E4C-4	E4C-5	E4C-6	E4C-7
Water Quality - Treatment Volume Estimate							
SFWMD, Wet Detention, Outfall to Impaired Waters: Yes - Okeechobee Basin							
Project Area = Total Basin Area-Pond Parcel (AC) =	65.28	75.02	48.27	144.54	32.34	29.31	35.46
Total Impervious Area (AC) =	22.35	27.04	17.15	35.76	12.93	10.53	12.75
Treatment Volume is Greater of:							
1" over Total Basin Area =	5.44	6.25	4.02	12.05	2.70	2.44	2.96
2.5" over Impervious Area =	4.66	5.63	3.57	7.45	2.69	2.19	2.66
Greater Volume Governing:	5.44	6.25	4.02	12.05	2.70	2.44	2.96
50% Additional Treatment Volume Additional for Discharge to Impaired Waters =	2.72	3.13	2.01	6.02	1.35	1.22	1.48
Total Treatment Volume Estimate (AF):	**8.16**	**9.38**	**6.03**	**18.07**	**4.04**	**3.66**	**4.43**
Volume for Pond Sizing Calculations							
Total of Attenuation plus Treatment Volume (AF):	15.83	18.52	11.87	31.77	8.28	7.22	8.74
Total Volume for Preliminary Pond Sizing (AF):	**15.83**	**18.52**	**11.87**	**31.77**	**8.28**	**7.22**	**8.74**
Preliminary Pond Sizing Calculations Assume control elevation 1-ft below ground plus 1-ft freeboard and pond W=2L							
Assume H, Treatment Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$							
Therefore, L (FT)=	587	635	508	832	425	397	436
and W (FT) =	1174	1270	1017	1664	849	793	873
Side Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
20 ft Maintenance Berm, 2 sides (FT) =	40	40	40	40	40	40	40
Tie-Down Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
Including Berm and Top Slopes, L (FT) =	659	707	580	904	497	469	508
Including Berm and Top Slopes, W (FT) =	1246	1342	1089	1736	921	865	945
Preliminary Pond Area Required:	**18.86**	**21.79**	**14.51**	**36.02**	**10.50**	**9.31**	**11.02**
Total Basin Area:	81.08	93.52	60.17	176.34	40.59	36.51	44.16
Pond Area % of Total Basin Area:	23.3%	23.3%	24.1%	20.4%	25.9%	25.5%	25.0%

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PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 5 **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description		Basin						
		E5-1	E5-2	E5-3	E5-4	E5-5	E5-6	E5-7
Water Quantity - Attenuation Volume Calculations								
P, SFWMD 25 year - 24 hr Storm Event (IN) =	8.6							
P, FDOT 100 year - 24 hr Storm Event (IN) =	10.6							
Pre-Development Conditions								
Existing Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	61.52	82.35	51.20	138.21	30.68	29.26	35.42
Existing Pavement - Impervious	98	0	0	0	0	0	0	0
Existing Pond Area - Pervious	80	14.4	19	10.3	26.6	7.7	6.75	8.2
Total Basin Area =		75.92	101.35	61.50	164.81	38.38	36.01	43.62
Weighted CN =		80.00	80.00	80.00	80.00	80.00	80.00	80.00
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		2.50	2.50	2.50	2.50	2.50	2.50	2.50
R, 25 year - 24 hr Storm Event (IN) =		6.19	6.19	6.19	6.19	6.19	6.19	6.19
R, 100 year - 24 hr Storm Event (IN) =		8.10	8.10	8.10	8.10	8.10	8.10	8.10
Post-Development Conditions	**Width (FT)**	**Length (FT)**						
Ultimate 8 Lane Osceola Parkway Extension	144.00	6186	8970	4152	5644	3360	3186	3858
Ultimate 8 Lane Northeast Connector	144.00	0	0	0	2117	0	0	0
1 Lane Ramp	21.00	4319	0	4079	21884	2029	0	0
2 Lane Frontage Ramp	64.00	0	0	0	0	0	0	0
Direct Airport Connector (33% Contribution)	68.00	0	0	0	0	0	0	0
Total Proposed Pavement Impervious Area (AC) =		22.53	29.65	15.69	36.21	12.09	10.53	12.75
Proposed Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	38.99	52.70	35.51	102.00	18.59	18.73	22.67
Proposed Pavement - Ultimate 8 Lane	98	22.53	29.65	15.69	36.21	12.09	10.53	12.75
Proposed Pond NWL - Impervious	100	14.4	19	10.3	26.6	7.7	6.75	8.2
Total Basin Area		75.92	101.35	61.50	164.81	38.38	36.01	43.62
Weighted CN		89.14	89.02	87.94	87.18	89.68	89.01	89.02
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		1.22	1.23	1.37	1.47	1.15	1.23	1.23
R, 25 year - 24 hr Storm Event (IN) =		7.29	7.28	7.15	7.06	7.36	7.28	7.28
R, 100 year - 24 hr Storm Event (IN) =		9.27	9.25	9.12	9.02	9.33	9.25	9.25
Attenuation Volume Estimate = Pre-Post Runoff								
Volume, 25 year - 24 hr Storm Event (AF) =		6.98	9.19	4.91	11.91	3.74	3.27	3.96
Volume, 100 year - 24 hr Storm Event (AF) =		**7.40**	**9.75**	**5.22**	**12.68**	**3.96**	**3.46**	**4.20**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study
SUBJECT: Alternative East 5

CALCULATED BY: R.Q.Ly **DATE:** 1/3/17
CHECKED BY: A.L.Windom **DATE:** 1/4/17

Description	Basin						
	E5-1	E5-2	E5-3	E5-4	E5-5	E5-6	E5-7
Water Quality - Treatment Volume Estimate							
SFWMD, Wet Detention, Outfall to Impaired Waters: Yes - Okeechobee Basin							
Project Area = Total Basin Area-Pond Parcel (AC) =	61.52	82.35	51.20	138.21	30.68	29.26	35.42
Total Impervious Area (AC) =	22.53	29.65	15.69	36.21	12.09	10.53	12.75
Treatment Volume is Greater of:							
1" over Total Basin Area =	5.13	6.86	4.27	11.52	2.56	2.44	2.95
2.5" over Impervious Area =	4.69	6.18	3.27	7.54	2.52	2.19	2.66
Greater Volume Governing:	5.13	6.86	4.27	11.52	2.56	2.44	2.95
50% Additional Treatment Volume Additional for Discharge to Impaired Waters =	2.56	3.43	2.13	5.76	1.28	1.22	1.48
Total Treatment Volume Estimate (AF):	**7.69**	**10.29**	**6.40**	**17.28**	**3.84**	**3.66**	**4.43**
Volume for Pond Sizing Calculations							
Total of Attenuation plus Treatment Volume (AF):	15.09	20.05	11.62	29.96	7.79	7.12	8.63
Total Volume for Preliminary Pond Sizing (AF):	**15.09**	**20.05**	**11.62**	**29.96**	**7.79**	**7.12**	**8.63**
Preliminary Pond Sizing Calculations Assume control elevation 1-ft below ground plus 1-ft freeboard and pond W=2L							
Assume H, Treatment Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$							
Therefore, L (FT)=	573	661	503	808	412	394	433
and W (FT) =	1147	1322	1006	1615	824	788	867
Side Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
20 ft Maintenance Berm, 2 sides (FT) =	40	40	40	40	40	40	40
Tie-Down Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
Including Berm and Top Slopes, L (FT) =	645	733	575	880	484	466	505
Including Berm and Top Slopes, W (FT) =	1219	1394	1078	1687	896	860	939
Preliminary Pond Area Required:	**18.05**	**23.44**	**14.24**	**34.08**	**9.96**	**9.19**	**10.90**
Total Basin Area:	75.92	101.35	61.50	164.81	38.38	36.01	43.62
Pond Area % of Total Basin Area:	23.8%	23.1%	23.2%	20.7%	25.9%	25.5%	25.0%

