

FINAL Existing Conditions Technical Memorandum

State Road 414 Expressway Extension
Project Development and Environment Study
From US 441 to SR 434
Orange County and Seminole County, Florida

CFX Project Number: 414-227

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**CENTRAL
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Acronyms and Abbreviations

AADT	annual average daily traffic
AMA	Alternative Mobility Area
BMAP	basin management action plan
CCTV	closed-circuit television
CFX	Central Florida Expressway Authority
DMS	dynamic message sign
EB	eastbound
FC	Federal Candidate
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FE	Federally Designated Endangered and State-listed
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FLUCCS	Florida Land Use Cover Classification System
FMSF	Florida Master Site File
FT	Federally Designated Threatened and State-listed
ST	State-designated Threatened
ft/ft	feet (foot) per foot
FWC	Florida Fish and Wildlife Conservation Commission
HW	hazardous waste
I-4	Interstate 4
ITS	Intelligent Transportation System
LOS	Level of Service
L RTP	Long Range Transportation Plan
MP	mile post
mph	mile(s) per hour
MVDS	microwave vehicle detection system
N/A	not applicable
NAC	Noise Abatement Criteria
NRE	Natural Resources Evaluation
NRHP	National Register of Historic Places
PD&E	Project Development and Environment
PI	point of intersection
PVI	point of vertical intersection
RHPZ	Riparian Habitat Protection Zone
ROW	right-of-way
SHPO	State Historic Preservation Officer
SJRWMD	St. Johns River Water Management District
SR 414	State Road 414
SR 429	State Road 429
SR 434	State Road 434
SR 436	State Road 436
SR 50	State Road 50
TIP	Transportation Improvement Plan
US 441	U.S. Highway 441
USFWS	U.S. Fish and Wildlife Service
WB	westbound

1. Project Overview

1.1 Project Background and Description

The Central Florida Expressway Authority is conducting the State Road 414 Expressway Extension Project Development and Environment Study to evaluate alternatives for a proposed grade-separated expressway extension of the tolled SR 414 (John Land Apopka Expressway). The existing SR 414 Expressway provides regional connectivity from State Road 429 and U.S. Highway 441 in Apopka and extends south and east to SR 414 (Maitland Boulevard) just east of US 441. Figure 1-1 presents the Regional Location Map. The study limits extend along the existing SR 414 (Maitland Boulevard) corridor from US 441 (Orange Blossom Trail) to State Road 434 (Forest City Road). Figure 1-2 presents the Project Location Map. The approximate 2.8-mile-long study corridor generally runs along the Orange and Seminole county lines and is located within the cities of Maitland (Orange County) and Altamonte Springs (Seminole County). Both CFX and the Florida Department of Transportation own portions of SR 414 within the project study limits. CFX owns and operates the SR 414 (John Land Apopka Expressway) from State Road 429 to just east of US 441 and FDOT owns and operates SR 414 (Maitland Boulevard) from just east of US 441 to U.S. Highway 17/U.S. Highway 92. Both CFX and FDOT own portions of SR 414 within the project study limits. The existing SR 414 (Maitland Boulevard) is a four-lane divided urban principal arterial with three major signalized intersections at Bear Lake Road/Rose Avenue, Eden Park Road and Magnolia Homes Road, and an unsignalized intersection at Gateway Drive between the grade-separated intersections of SR 414/US 441 and SR 414/SR 434. A minor grade-separated overpass exists over the Little Wekiva Canal and an access road between the Lake Lotus Park and Ride lot and Lake Lotus Park.

The PD&E Study is evaluating alternatives for a proposed grade-separated SR 414 Expressway Extension to provide system linkage between the western terminus of the SR 414 (John Land Apopka Expressway) and Interstate 4. The SR 414 Expressway Extension includes alternatives for a facility with up to two lanes in each direction from US 441 to SR 434. Project alternatives involve various configurations of grade-separated express lanes on SR 414 (Maitland Boulevard) to provide needed capacity between US 441 and SR 434 while maintaining the existing local access lanes. Alternatives considered include reversible, bi-directional and convertible express lanes along the project corridor to avoid right-of-way acquisition needs.