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 6 **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description		Basin						
		E6-1	E6-2	E6-3	E6-4	E6-5	E6-6	E6-7
Water Quantity - Attenuation Volume Calculations								
P, SFWMD 25 year - 24 hr Storm Event (IN) =	8.6							
P, FDOT 100 year - 24 hr Storm Event (IN) =	10.6							
Pre-Development Conditions								
Existing Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	79.77	88.27	28.05	165.70	32.31	29.26	35.42
Existing Pavement - Impervious	98	0	0	0	0	0	0	0
Existing Pond Area - Pervious	80	16	20.4	6.9	31.8	8.25	6.75	8.2
Total Basin Area =		95.77	108.67	34.95	197.50	40.56	36.01	43.62
Weighted CN =		80.00	80.00	80.00	80.00	80.00	80.00	80.00
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		2.50	2.50	2.50	2.50	2.50	2.50	2.50
R, 25 year - 24 hr Storm Event (IN) =		6.19	6.19	6.19	6.19	6.19	6.19	6.19
R, 100 year - 24 hr Storm Event (IN) =		8.10	8.10	8.10	8.10	8.10	8.10	8.10
Post-Development Conditions	**Width (FT)**	**Length (FT)**						
Ultimate 8 Lane Osceola Parkway Extension	144.00	6635	9614	2793	6198	3360	3186	3858
Ultimate 8 Lane Northeast Connector	144.00	0	0	0	3936	0	0	0
1 Lane Ramp	21.00	4319	0	3225	19952	3772	0	0
2 Lane Frontage Ramp	64.00	0	0	0	0	0	0	0
Direct Airport Connector (33% Contribution)	68.00	0	0	0	0	0	0	0
Total Proposed Pavement Impervious Area (AC) =		24.02	31.78	10.79	43.12	12.93	10.53	12.75
Proposed Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	55.75	56.49	17.26	122.58	19.38	18.73	22.67
Proposed Pavement - Ultimate 8 Lane	98	24.02	31.78	10.79	43.12	12.93	10.53	12.75
Proposed Pond NWL - Impervious	100	16	20.4	6.9	31.8	8.25	6.75	8.2
Total Basin Area		95.77	108.67	34.95	197.50	40.56	36.01	43.62
Weighted CN		87.86	89.02	89.50	87.15	89.80	89.01	89.02
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		1.38	1.23	1.17	1.47	1.14	1.23	1.23
R, 25 year - 24 hr Storm Event (IN) =		7.14	7.28	7.34	7.05	7.37	7.28	7.28
R, 100 year - 24 hr Storm Event (IN) =		9.10	9.25	9.31	9.02	9.35	9.25	9.25
Attenuation Volume Estimate = Pre-Post Runoff								
Volume, 25 year - 24 hr Storm Event (AF) =		7.57	9.86	3.34	14.21	4.00	3.27	3.96
Volume, 100 year - 24 hr Storm Event (AF) =		**8.05**	**10.46**	**3.54**	**15.13**	**4.24**	**3.46**	**4.20**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 6 **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description	Basin						
	E6-1	E6-2	E6-3	E6-4	E6-5	E6-6	E6-7
Water Quality - Treatment Volume Estimate							
SFWMD, Wet Detention, Outfall to Impaired Waters: Yes - Okeechobee Basin							
Project Area = Total Basin Area-Pond Parcel (AC) =	79.77	88.27	28.05	165.70	32.31	29.26	35.42
Total Impervious Area (AC) =	24.02	31.78	10.79	43.12	12.93	10.53	12.75
Treatment Volume is Greater of:							
1" over Total Basin Area =	6.65	7.36	2.34	13.81	2.69	2.44	2.95
2.5" over Impervious Area =	5.00	6.62	2.25	8.98	2.69	2.19	2.66
Greater Volume Governing:	6.65	7.36	2.34	13.81	2.69	2.44	2.95
50% Additional Treatment Volume Additional for Discharge to Impaired Waters =	3.32	3.68	1.17	6.90	1.35	1.22	1.48
Total Treatment Volume Estimate (AF):	**9.97**	**11.03**	**3.51**	**20.71**	**4.04**	**3.66**	**4.43**
Volume for Pond Sizing Calculations							
Total of Attenuation plus Treatment Volume (AF):	18.02	21.49	7.05	35.84	8.28	7.12	8.63
Total Volume for Preliminary Pond Sizing (AF):	**18.02**	**21.49**	**7.05**	**35.84**	**8.28**	**7.12**	**8.63**
Preliminary Pond Sizing Calculations Assume control elevation 1-ft below ground plus 1-ft freeboard and pond W=2L							
Assume H, Treatment Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$							
Therefore, L (FT)=	626	684	392	884	425	394	433
and W (FT) =	1253	1368	784	1767	849	788	867
Side Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
20 ft Maintenance Berm, 2 sides (FT) =	40	40	40	40	40	40	40
Tie-Down Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
Including Berm and Top Slopes, L (FT) =	698	756	464	956	497	466	505
Including Berm and Top Slopes, W (FT) =	1325	1440	856	1839	921	860	939
Preliminary Pond Area Required:	**21.24**	**25.00**	**9.11**	**40.34**	**10.50**	**9.19**	**10.90**
Total Basin Area:	95.77	108.67	34.95	197.50	40.56	36.01	43.62
Pond Area % of Total Basin Area:	22.2%	23.0%	26.1%	20.4%	25.9%	25.5%	25.0%

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study | **CALCULATED BY:** R.Q.Ly | **DATE:** 1/3/17

SUBJECT: Alternative East 7 | **CHECKED BY:** A.L.Windom | **DATE:** 1/4/17

Description		Basin						
		E7-1	E7-2	E7-3	E7-4	E7-5	E7-6	E7-7
Water Quantity - Attenuation Volume Calculations								
P, SFWMD 25 year - 24 hr Storm Event (IN) =	8.6							
P, FDOT 100 year - 24 hr Storm Event (IN) =	10.6							
Pre-Development Conditions								
Existing Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	60.44	78.01	34.03	131.72	30.73	29.26	35.42
Existing Pavement - Impervious	98	0	0	0	0	0	0	0
Existing Pond Area - Pervious	80	14.2	18	8.3	25.1	8.4	6.75	8.2
Total Basin Area =		74.64	96.01	42.33	156.82	39.13	36.01	43.62
Weighted CN =		80.00	80.00	80.00	80.00	80.00	80.00	80.00
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		2.50	2.50	2.50	2.50	2.50	2.50	2.50
R, 25 year - 24 hr Storm Event (IN) =		6.19	6.19	6.19	6.19	6.19	6.19	6.19
R, 100 year - 24 hr Storm Event (IN) =		8.10	8.10	8.10	8.10	8.10	8.10	8.10
Post-Development Conditions	**Width (FT)**	**Length (FT)**						
Ultimate 8 Lane Osceola Parkway Extension	144.00	6093	8508	3696	5522	3385	3186	3858
Ultimate 8 Lane Northeast Connector	144.00	0	0	0	1500	0	0	0
1 Lane Ramp	21.00	4319	0	1480	20900	3923	0	0
2 Lane Frontage Ramp	64.00	0	0	0	0	0	0	0
Direct Airport Connector (33% Contribution)	68.00	0	0	0	0	0	0	0
Total Proposed Pavement Impervious Area (AC) =		22.22	28.13	12.93	33.29	13.08	10.53	12.75
Proposed Runoff CN	**CN**	**Area (AC)**						
Smyrna Fine Sand (A/D), Pervious	80	38.22	49.88	21.10	98.43	17.65	18.73	22.67
Proposed Pavement - Ultimate 8 Lane	98	22.22	28.13	12.93	33.29	13.08	10.53	12.75
Proposed Pond NWL - Impervious	100	14.2	18	8.3	25.1	8.4	6.75	8.2
Total Basin Area		74.64	96.01	42.33	156.82	39.13	36.01	43.62
Weighted CN		89.16	89.02	89.42	87.02	90.31	89.01	89.02
Runoff, R (IN)=$(P-0.2S)^2/(P+0.8S)$								
Soil Storage, S = 1000/CN - 10 =		1.22	1.23	1.18	1.49	1.07	1.23	1.23
R, 25 year - 24 hr Storm Event (IN) =		7.30	7.28	7.33	7.04	7.43	7.28	7.28
R, 100 year - 24 hr Storm Event (IN) =		9.27	9.25	9.30	9.00	9.41	9.25	9.25
Attenuation Volume Estimate = Pre-Post Runoff								
Volume, 25 year - 24 hr Storm Event (AF) =		6.88	8.72	4.01	11.08	4.06	3.27	3.96
Volume, 100 year - 24 hr Storm Event (AF) =		**7.30**	**9.24**	**4.25**	**11.80**	**4.29**	**3.46**	**4.20**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study **CALCULATED BY:** R.Q.Ly **DATE:** 1/3/17

SUBJECT: Alternative East 7 **CHECKED BY:** A.L.Windom **DATE:** 1/4/17

Description	Basin						
	E7-1	E7-2	E7-3	E7-4	E7-5	E7-6	E7-7
Water Quality - Treatment Volume Estimate							
SFWMD, Wet Detention, Outfall to Impaired Waters: Yes - Okeechobee Basin							
Project Area = Total Basin Area-Pond Parcel (AC) =	60.44	78.01	34.03	131.72	30.73	29.26	35.42
Total Impervious Area (AC) =	22.22	28.13	12.93	33.29	13.08	10.53	12.75
Treatment Volume is Greater of:							
1" over Total Basin Area =	5.04	6.50	2.84	10.98	2.56	2.44	2.95
2.5" over Impervious Area =	4.63	5.86	2.69	6.94	2.73	2.19	2.66
Greater Volume Governing:	5.04	6.50	2.84	10.98	2.73	2.44	2.95
50% Additional Treatment Volume Additional for Discharge to Impaired Waters =	2.52	3.25	1.42	5.49	1.36	1.22	1.48
Total Treatment Volume Estimate (AF):	**7.56**	**9.75**	**4.25**	**16.47**	**4.09**	**3.66**	**4.43**
Volume for Pond Sizing Calculations							
Total of Attenuation plus Treatment Volume (AF):	14.85	19.00	8.51	28.27	8.38	7.12	8.63
Total Volume for Preliminary Pond Sizing (AF):	**14.85**	**19.00**	**8.51**	**28.27**	**8.38**	**7.12**	**8.63**
Preliminary Pond Sizing Calculations Assume control elevation 1-ft below ground plus 1-ft freeboard and pond W=2L							
Assume H, Treatment Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$							
Therefore, L (FT)=	569	643	430	785	427	394	433
and W (FT) =	1138	1286	861	1569	855	788	867
Side Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
20 ft Maintenance Berm, 2 sides (FT) =	40	40	40	40	40	40	40
Tie-Down Slopes, 1:4, 2 ft depth, 2 sides (FT) =	16	16	16	16	16	16	16
Including Berm and Top Slopes, L (FT) =	641	715	502	857	499	466	505
Including Berm and Top Slopes, W (FT) =	1210	1358	933	1641	927	860	939
Preliminary Pond Area Required:	**17.79**	**22.30**	**10.76**	**32.27**	**10.62**	**9.19**	**10.90**
Total Basin Area:	74.64	96.01	42.33	156.82	39.13	36.01	43.62
Pond Area % of Total Basin Area:	23.8%	23.2%	25.4%	20.6%	27.1%	25.5%	25.0%

APPENDIX E

Floodplain Compensation Calculations

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study
SUBJECT: Alternative West 1A

CALCULATED BY: K.A.Simmonds **DATE:** 1/3/17
CHECKED BY: A.L.Windom **DATE:**

Description	Floodplain Impact Basins				
	FPC-W1A-A1	FPC-W1A-B1	FPC-W1A-B2	FPC-W1A-B3	FPC-W1A-B4
Floodplain Compensation Calculations					
Floodplain Impacts					
Base Flood Elevation (FT) =	75	80	79	78	75
Data Source: F = FEMA, Q = Quad Map Elevations	F	F	Q	Q	Q
Total Impact Area (AC) =	2.1	2.3	11.2	12.2	4.8
Average Existing Ground Elevation (FT) =	74.5	79	78	77	74
Proposed Ground Elevation (FT) =	80.5	85	84	83	80
Depth of Impact (FT) = Top of Impact - Base Flood Elevation =	0.5	1	1	1	1
Impact Area x Depth of Impact = Total Floodplain Impact Volume (AF) =	1.05	2.3	11.2	12.2	4.8
Floodplain Compensation					
Floodplain Compensation Pond Volume Required (AF)	1.05	2.3	11.2	12.2	4.8
Preliminary Floodplain Compensation Pond Sizing Calculations Assume control elevation 1-ft below ground and pond W=2L					
Assume H, Floodplain Compensation Pond Depth (FT) =	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$					
Therefore, L (FT)=	151	224	494	515	323
and W (FT) =	302	448	988	1031	647
Side Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8
10 ft Maintenance Berm, 2 sides (FT) =	20	20	20	20	20
Tie-Down Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8
Including Berm and Top Slopes, L (FT) =	187	260	530	551	359
Including Berm and Top Slopes, W (FT) =	338	484	1024	1067	683
Preliminary Floodplain Compensation Pond Area Required:	**1.45**	**2.88**	**12.45**	**13.51**	**5.63**
Total Floodplain Compensation Pond Area Required (AC):	**1.45**	**34.48**			

	Floodplain Compensation Ponds	
	FPC-W1A-1	FPC-W1A-2
Total Floodplain Compensation Pond Area Provided (AC):	**2.5**	**38.65**
Total Floodplain Compensation Pond Volume Provided (AF):	**1.80**	**34.19**
Total Floodplain Compensation Pond Volume Required (AF):	**1.05**	**30.50**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study
SUBJECT: Alternative West 1B

CALCULATED BY: K.A.Simmonds **DATE:** 1/3/17
CHECKED BY: A.L.Windom **DATE:**

Description	Floodplain Impact Basins				
	FPC-W1B-A1	FPC-W1B-B1	FPC-W1B-B2	FPC-W1B-B3	FPC-W1B-B4
Floodplain Compensation Calculations					
Floodplain Impacts					
Base Flood Elevation (FT) =	75	80	79	78	75
Data Source: F = FEMA, Q = Quad Map Elevations	F	F	Q	Q	Q
Total Impact Area (AC) =	2.1	2.3	11.2	12.2	4.9
Average Existing Ground Elevation (FT) =	74.5	79	78	77	74
Proposed Ground Elevation (FT) =	80.5	85	84	83	80
Depth of Impact (FT) = Top of Impact - Base Flood Elevation =	0.5	1	1	1	1
Impact Area x Depth of Impact =					
Total Floodplain Impact Volume (AF) =	1.05	2.3	11.2	12.2	4.9
Floodplain Compensation					
Floodplain Compensation Pond Volume Required (AF)	1.05	2.3	11.2	12.2	4.9
Preliminary Floodplain Compensation Pond Sizing Calculations Assume control elevation 1-ft below ground and pond W=2L					
Assume H, Floodplain Compensation Pond Depth (FT) =	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$					
Therefore, L (FT)=	151	224	494	515	327
and W (FT) =	302	448	988	1031	653
Side Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8
10 ft Maintenance Berm, 2 sides (FT) =	20	20	20	20	20
Tie-Down Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8
Including Berm and Top Slopes, L (FT) =	187	260	530	551	363
Including Berm and Top Slopes, W (FT) =	338	484	1024	1067	689
Preliminary Floodplain Compensation Pond Area Required:	**1.45**	**2.88**	**12.45**	**13.51**	**5.74**
Total Floodplain Compensation Pond Area Required (AC):	**1.45**	**34.59**			

	Floodplain Compensation Ponds	
	FPC-W1B-1	FPC-W1B-2
Total Floodplain Compensation Pond Area Provided (AC):	**2.5**	**38.65**
Total Floodplain Compensation Pond Volume Provided (AF):	**1.80**	**34.20**
Total Floodplain Compensation Pond Volume Required (AF):	**1.05**	**30.60**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study
SUBJECT: Alternative West 2

CALCULATED BY: K.A.Simmonds **DATE:** 1/3/17
CHECKED BY: A.L.Windom **DATE:**

Description	Floodplain Impact Basins				
	FPC-W2-A1	FPC-W2-B1	FPC-W2-B2	FPC-W2-B3	FPC-W2-C1
Floodplain Compensation Calculations					
Floodplain Impacts					
Base Flood Elevation (FT) =	75	80	78	78	79
Data Source: F = FEMA, Q = Quad Map Elevations	F	F	Q	Q	Q
Total Impact Area (AC) =	2.1	1.3	11.5	3.6	6.5
Average Existing Ground Elevation (FT) =	74.5	79	77	77	78
Proposed Ground Elevation (FT) =	80.5	85	83	83	84
Depth of Impact (FT) = Top of Impact - Base Flood Elevation =	0.5	1	1	1	1
Impact Area x Depth of Impact =					
Total Floodplain Impact Volume (AF) =	1.05	1.3	11.5	3.6	6.5
Floodplain Compensation					
Floodplain Compensation Pond Volume Required (AF)	1.05	1.3	11.5	3.6	6.5
Preliminary Floodplain Compensation Pond Sizing Calculations Assume control elevation 1-ft below ground and pond W=2L					
Assume H, Floodplain Compensation Pond Depth (FT) =	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$					
Therefore, L (FT)=	151	168	500	280	376
and W (FT) =	302	337	1001	560	753
Side Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8
10 ft Maintenance Berm, 2 sides (FT) =	20	20	20	20	20
Tie-Down Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8
Including Berm and Top Slopes, L (FT) =	187	204	536	316	412
Including Berm and Top Slopes, W (FT) =	338	373	1037	596	789
Preliminary Floodplain Compensation Pond Area Required:	**1.45**	**1.75**	**12.77**	**4.32**	**7.46**
Total Floodplain Compensation Pond Area Required (AC):	**1.45**	**18.84**			**7.46**

	Floodplain Compensation Ponds		
	FPC-W2-1	FPC-W2-2	FPC-W2-3
Total Floodplain Compensation Pond Area Provided (AC):	**2.50**	**18.90**	**7.55**
Total Floodplain Compensation Pond Volume Provided (AF):	**1.80**	**16.45**	**6.58**
Total Floodplain Compensation Pond Volume Required (AF):	**1.05**	**16.40**	**6.50**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study
SUBJECT: Alternative East 1

CALCULATED BY: K.A.Simmonds **DATE:** 1/3/17
CHECKED BY: A.L.Windom **DATE:**

Description	Floodplain Impact Basins									
	FPC-E1-D1	FPC-E1-E1	FPC-E1-G1	FPC-E1-J1	FPC-E1-K1	FPC-E1-K2	FPC-E1-K3	FPC-E1-L1	FPC-E1-M1	FPC-E1-N1
Floodplain Compensation Calculations										
Floodplain Impacts										
Base Flood Elevation (FT) =	63	63	64	67.2	63	63	64.3	69.1	70	65.5
Data Source: F = FEMA, Q = Quad Map Elevations	F	F	Q	F	F	F	F	F	F	F
Total Impact Area (AC) =	30.1	3.4	18.4	13.8	1	27.4	13	2.2	2.2	14.5
Average Existing Ground Elevation (FT) =	62	62	63	66.2	62	62	63.3	68.1	69	64.5
Proposed Ground Elevation (FT) =	68	68	69	72.2	68	68	69.3	74.1	75	70.5
Depth of Impact (FT) = Top of Impact - Base Flood Elevation =	1	1	1	1	1	1	1	1	1	1
Impact Area x Depth of Impact =										
Total Floodplain Impact Volume (AF) =	30.1	3.4	18.4	13.8	1	27.4	13	2.2	2.2	14.5
Floodplain Compensation										
Floodplain Compensation Pond Volume Required (AF)	30.1	3.4	18.4	13.8	1	27.4	13	2.2	2.2	14.5
Preliminary Floodplain Compensation Pond Sizing Calculations Assume control elevation 1-ft below ground and pond W=2L										
Assume H, Floodplain Compensation Pond Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$										
Therefore, L (FT)=	810	272	633	548	148	773	532	219	219	562
and W (FT) =	1619	544	1266	1096	295	1545	1064	438	438	1124
Side Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8
10 ft Maintenance Berm, 2 sides (FT) =	20	20	20	20	20	20	20	20	20	20
Tie-Down Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8
Including Berm and Top Slopes, L (FT) =	846	308	669	584	184	809	568	255	255	598
Including Berm and Top Slopes, W (FT) =	1655	580	1302	1132	331	1581	1100	474	474	1160
Preliminary Floodplain Compensation Pond Area Required:	**32.14**	**4.10**	**20.00**	**15.19**	**1.40**	**29.35**	**14.35**	**2.77**	**2.77**	**15.92**
Total Floodplain Compensation Pond Area Required (AC):	**56.24**			**15.19**	**45.09**			**2.77**	**2.77**	**15.92**

	Floodplain Compensation Ponds				
	FPC-E1-1	FPC-E1-2	FPC-E1-3	FPC-E1-4	FPC-E1-5
Total Floodplain Compensation Pond Area Provided (AC):	**56.55**	**15.22**	**45.20**	**5.54**	**15.97**
Total Floodplain Compensation Pond Volume Provided (AF):	**52.19**	**13.83**	**41.50**	**4.40**	**14.54**
Total Floodplain Compensation Pond Volume Required (AF):	**51.90**	**13.80**	**41.40**	**4.40**	**14.50**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study
SUBJECT: Alternative East 2