Prior to the PD&E Study, CFX completed the SR 414 Reversible Express Lanes Schematic Report that included an assessment of tolled, directional express lanes within the median of SR 414. The Report recommended a two-lane, reversible, grade-separated viaduct in the median of SR 414. The Report also found that a single lane bi-directional express lane would require a 75 percent wider bridge and was not considered viable (CFX 2019).

The proposed improvements also include reconfiguring the existing at-grade SR 414 (Maitland Boulevard) to accommodate the SR 414 Expressway Extension facility while maintaining two SR 414 (Maitland Boulevard) local access lanes in each direction. The study involves analysis of intersection improvements, bridge modifications at Lake Bosse and Little Wekiva Canal, stormwater management facilities, pedestrian and bicycle needs and access management modifications. A No-Build Alternative is also considered throughout the study.

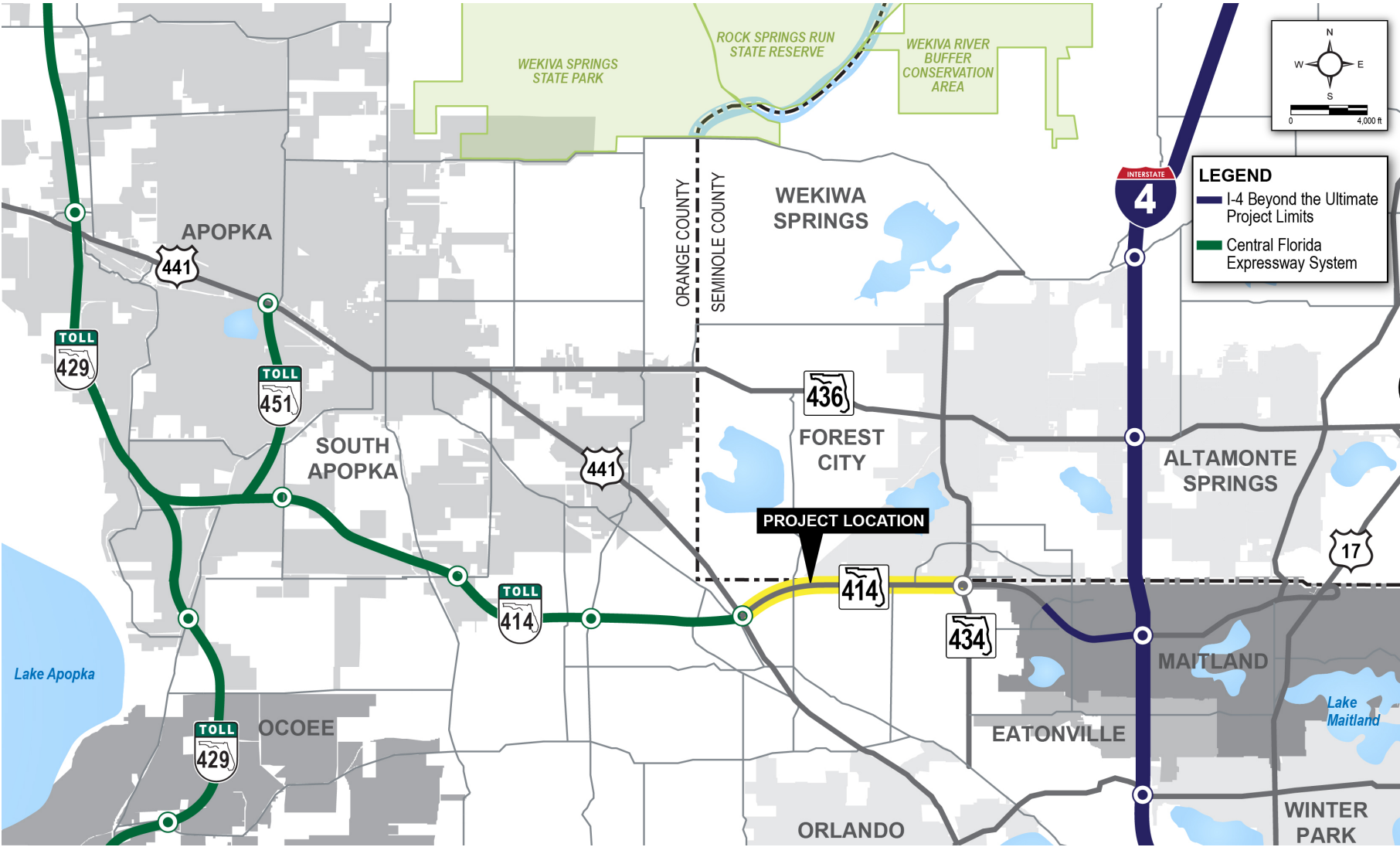


Figure 1-1. Regional Location Map

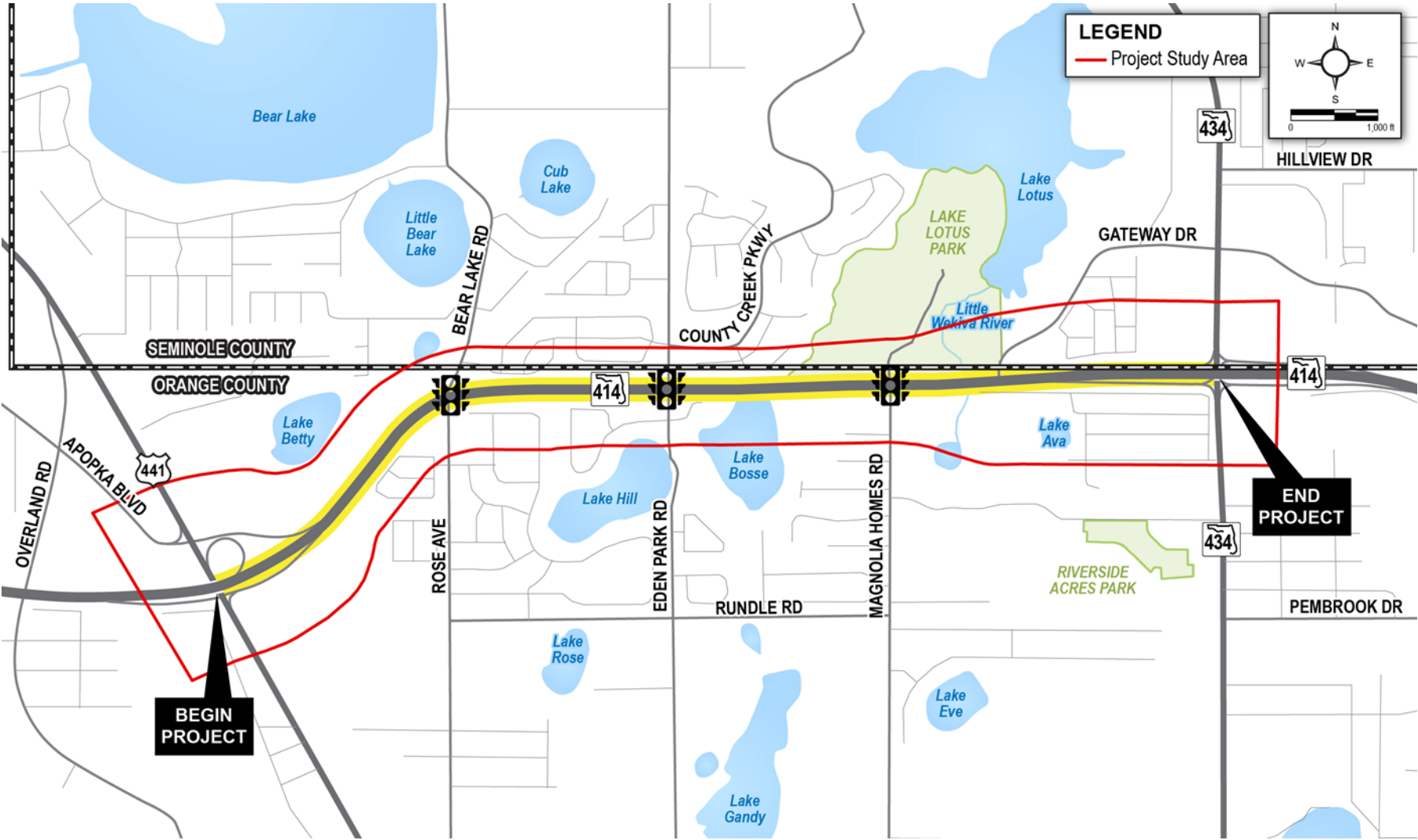


Figure 1-2. Project Location Map

1.2 Purpose and Need

The purpose of the proposed SR 414 Expressway Extension is to provide needed capacity on the SR 414 corridor and improve system connectivity between SR 429 and I-4 to meet future traffic needs. The 2.8-mile-long project corridor of SR 414 (Maitland Boulevard) is an arterial connecting two limited-access facilities. The proposed project will complete the limited-access gap between US 441 and SR 434 and provide limited-access regional connectivity between SR 429 and I-4. The proposed grade-separated SR 414 Expressway Extension will separate the through traffic from the local traffic, allowing for greater mobility and reduced congestion for both facilities. The proposed improvements are to 1) accommodate anticipated transportation demand, 2) improve safety, 3) improve system connectivity/linkage and 4) support multimodal opportunities.