CALCULATED BY: K.A.Simmonds **DATE:** 1/3/17
CHECKED BY: A.L.Windom **DATE:**

Description	Floodplain Impact Basins												
	FPC-E2-D1	FPC-E2-E1	FPC-E2-G1	FPC-E2-I1	FPC-E2-J1	FPC-E2-J2	FPC-E2-J3	FPC-E2-K1	FPC-E2-K2	FPC-E2-K3	FPC-E2-L1	FPC-E2-M1	FPC-E2-N1
Floodplain Compensation Calculations													
Floodplain Impacts													
Base Flood Elevation (FT) =	63	63	64	71	69.8	71	70.1	63	63	63	69.1	70	65.5
Data Source: F = FEMA, Q = Quad Map Elevations	F	F	Q	Q	F	F	F	F	F	F	F	F	F
Total Impact Area (AC) =	30.3	4.4	17	13.8	0.9	0.7	1.4	42.4	13.3	13	2	2.2	14.5
Average Existing Ground Elevation (FT) =	62	62	63	70	68.8	70	69.1	62	62	62	68.1	69	64.5
Proposed Ground Elevation (FT) =	68	68	69	76	74.8	76	75.1	68	68	68	74.1	75	70.5
Depth of Impact (FT) = Top of Impact - Base Flood Elevation =	1	1	1	1	1	1	1	1	1	1	1	1	1
Impact Area x Depth of Impact =													
Total Floodplain Impact Volume (AF) =	30.3	4.4	17	13.8	0.9	0.7	1.4	42.4	13.3	13	2	2.2	14.5
Floodplain Compensation													
Floodplain Compensation Pond Volume Required (AF)	30.3	4.4	17	13.8	0.9	0.7	1.4	42.4	13.3	13	2	2.2	14.5
Preliminary Floodplain Compensation Pond Sizing Calculations Assume control elevation 1-ft below ground and pond W=2L													
Assume H, Floodplain Compensation Pond Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$													
Therefore, L (FT)=	812	310	608	548	140	123	175	961	538	532	209	219	562
and W (FT) =	1625	619	1217	1096	280	247	349	1922	1076	1064	417	438	1124
Side Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8	8
10 ft Maintenance Berm, 2 sides (FT) =	20	20	20	20	20	20	20	20	20	20	20	20	20
Tie-Down Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8	8
Including Berm and Top Slopes, L (FT) =	848	346	644	584	176	159	211	997	574	568	245	255	598
Including Berm and Top Slopes, W (FT) =	1661	655	1253	1132	316	283	385	1958	1112	1100	453	474	1160
Preliminary Floodplain Compensation Pond Area Required:	**32.34**	**5.20**	**18.54**	**15.19**	**1.28**	**1.04**	**1.86**	**44.81**	**14.66**	**14.35**	**2.55**	**2.77**	**15.92**
Total Floodplain Compensation Pond Area Required (AC):		**56.08**			**19.36**				**73.83**			**21.24**	
	Floodplain Compensation Ponds												
	FPC-E2-1			**FPC-E2-2**				**FPC-E2-3**			**FPC-E2-4**		
Total Floodplain Compensation Pond Area Provided (AC):	**56.10**			**19.38**				**73.87**			**21.26**		
Total Floodplain Compensation Pond Volume Provided (AF):	**51.72**			**16.81**				**68.74**			**18.72**		
Total Floodplain Compensation Pond Volume Required (AF):	**51.70**			**16.80**				**68.70**			**18.70**		

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study
SUBJECT: Alternative East 3

CALCULATED BY: K.A.Simmonds **DATE:** 1/3/17
CHECKED BY: A.L.Windom **DATE:**

Description	Floodplain Impact Basins											
	FPC-E3-D1	FPC-E3-E1	FPC-E3-G1	FPC-E3-H1	FPC-E3-J1	FPC-E3-K1	FPC-E3-K2	FPC-E3-K3	FPC-E3-K4	FPC-E3-L1	FPC-E3-M1	FPC-E3-N1
Floodplain Compensation Calculations												
Floodplain Impacts												
Base Flood Elevation (FT) =	63	63	64	69	67.2	65.5	65.5	63	63	69.1	70	65.5
Data Source: F = FEMA, Q = Quad Map Elevations	F	F	Q	Q	F	F	F	F	F	F	F	F
Total Impact Area (AC) =	30	3.4	17	13.8	5.6	0.7	1.4	15.6	13	2.1	2.2	14.5
Average Existing Ground Elevation (FT) =	62	62	63	68	66.2	64.5	64.5	62	62	68.1	69	64.5
Proposed Ground Elevation (FT) =	68	68	69	74	72.2	70.5	70.5	68	68	74.1	75	70.5
Depth of Impact (FT) = Top of Impact - Base Flood Elevation =	1	1	1	1	1	1	1	1	1	1	1	1
Impact Area x Depth of Impact =												
Total Floodplain Impact Volume (AF) =	30	3.4	17	13.8	5.6	0.7	1.4	15.6	13	2.1	2.2	14.5
Floodplain Compensation												
Floodplain Compensation Pond Volume Required (AF)	30	3.4	17	13.8	5.6	0.7	1.4	15.6	13	2.1	2.2	14.5
Preliminary Floodplain Compensation Pond Sizing Calculations Assume control elevation 1-ft below ground and pond W=2L												
Assume H, Floodplain Compensation Pond Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$												
Therefore, L (FT)=	808	272	608	548	349	123	175	583	532	214	219	562
and W (FT) =	1617	544	1217	1096	698	247	349	1166	1064	428	438	1124
Side Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8
10 ft Maintenance Berm, 2 sides (FT) =	20	20	20	20	20	20	20	20	20	20	20	20
Tie-Down Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8
Including Berm and Top Slopes, L (FT) =	844	308	644	584	385	159	211	619	568	250	255	598
Including Berm and Top Slopes, W (FT) =	1653	580	1253	1132	734	283	385	1202	1100	464	474	1160
Preliminary Floodplain Compensation Pond Area Required:	**32.03**	**4.10**	**18.54**	**15.19**	**6.50**	**1.04**	**1.86**	**17.07**	**14.35**	**2.66**	**2.77**	**15.92**
Total Floodplain Compensation Pond Area Required (AC):	**54.68**			**15.19**	**6.50**	**34.32**				**21.36**		

	Floodplain Compensation Ponds			
	FPC-E3-1	FPC-E3-2	FPC-E3-3	FPC-E3-4
Total Floodplain Compensation Pond Area Provided (AC):	**54.69**	**30.80**	**25.28**	**21.38**
Total Floodplain Compensation Pond Volume Provided (AF):	**50.41**	**27.55**	**22.61**	**18.82**
Total Floodplain Compensation Pond Volume Required (AF):	**50.40**	**19.40**	**30.70**	**18.80**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study
SUBJECT: Alternative East 4A

CALCULATED BY: K.A.Simmonds **DATE:** 1/3/17
CHECKED BY: A.L.Windom **DATE:**

Description	Floodplain Impact Basins												
	FPC-E4A-D1	FPC-E4A-E1	FPC-E4A-G1	FPC-E4A-I1	FPC-E4A-J1	FPC-E4A-J2	FPC-E4A-J3	FPC-E4A-K1	FPC-E4A-K2	FPC-E4A-K3	FPC-E4A-L1	FPC-E4A-M1	FPC-E4A-N1
Floodplain Compensation Calculations													
Floodplain Impacts													
Base Flood Elevation (FT) =	63	63	64	71	69.8	70.1	67.2	65.5	63	63	69.1	70	65.5
Data Source: F = FEMA, Q = Quad Map Elevations	F	F	Q	Q	F	F	F	F	F	F	F	F	F
Total Impact Area (AC) =	30.2	4.3	19	7.1	2.4	3.7	2.2	7.8	19.7	13.2	0.7	2.2	14.5
Average Existing Ground Elevation (FT) =	62	62	63	70	68.8	69.1	66.2	64.5	62	62	68.1	69	64.5
Proposed Ground Elevation (FT) =	68	68	69	76	74.8	75.1	72.2	70.5	68	68	74.1	75	70.5
Depth of Impact (FT) = Top of Impact - Base Flood Elevation =	1	1	1	1	1	1	1	1	1	1	1	1	1
Impact Area x Depth of Impact =													
Total Floodplain Impact Volume (AF) =	30.2	4.3	19	7.1	2.4	3.7	2.2	7.8	19.7	13.2	0.7	2.2	14.5
Floodplain Compensation													
Floodplain Compensation Pond Volume Required (AF)	30.2	4.3	19	7.1	2.4	3.7	2.2	7.8	19.7	13.2	0.7	2.2	14.5
Preliminary Floodplain Compensation Pond Sizing Calculations Assume control elevation 1-ft below ground and pond W=2L													
Assume H, Floodplain Compensation Pond Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$													
Therefore, L (FT)=	811	306	643	393	229	284	219	412	463	536	123	219	562
and W (FT) =	1622	612	1287	786	457	568	438	824	926	1072	247	438	1124
Side Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8	8
10 ft Maintenance Berm, 2 sides (FT) =	20	20	20	20	20	20	20	20	20	20	20	20	20
Tie-Down Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8	8
Including Berm and Top Slopes, L (FT) =	847	342	679	429	265	320	255	448	499	572	159	255	598
Including Berm and Top Slopes, W (FT) =	1658	648	1323	822	493	604	474	860	962	1108	283	474	1160
Preliminary Floodplain Compensation Pond Area Required:	**32.24**	**5.09**	**20.62**	**8.10**	**3.00**	**4.43**	**2.77**	**8.85**	**11.03**	**14.56**	**1.04**	**2.77**	**15.92**
Total Floodplain Compensation Pond Area Required (AC):	**57.95**			**8.10**	**3.00**	**4.43**	**2.77**	**8.85**	**11.03**	**14.56**	**19.73**		

	Floodplain Compensation Ponds				
	FPC-E4A-1	FPC-E4A-2A	FPC-E4A-2B	FPC-E4A-3	FPC-E4A-4
Total Floodplain Compensation Pond Area Provided (AC):	**57.96**	**8.13**	**37.15**	**7.50**	**19.77**
Total Floodplain Compensation Pond Volume Provided (AF):	**53.51**	**56.14**			**19.81**
Total Floodplain Compensation Pond Volume Required (AF):	**53.50**	**56.10**			**19.77**

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study
SUBJECT: Alternative East 4B

CALCULATED BY: R.Q. Ly **DATE:** 1/3/17
CHECKED BY: A.L.Windom **DATE:**

Description	Floodplain Impact Basins													
	FPC-E4B-D1	FPC-E4B-G1	FPC-E4B-I1	FPC-E4B-I2	FPC-E4B-J1	FPC-E4B-J2	FPC-E4B-J3	FPC-E4B-H1	FPC-E4B-K1	FPC-E4B-K2	FPC-E4B-K3	FPC-E4B-L1	FPC-E4B-M1	FPC-E4B-N1
Floodplain Compensation Calculations														
Floodplain Impacts														
Base Flood Elevation (FT) =	63	64	71	73	69.8	69.8	70.1	67.2	65.5	63	64.3	69.1	70	65.5
Data Source: F = FEMA, Q = Quad Map Elevations	F	Q	Q	Q	F	F	F	F	F	F	F	F	F	F
Total Impact Area (AC) =	18.9	24.4	8.7	0.9	4.2	1.2	7.5	0.8	10.13	20.9	13.2	0.7	2.2	14.5
Average Existing Ground Elevation (FT) =	62	63	70	72	68.8	68.8	69.1	66.2	64.5	62	63.3	68.1	69	64.5
Proposed Ground Elevation (FT) =	68	69	76	78	74.8	74.8	75.1	72.2	70.5	68	69.3	74.1	75	70.5
Depth of Impact (FT) = Top of Impact - Base Flood Elevation =	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Impact Area x Depth of Impact =														
Total Floodplain Impact Volume (AF) =	18.9	24.4	8.7	0.9	4.2	1.2	7.5	0.8	10.13	20.9	13.2	0.7	2.2	14.5
Floodplain Compensation														
Floodplain Compensation Pond Volume Required (AF)	18.9	24.4	8.7	0.9	4.2	1.2	7.5	0.8	10.13	20.9	13.2	0.7	2.2	14.5
Preliminary Floodplain Compensation Pond Sizing Calculations Assume control elevation 1-ft below ground and pond W=2L														
Assume H, Floodplain Compensation Pond Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$														
Therefore, L (FT)=	642	729	435	140	302	162	404	132	470	675	536	123	219	562
and W (FT) =	1283	1458	871	280	605	323	808	264	939	1349	1072	247	438	1124
Side Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8	8	8
10 ft Maintenance Berm, 2 sides (FT) =	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Tie-Down Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Including Berm and Top Slopes, L (FT) =	678	765	471	176	338	198	440	168	506	711	572	159	255	598
Including Berm and Top Slopes, W (FT) =	1319	1494	907	316	641	359	844	300	975	1385	1108	283	474	1160
Preliminary Floodplain Compensation Pond Area Required:	**20.52**	**26.24**	**9.81**	**1.28**	**4.98**	**1.63**	**8.53**	**1.16**	**11.32**	**22.60**	**14.56**	**1.04**	**2.77**	**15.92**
Total Floodplain Compensation Pond Area Required (AC):	**46.76**		**9.81**	**17.58**					**48.49**			**19.73**		
	Floodplain Compensation Ponds													
	FPC-E4B-1		**FPC-E4A-2A**	**FPC-E4B-2B**					**FPC-E4B-3**			**FPC-E4B-4**		
Total Floodplain Compensation Pond Area Provided (AC):	**46.89**		**10.06**	**18.31**					**48.15**			**21.00**		
Total Floodplain Compensation Pond Volume Provided (AF):	**43.42**		**59.33**									**18.52**		
Total Floodplain Compensation Pond Volume Required (AF):	**43.30**		**58.83**									**17.40**		

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study
SUBJECT: Alternative East 4C

CALCULATED BY: R.Q. Ly **DATE:** 1/3/17
CHECKED BY: A.L.Windom **DATE:**

Description	Floodplain Impact Basins												
	FPC-E4C-D1	FPC-E4C-G1	FPC-E4C-E1	FPC-E4C-I1	FPC-E4C-J1	FPC-E4C-J2	FPC-E4C-J4	FPC-E4C-K1	FPC-E4C-K2	FPC-E4C-K3	FPC-E4C-L1	FPC-E4C-M1	FPC-E4C-N1
Floodplain Compensation Calculations													
Floodplain Impacts													
Base Flood Elevation (FT) =	63	64	63	71	71	70.1	70.7	65.5	63	64.3	69.1	70	65.5
Data Source: F = FEMA, Q = Quad Map Elevations	F	Q	F	Q	F	F	F	F	F	F	F	F	F
Total Impact Area (AC) =	30.3	19	4.4	6.3	2	2.76	0.67	15.2	20.9	14.3	0.7	2.2	14.5
Average Existing Ground Elevation (FT) =	62	63	62	70	70	69.1	69.7	64.5	62	63.3	68.1	69	64.5
Proposed Ground Elevation (FT) =	68	69	68	76	76	75.1	75.7	70.5	68	69.3	74.1	75	70.5
Depth of Impact (FT) = Top of Impact - Base Flood Elevation =	1	1	1	1	1	1	1	1	1	1	1	1	1
Impact Area x Depth of Impact =													
Total Floodplain Impact Volume (AF) =	30.3	19	4.4	6.3	2	2.76	0.67	15.2	20.9	14.3	0.7	2.2	14.5
Floodplain Compensation													
Floodplain Compensation Pond Volume Required (AF)	30.3	19	4.4	6.3	2	2.76	0.67	15.2	20.9	14.3	0.7	2.2	14.5
Preliminary Floodplain Compensation Pond Sizing Calculations Assume control elevation 1-ft below ground and pond W=2L													
Assume H, Floodplain Compensation Pond Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$													
Therefore, L (FT)=	812	643	310	370	209	245	121	575	675	558	123	219	562
and W (FT) =	1625	1287	619	741	417	490	242	1151	1349	1116	247	438	1124
Side Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8	8
10 ft Maintenance Berm, 2 sides (FT) =	20	20	20	20	20	20	20	20	20	20	20	20	20
Tie-Down Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8	8
Including Berm and Top Slopes, L (FT) =	848	679	346	406	245	281	157	611	711	594	159	255	598
Including Berm and Top Slopes, W (FT) =	1661	1323	655	777	453	526	278	1187	1385	1152	283	474	1160
Preliminary Floodplain Compensation Pond Area Required:	**32.34**	**20.62**	**5.20**	**7.25**	**2.55**	**3.40**	**1.00**	**16.66**	**22.60**	**15.71**	**1.04**	**2.77**	**15.92**
Total Floodplain Compensation Pond Area Required (AC):	**58.17**			**69.16**							**19.73**		
	Floodplain Compensation Ponds												
	FPC-E4C-1			**FPC-E4C-2**							**FPC-E4C-3**		
Total Floodplain Compensation Pond Area Provided (AC):	**58.19**			**69.21**							**21.00**		
Total Floodplain Compensation Pond Volume Provided (AF):	**53.72**			**62.17**							**18.52**		
Total Floodplain Compensation Pond Volume Required (AF):	**53.70**			**62.13**							**17.40**		

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study
SUBJECT: Alternative East 5

CALCULATED BY: R.Q. Ly **DATE:** 1/3/17
CHECKED BY: A.L.Windom **DATE:**

Description	Floodplain Impact Basins													
	FPC-E5-D1	FPC-E5-F1	FPC-E5-I1	FPC-E5-I2	FPC-E5-J1	FPC-E5-J2	FPC-E5-J3	FPC-E5-J4	FPC-E5-K1	FPC-E5-K2	FPC-E5-K3	FPC-E5-L1	FPC-E5-M1	FPC-E5-N1
Floodplain Compensation Calculations														
Floodplain Impacts														
Base Flood Elevation (FT) =	63	64	71	73	69.8	71	70.1	70.7	65.5	63	64.3	69.1	70	65.5
Data Source: F = FEMA, Q = Quad Map Elevations	F	Q	Q	Q	F	F	F	F	F	F	F	F	F	F
Total Impact Area (AC) =	17	25.5	6.76	9.26	2.03	2.01	3.07	0.67	12.4	14.9	13.2	0.7	2.2	14.5
Average Existing Ground Elevation (FT) =	62	63	70	72	68.8	70	69.1	69.7	64.5	62	63.3	68.1	69	64.5
Proposed Ground Elevation (FT) =	68	69	76	78	74.8	76	75.1	75.7	70.5	68	69.3	74.1	75	70.5
Depth of Impact (FT) = Top of Impact - Base Flood Elevation =	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Impact Area x Depth of Impact = Total Floodplain Impact Volume (AF) =	17	25.5	6.76	9.26	2.03	2.01	3.07	0.67	12.4	14.9	13.2	0.7	2.2	14.5
Floodplain Compensation														
Floodplain Compensation Pond Volume Required (AF)	17	25.5	6.76	9.26	2.03	2.01	3.07	0.67	12.4	14.9	13.2	0.7	2.2	14.5
Preliminary Floodplain Compensation Pond Sizing Calculations Assume control elevation 1-ft below ground and pond W=2L														
Assume H, Floodplain Compensation Pond Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$														
Therefore, L (FT)=	608	745	384	449	210	209	259	121	520	570	536	123	219	562
and W (FT) =	1217	1490	767	898	421	418	517	242	1039	1139	1072	247	438	1124
Side Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8	8	8
10 ft Maintenance Berm, 2 sides (FT) =	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Tie-Down Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Including Berm and Top Slopes, L (FT) =	644	781	420	485	246	245	295	157	556	606	572	159	255	598
Including Berm and Top Slopes, W (FT) =	1253	1526	803	934	457	454	553	278	1075	1175	1108	283	474	1160
Preliminary Floodplain Compensation Pond Area Required:	**18.54**	**27.38**	**7.74**	**10.40**	**2.58**	**2.56**	**3.74**	**1.00**	**13.72**	**16.34**	**14.56**	**1.04**	**2.77**	**15.92**
Total Floodplain Compensation Pond Area Required (AC):	**45.92**		**72.64**									**19.73**		
	Floodplain Compensation Ponds													
	FPC-E5-1		**FPC-E5-2**									**FPC-E5-3**		
Total Floodplain Compensation Pond Area Provided (AC):	**45.96**		**72.65**									**21.29**		
Total Floodplain Compensation Pond Volume Provided (AF):	**42.54**		**64.31**									**18.77**		
Total Floodplain Compensation Pond Volume Required (AF):	**42.50**		**64.30**									**17.40**		

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study

SUBJECT: Alternative East 6

CALCULATED BY: R.Q. Ly **DATE:** 1/3/17

CHECKED BY: A.L.Windom **DATE:**

Description	Floodplain Impact Basins									
	FPC-E6-D1	**FPC-E6-F1**	**FPC-E6-I1**	**FPC-E6-I2**	**FPC-E6-K1**	**FPC-E6-K2**	**FPC-E6-K3**	**FPC-E6-L1**	**FPC-E6-M1**	**FPC-E6-N1**
Floodplain Compensation Calculations										
Floodplain Impacts										
Base Flood Elevation (FT) =	63	64	71	73	65.5	63	64.3	69.1	70	65.5
Data Source: F = FEMA, Q = Quad Map Elevations	F	Q	Q	Q	F	F	F	F	F	F
Total Impact Area (AC) =	13.8	28.4	3.7	12.9	19.9	20.8	13.2	0.7	2.2	14.5
Average Existing Ground Elevation (FT) =	62	63	70	72	64.5	62	63.3	68.1	69	64.5
Proposed Ground Elevation (FT) =	68	69	76	78	70.5	68	69.3	74.1	75	70.5
Depth of Impact (FT) = Top of Impact - Base Flood Elevation =	1	1	1	1	1	1	1	1	1	1
Impact Area x Depth of Impact =										
Total Floodplain Impact Volume (AF) =	13.8	28.4	3.7	12.9	19.9	20.8	13.2	0.7	2.2	14.5
Floodplain Compensation										
Floodplain Compensation Pond Volume Required (AF)	13.8	28.4	3.7	12.9	19.9	20.8	13.2	0.7	2.2	14.5
Preliminary Floodplain Compensation Pond Sizing Calculations Assume control elevation 1-ft below ground and pond W=2L										
Assume H, Floodplain Compensation Pond Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$										
Therefore, L (FT)=	548	786	284	530	658	673	536	123	219	562
and W (FT) =	1096	1573	568	1060	1317	1346	1072	247	438	1124
Side Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8
10 ft Maintenance Berm, 2 sides (FT) =	20	20	20	20	20	20	20	20	20	20
Tie-Down Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8
Including Berm and Top Slopes, L (FT) =	584	822	320	566	694	709	572	159	255	598
Including Berm and Top Slopes, W (FT) =	1132	1609	604	1096	1353	1382	1108	283	474	1160
Preliminary Floodplain Compensation Pond Area Required:	**15.19**	**30.38**	**4.43**	**14.24**	**21.56**	**22.50**	**14.56**	**1.04**	**2.77**	**15.92**
Total Floodplain Compensation Pond Area Required (AC):	**45.57**		**77.30**					**19.73**		
	Floodplain Compensation Ponds									
	FPC-E6-1		**FPC-E6-2**					**FPC-E6-3**		
Total Floodplain Compensation Pond Area Provided (AC):	**45.58**		**77.39**					**20.62**		
Total Floodplain Compensation Pond Volume Provided (AF):	**42.21**		**70.58**					**18.18**		
Total Floodplain Compensation Pond Volume Required (AF):	**42.20**		**70.50**					**17.40**		

JACOBS ch2m

PROJECT: Osceola Parkway Extension PDE Study
SUBJECT: Alternative East 7

CALCULATED BY: R.Q. Ly **DATE:** 1/3/17
CHECKED BY: A.L.Windom **DATE:**

Description	Floodplain Impact Basins											
	FPC-E7-D1	FPC-E7-E1	FPC-E7-G1	FPC-E7-I1	FPC-E7-J1	FPC-E7-J2	FPC-E7-K1	FPC-E7-K2	FPC-E7-K3	FPC-E7-L1	FPC-E7-M1	FPC-E7-N1
Floodplain Compensation Calculations												
Floodplain Impacts												
Base Flood Elevation (FT) =	63	63	64	71	69.8	71	65.5	63	64.3	69.1	70	65.5
Data Source: F = FEMA, Q = Quad Map Elevations	F	F	Q	Q	F	F	F	F	F	F	F	F
Total Impact Area (AC) =	30.3	4.3	19	5.6	0.9	0.3	14.6	7.9	13.1	0.7	2.2	14.5
Average Existing Ground Elevation (FT) =	62	62	63	70	68.8	70	64.5	62	63.3	68.1	69	64.5
Proposed Ground Elevation (FT) =	68	68	69	76	74.8	76	70.5	68	69.3	74.1	75	70.5
Depth of Impact (FT) = Top of Impact - Base Flood Elevation =	1	1	1	1	1	1	1	1	1	1	1	1
Impact Area x Depth of Impact =												
Total Floodplain Impact Volume (AF) =	30.3	4.3	19	5.6	0.9	0.3	14.6	7.9	13.1	0.7	2.2	14.5
Floodplain Compensation												
Floodplain Compensation Pond Volume Required (AF)	30.3	4.3	19	5.6	0.9	0.3	14.6	7.9	13.1	0.7	2.2	14.5
Preliminary Floodplain Compensation Pond Sizing Calculations Assume control elevation 1-ft below ground and pond W=2L												
Assume H, Floodplain Compensation Pond Depth (FT) =	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pond Volume = LxWxH = Lx2LxH = $2xL^2xH$												
Therefore, L (FT)=	812	306	643	349	140	81	564	415	534	123	219	562
and W (FT) =	1625	612	1287	698	280	162	1128	830	1068	247	438	1124
Side Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8
10 ft Maintenance Berm, 2 sides (FT) =	20	20	20	20	20	20	20	20	20	20	20	20
Tie-Down Slopes, 1:4, 1 ft depth, 2 sides (FT) =	8	8	8	8	8	8	8	8	8	8	8	8
Including Berm and Top Slopes, L (FT) =	848	342	679	385	176	117	600	451	570	159	255	598
Including Berm and Top Slopes, W (FT) =	1661	648	1323	734	316	198	1164	866	1104	283	474	1160
Preliminary Floodplain Compensation Pond Area Required:	**32.34**	**5.09**	**20.62**	**6.50**	**1.28**	**0.53**	**16.03**	**8.96**	**14.45**	**1.04**	**2.77**	**15.92**
Total Floodplain Compensation Pond Area Required (AC):	**58.06**			**8.30**			**39.44**			**19.73**		
	Floodplain Compensation Ponds											
	FPC-E7-1			**FPC-E7-2**			**FPC-E7-3**			**FPC-E7-4**		
Total Floodplain Compensation Pond Area Provided (AC):	**58.09**			**8.30**			**39.45**			**20.62**		
Total Floodplain Compensation Pond Volume Provided (AF):	**53.63**			**6.80**			**35.61**			**18.18**		
Total Floodplain Compensation Pond Volume Required (AF):	**53.60**			**6.80**			**35.60**			**17.40**		

APPENDIX F

Correspondence

OSCEOLA PARKWAY EXTENSION

Coordination Meeting

Concept, Feasibility and Mobility Study

PROJECT: Osceola Parkway Extension Concept, Feasibility and Mobility Study
Orange County and Osceola County, Florida
Contract No. 001248; Project Identification No. 599-221

MEETING DATE: Tuesday 12/19/2017

MEETING TIME: 9:30 AM to 11:00 AM

LOCATION: Sandpiper Conference Room – 3rd Floor
CFX Headquarters
4974 ORL Tower Road, Orlando, FL 32807

CONFERENCE CALL NUMBER: 1-866-203-7023

ACCESS CODE: 4346590295

ATTENDEES:

Name	Organization	Email
Scott Carter	CH2M	scott.carter1@ch2m.com
Nicole Gough	Dewberry	ngough@dewberry.com
Keith Jackson	Dewberry	kjackson@dewberry.com
Matt Lamb	CH2M	matt.lamb@ch2m.com
Clayton Lee	Dewberry	clee@dewberry.com
Glenn Pressimone	CFX	glenn.pressimone@cfxway.com

1. Background

A meeting was held on December 5, 2017 at CFX including Dewberry and CH2M. The primary purpose was to review right-of-way parcels provided by CH2M to Dewberry for right-of-way cost estimating purposes. During that discussion, most of the ponds for each of the twelve alternatives were moved or modified to optimize right-of-way costs and minimize impacts. The ponds discussed were based upon preliminary pond-sizing calculations prepared the prior week for an "8-Lane ultimate build-out" scenario. Following that meeting, each of the ponds for each of the alternatives was relocated as discussed during that meeting.

2. Preliminary Pond Sizing Calculations

Following the December 5, 2017 meeting, Dewberry reviewed CH2M's 8-lane pond sizing calculations. The pond sizes were estimated using required permanent pool volumes, required treatment volumes, berm sizes, littoral zones and a factor for tie-in grading. Scott briefly went over this CH2M planning-level methodology and the accompanying spreadsheets.

3. More Refined Sizing Requested

Clayton suggested that a more refined approach to sizing the pond parcels was required. He suggested beginning with the required treatment volume, required attenuation volume and using curve number calculations to come to both. He provided an example set of calculations for use by CH2M. For rules of thumb, Clayton suggested the following:

- Maximum treatment depth in a pond should be 18”
- Assume treatment volume is 12” deep and that attenuation volume could be up to 6” deep
- Questions about South Florida Water Management District (SFWMD) design criteria could be directed to Mr. Mark Darren of the District
- Assume that 50% additional treatment volume will be required for “impaired” water bodies; do this for all pond as a conservative assumption
- Include an overall drainage map “overlay” to the current roll plots
- Keep pond and flood plain impact “ponds” out of 100-year flood plain and out of wetlands
- Note the presence of a major ditch along the north side of Clapp Simms Duda Road
- Note the presence of a major ditch west of Jim Branch Creek north of the county line within the Poitras Property
- Note that US Army Corps of Engineers and SFWMD both regulate the C-29A and C-30 canals
- The portion of the Poitras Property just west of Narcoossee Road and Fells Landing is under a current wetland permit review
- Assume that no ponds will be allowed within Split Oak Forest
- Endeavor to eliminate small remnants of parcels when a pond is sited; that is, push the pond parcel portion of the overall parcel to the edges of that parcel
- Try to use existing borrow pits for stormwater ponds by adding a control structure
- Assume seasonal high-water level is 1 foot below existing grade

4. Flood Plain Considerations

The planning-level pond sizing calculations developed by CH2M did not address flood-plain impacts. Glenn directed that these now be incorporated into the pond sizing / siting analyses. In particular, he wants the flood plain compensation “ponds” to be separate from the stormwater ponds. The flood plain compensation “ponds”, though they could be dry, will likely be wet as the project will need significant amounts of fill. CH2M will provide flood plain boundaries (from GIS), estimate flood plain impacts and then provide compensating storage in separate flood plain “ponds”.

5. CH2M’s Approach to Refined Pond Sizing

Using the sample calculations provide by Dewberry and the assumptions listed above, CH2M will develop revised pond sizes for one of the Alternatives (East 4A). Flood plain compensation “ponds” will be developed for East 4A as well. A complete set of checked calculations and corresponding drainage map will be provided to Dewberry for confirmation. Upon confirmation of the approach and results for East 4A, revised ponds for the other alternatives will be developed. Priority will be given to Alternatives West 1B, East 4A, East 5 and East 6 with the other alternatives to follow.

The deliverable will be a drainage map (showing basins and flood plains) and pond sizing calculations for each of the twelve alternatives.

A formal "Pond Siting Report" (as defined by FDOT) was discussed and set aside. Glenn stressed during the meeting and a subsequent phone call that the pond sizes and locations need to be "more than planning-level" without the full documentation required in a Pond Siting Report. He wants consideration of bridge locations (profile high points), likely outfalls, minimized parcel remainders, minimization of flood plain and wetland impacts and similar criteria to be considered in the pond siting. Only one pond site per basin / sub-basin will be required.

6. Schedule

The next CFX board meeting is scheduled for Thursday, January 11th. In order to have the updated High-Level Comparison Matrix ready for that board meeting (should Glenn decide to present it), CH2M needs to have revised pond sites, shape files, etc. ready for Dewberry by COB January 4th.

OSCEOLA PARKWAY EXTENSION

Project Progress Meeting #16

Concept, Feasibility and Mobility Study

PROJECT: Osceola Parkway Extension Concept, Feasibility and Mobility Study
Orange and Osceola County, Florida
Contract No. 001248; Project Identification No. 599-221

MEETING DATE: Thu 01/04/2018

MEETING TIME: 10:30 AM to 11:30 AM

LOCATION: CFX - 4974 ORL Tower Road, Orlando, Florida 32807
Sandpiper Conference Room - 3rd Floor

CONFERENCE CALL NUMBER: 1-866-203-7023

ACCESS CODE: 4346590295

Attendees:

Joe Berenis, Brian Hutchings – CFX

Mike Snyder, Matt Lamb, Scott Carter – CH2M

Jonathan Williamson – Dewberry

1. Review of previous meeting issues and action items

	Description	Responsible Person	Completion Date	Status
15	Corridor Development	Scott Carter / CH2M	Ongoing	*Continuing meetings being held with Tavistock and other stakeholders.* ***Alternative 4C revised southerly to minimize Split Oak Forest remainder.***
20	Include a Simpson Road connection to OPE?	Matt Lamb / CH2M	10-05-17 **Pending**	Configure Alternative West 1 to allow for this possible future connection. No additional changes necessary at this time.
24	Follow-up with Glenn Pressimone to confirm that Echezabal should survey a portion of the Poitras Property rather than Eagle Creek Village.	Scott Carter / CH2M	10-26-17 Pending	*Awaiting further internal CFX discussions.*
28	Cost Opinions for Alternative Corridors	Scott Carter / CH2M	11-03-17 Continuing	*Reconfigured all alternative estimates into a "base" cost plus optional additions.*
29	Pond sizing / siting calculations	Kennedy Simmonds / CH2M	01-11-18	All ponds resized using "design-level" calculations. Submitted for internal QC.

Amy Windom of CH2M will follow-up with Clayton Lee of Dewberry regarding specifics of pond sizing calculations. Per Joe's direction at today's meeting, we are to use the most restrictive criteria among the agencies (SFWMD, FDOT, etc.). In this case, this would mean adding the treatment volume and attenuation volume rather than using only the larger of the two.

2. Data Collection

a) Received CADD files for NED commercial center and Del Webb parcel from Tavistock on 10-27-17.

b) Verified documentation of Scrub Jay sightings in October 2014 by Inwood Consulting (Appendix H of 2017 PD&E Environmental Technical Compendium). Added approximate Scrub Jay habitat from GIS sources to current corridors "board".

c) Received CADD file for Tavistock-developed Alternative "East 4B" on 11-13-17. Incorporated into working alternatives graphic.

3. Recent Activities

a) Prepared exhibits for discussions among CFX, Tavistock and environmental activists regarding potential impacts to Split Oak Forest and efforts to mitigate those impacts. Meeting held at CFX among these parties to discuss mitigation options on 11-30-17.

b) Updated all alternatives' cost estimates and right-of-way parcels to reflect meetings among CFX, Dewberry and CH2M held on 12-06-17 and 12-19-2017. Includes adding smaller structures (e.g. box culverts) to estimates and relocating most ponds to optimize right-of-way costs. Coordination also included wetland and conservation impacts and mitigation costs that will be included in the updated High-Level Comparison Matrix.

CH2M should finalize the estimates, complete internal QC reviews and then forward to Dewberry for another check. Rights-of-way must be updated for pond size changes (see Section 1, Item 29 above) and then right-of-way cost estimates and wetland / conservation impact estimates will have to be updated by Dewberry.

The pending comparison matrix, based upon the sample provided by Jonathan Williamson of Dewberry, should include Alternatives West 1A, 1B and 2 as well as East 1, 3, 4A, 4C, 5 and 6.

4. Public involvement (Task 7.0)

a) Web pages prepared by QCA for each of the concept, feasibility and mobility study segments went "live" with the public on 11-20-17.

b) QCA has confirmed January 31st as the date for the next EAG meeting. Draft invitation letter circulated to teams on 12-31-17.

Mary Brooks of QCA had requested updated property owner lists by January 10th. CH2M has ordered updated information from Orange County (on January 2nd) but it may not be available before the 10th. Osceola's information is available on line. Scott will follow-up with Mary to see how she wants to deal with the possibly-delayed Orange County property owners.

c) Preparing Stakeholder Involvement Chapter of Concept, Feasibility, and Mobility Study Report. Need to coordinate with QCA.

d) Need to confirm with CFX which Alternatives to show on our corridor and constraints boards for the upcoming EAG / PAG and public meetings. Also need to confirm if stormwater pond sites and flood plain compensation ponds should be shown.

Boards should include West 1A, 1B and 2 as well as East 1, 3, 4A, 4C, 5 and 6. The PD&E Alternative (both east and west) should also be included.

5. Engineering

a) Corridor alignments – Meetings w/ Tavistock and CFX held on 08-28-17, 09-14-17, 10-12-17, 10-26-17 and 11-13-17. Reduced initial alternatives to West 1, West 2, East 1, East 2, East 3, East 4, East 5, East 6 and East 7. Discussions continue with Tavistock.

b) Reworking pond sizing analysis to use "design-level" rather than "planning-level" calculations. Including flood plain impact compensation "ponds" as well.

6. Environment (Scope Tasks 8.5, 8.9, 10.3, 10.5)

a) Impacts matrix for Initial Alternative Corridors 1-9 complete. Prepared social, natural, and physical impacts matrix for Viable Alternative Corridors West 1, West 2, East 1, East 2 … East 7. Impacts will be presented with quantities of acres, number of crossings, etc.

b) Work continues on Purpose and Need as part of the final Concept, Feasibility, & Mobility Study Report.

c) Internal drafts of transit and multi-modal alternatives sections of Concept, Feasibility and Mobility Study Report circulated for internal review on 12-29-17.

7. Project Management

a) Preparing request for Supplemental Agreement No. 2 to fund development and analysis of corridor alternatives beyond the originally-scoped three and preparation of the cost opinion tech memo.

b) Preparing request for Supplemental Agreement to reassign work from BCC to CH2M. BCC has informed us that they are unable to execute their scoped work in accordance with the project schedule needs.

8. Next Steps

- Develop alternate mobility programs (transit, intermodal, etc.) content for Feasibility Study.
- Continue with concept development reflecting on-going discussions with stakeholders.

9. New Action Items

	Description	Responsible Person	Due Date	Completion Date	Status
a	Provide updated property owner lists to Mary Brooks of QCA.	Scott Carter / CH2M	01-10-18		
b	Provide updated "slide show" for Split Oak impacts; add in Alternative 4C impact slides	Scott Carter / CH2M	01-09-18	01-09-19 **Completed**	
c	Update pond sizes to reflect attenuation volume PLUS treatment volume in determining required parcel sizes	Amy Windom / CH2M	01-12-18		

Ly, Ricky/ORL

From: Lee, Clayton <clee@Dewberry.com>
Sent: Thursday, January 11, 2018 2:01 PM
To: Windom, Amy/ORL
Cc: Williamson, Jonathan; Lamb, Matt/ORL; Cintron, Ricardo; Carter, Scott/JAX; Ly, Ricky/ORL
Subject: RE: CFX Osceola Parkway Extension [EXTERNAL]

Thanks Amy,
The information you provided along with our follow up phone conversation confirms that your methodology is acceptable and will provide wiggle room in the refined PD&E design for the ROW accusation.

Clayton J. Lee, P.E.
Project Manager
Senior Drainage Engineer
Dewberry
800 North Magnolia Ave., Suite 1000
Orlando, FL 32803
321.354.9652
http://secure-web.cisco.com/1ILSwkF79hqjMiDjnAzQWt_pN9laslwaNpkVCTS8EvdtpkRFOGiSZNR1WF75U3-5H2cde_NKdAOdGD1UP32JB6rJe92g5BwTGxl3Is95t0e4I9J__RTTV35J-LGI4vXpHbYYJ2HYh4ublK59Zx-OX2jnZCbJUq4ynpIz0dM9cBnlCJjJMwwS6symNseA0j_gZSYEC85DZYjX7m7UDOfuMY-L_V9lwoDuJmW5ee3EvusE57isFzIYDWxv3j_c3NwgIxo56ULOu8juXRJhsrZs1YQktCKsmG7WeV5kqrC-__tji6QtwFanzCK_57bNkrbk-Yrmlmgh_roEZuTxs4Nw39T_xznmLdOsRVwInnyUEjyZrUul4h065ie4_gtBoBsU3p2CxLvyWIe6bZcejLy2VjK6RQuzUm2D1o50PySjVzEXXlEpGYQLfkXhgF-FDVLEb-eFe59-4Codx_CbP5hAQsDxp06v9-cHscrI8AHVEAkU/http%3A%2F%2Fwww.dewberry.com

From: Windom, Amy/ORL [mailto:Amy.Windom@CH2M.com]
Sent: Wednesday, January 10, 2018 6:49 PM
To: Lee, Clayton <clee@Dewberry.com>
Cc: Williamson, Jonathan <jwilliamson@Dewberry.com>; Lamb, Matt/ORL <Matt.Lamb@ch2m.com>; Carter, Scott/JAX <Scott.Carter1@ch2m.com>; Ly, Ricky/ORL <Ricky.Ly@ch2m.com>
Subject: RE: CFX Osceola Parkway Extension

This message originated from outside your organization

Thanks Clayton. I am sorry I missed your call. I left a message this afternoon in return. Maybe I can call tomorrow and talk drainage! Would 830 AM or 130 PM work?

Here's what we were doing:

- We are looking at 1-ft total depth for the treatment plus attenuation. Attenuation generally is the larger volume for new alignment. The option you are talking about for 1-ft treatment then adding attenuation on top is also reasonable, but would result in a smaller pond area and would require higher road profile/fill. So, we were going for the larger pond area rather than higher fill costs based on last Thursday's meeting.
- I neglected to mention in the original email that we are doing cup-for-cup volume replacement sites to compensate for roadway fill within 100-year floodplains. We set floodplain elevations based on FEMA mapping or LOMR if available. If not, an overlay of the quad. We assumed seasonal high groundwater 1-ft below the ground, so compensation depth is 1-ft. We do not see significant historic basin storage outside of the floodplain areas. Compensation requirements can be reduced at design with modeling and better data, but that is beyond our goal for now.
- We have cross drainage features (pipes or bridges) for the existing channelized or concentrated flows such as creeks or ditches. Parallel ditches are expected to be handled within the right-of-way width, if needed. A

separate offsite parallel ditch may not be required since FDOT and SFWMD now allow for offsite and onsite to be comingled without an increase to pond volumes.

- We have adjusted pond sites to include the borrow pits as recommended and have refined the locations and sizes. I'm not sure what you mean about item 5, but I suspect we just need to chat and it will be clear!

Thanks,
Amy

Amy Windom, PE
Direct 1 407 650 2144
Cell 1 407 342 4057
Email Amy.Windom@ch2m.com

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From: Lee, Clayton [mailto:clee@Dewberry.com]
Sent: Wednesday, January 10, 2018 3:13 PM
To: Windom, Amy/ORL <Amy.Windom@CH2M.com>
Cc: Williamson, Jonathan <jwilliamson@Dewberry.com>; Lamb, Matt/ORL <Matt.Lamb@ch2m.com>; Carter, Scott/JAX <Scott.Carter1@ch2m.com>; Ly, Ricky/ORL <Ricky.Ly@ch2m.com>
Subject: RE: CFX Osceola Parkway Extension [EXTERNAL]

Amy,
The example is pretty good. I would like to discuss the final step of Pond Size calculation. The assumed 1' depth should be for the treatment volume only to get an initial area. Then stack the attenuation volume above this stage in order to work up the slope for the 1' free board, etc. as you have worked through. I feel this still provides for some site flexibility.

Some items to keep in mind:

1. Need to show / identify the rough Pre & Post drainage basins.
2. Account for floodplain and historic storage impacts by providing compensation.
3. Two major ditch conveyances that run along the road ROW may be impacted by the roadway footprint and additional ROW for ditch relocation should be considered.
4. Evaluate utilizing existing borrow pits for optional sites.
5. Major cross drains, wetlands, bridges and intersections will limit the conveyance to distant pond sites. It appears additional pond sites may be warranted.

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From: Windom, Amy/ORL [mailto:Amy.Windom@CH2M.com]
Sent: Friday, January 05, 2018 3:52 PM
To: Lee, Clayton <clee@Dewberry.com>
Cc: Williamson, Jonathan <jwilliamson@Dewberry.com>; Lamb, Matt/ORL <Matt.Lamb@ch2m.com>; Carter, Scott/JAX <Scott.Carter1@ch2m.com>; Ly, Ricky/ORL <Ricky.Ly@ch2m.com>
Subject: CFX Osceola Parkway Extension

This message originated from outside your organization

Hello Clayton –

Hope all is well. This email is to outline the calculation approach and provide a sample calculation for the Osceola Parkway Extension pond sizing effort requested. Below are the background, criteria, and methodology proposed. I can set a conference call for Monday morning if you have any questions or would like to discuss. We are proceeding with getting the spreadsheets updated, but want to get your concurrence before we start making changes to the ponds shown on the microstation files. Note we will also be incorporating Nicole's environmental input on pond locations.

Background: As background, you provided sample calculations using the SCS equation for total storm runoff to calculate the runoff volume difference for an estimated attenuation volume and the water management district requirements for wet detention to calculate an estimated treatment volume. The sample calculations show that the volume provided can be both treatment and attenuation, so the larger volume dictates the pond size. Since the treatment volume can be used to meet attenuation in SFWMD, it is a common approach used in the past. But, the 2018 FDOT Drainage Design Guide shows the attenuation and treatment volumes added, or stacked, in the design example. There is not a specific requirement in the manual to add the two volumes and in the past we have made that judgement based on the water management district. Due to the early level of this analysis, the topic was discussed in the progress meeting on 1/4/2018. The decision was to proceed with pond sizing using the "stacked" volumes, which is reflected in our calculation example.

Criteria: The criteria are from the 2018 FDOT Drainage Manual, 2018 FDOT Drainage Design Guide, and the SFWMD Permit Information Manual. The following criteria apply:

- Attenuation: Open basin criteria applies.
    - SFWMD uses the local government requirements if available. While the project crosses from Orange County to Osceola County, the Orange County 25-year/24-hour storm will provide a reasonable attenuation estimate. The SFWMD rainfall is 8.6" based on nearby permits, which is slightly higher than other publications. The pond area is included in the basin area for attenuation. SFWMD does not have a freeboard requirement.
    - FDOT has a critical duration requirement. FDOT requires a 1-foot freeboard to allow for grading variations during construction. Typically we find that the 24 hour duration is often the critical storm for open basins.
- Treatment: The treatment volume estimate is based on the wet pond requirement plus an additional 50% because the project discharges to an impaired waterbody (Lake Okeechobee). Wet detention requirements are the greater of
    - 1" x Project Area, which does not include the pond water surface area per 4.2.2(c) SFWMD Vol II
    - 2.5" x Impervious Area, which does not include the pond water surface area.

Methodology: Below is methodology:

- Estimate the attenuation and treatment volumes from the criteria above.
- Determine the area of right-of-way based on a 1-foot depth, 1-foot freeboard, stacked attenuation/treatment volumes, and a maintenance berm.
- Use the right-of-way estimate and the environmental input to adjust pond locations and sizes for each alternative. Avoidance of constraints such as floodplains will be considered in the pond sites to the greatest extent possible. Extra care will be given to ensure we are not showing uneconomic remainders.

Let me know if you have any questions and/or want to have a conference call Monday morning.

Thanks,
Amy

Amy Windom, PE
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If you've received this email even though it's intended for someone else, then please delete the email, don't share its contents with others, and don't read its attachments. Thank you.

Attachment F
Evaluation of OCX 2017 PD&E

Attachment F-1
Draft PDE Evaluation TM

D R A F T

Project Development and Environment Study Evaluation Technical Memorandum

Osceola Parkway Extension
Concept, Feasibility, and Mobility Study
Contract No.: 001248
Project Identification No.: 599-221
Orange and Osceola Counties, Florida

Prepared for

CENTRAL FLORIDA EXPRESSWAY AUTHORITY

August 2017

Prepared by

ch2m.

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