1.2.1 Anticipated Transportation Demand

Traffic demand is based on the *Project Traffic Analysis Report* (CFX 2021h). Traffic counts from October 2019 indicate that the annual average daily traffic on SR 414 is approximately 59,000 vehicles per day west of SR 434, exceeding an adopted Level of Service D. Within the project limits, the study corridor experiences significant peak-hour traffic congestion. In the existing condition, high-speed travelers on the limited-access facilities east and west of the project corridor transition to a signalized arterial roadway with lower speeds and multiple cross streets that provide access to significant residential land uses and serve as collector roadways. Within the study limits, the traffic signals along SR 414 are located approximately every 0.5 mile, which impedes traffic flow and increases travel time through the corridor by 15 minutes on average in the peak-hour direction. Preliminary traffic forecasts indicate that the AADT on SR 414 west of SR 434 will double by 2045. While there are no Developments of Regional Impact within the study area, residential land development projects are located in the northeast corner of US 441 and SR 414, as well as in the southeast corner of SR 434 and SR 414. Additionally, several mixed-use land development projects are located along SR 429 (Wekiva Parkway) northwest of the study area.

As noted in the PTAR, the Florida Bureau of Economic and Business Research estimates population in Orange County to grow 1.5 percent per year, Seminole County population is expected to grow 1.4 percent per year and Lake County population is anticipated to grow 1.7 percent per year. Employment growth rates are similar, with Orange County at 1.8 percent, Seminole County at 1.6 percent and Lake County at 1.7 percent. The Maitland Center, located on SR 414 just west of I-4, is a large office complex whose employment base contributes to the existing traffic congestion along SR 414 in the morning (eastbound direction) and afternoon (westbound direction) peak hours.

With increased population and employment growth in the region and continued development near SR 429, traffic volumes on SR 414 are expected continue to increase. Traffic from eastern Lake County (west of the study area) heading to the employment centers in the Orlando Metropolitan Area is steadily increasing. The proposed improvements are needed to accommodate existing and future travel demand and to provide a limited-access connection between the northwestern portions of the Orlando Metropolitan Area and I-4.

1.2.2 Safety

According to crash data extracted from the state's Crash Analysis Reporting System, the study area experienced 694 total crashes between 2014 and 2018. Of these crash incidents, two fatalities were reported and another 164 resulted in injury (CFX 2021h). In 2019, two pedestrian/bicycle fatalities occurred within the study area based on local media reports. However, the 2019 crash history is not yet

available. By separating regional traffic from local traffic, along with improving the pedestrian and bicycle facilities, the proposed improvements will improve accommodations for pedestrians, bicyclists and motorized vehicles throughout the study area.

1.2.3 Improved System Connectivity/Linkage

As stated previously, there is a limited-access gap along the SR 414 corridor within the project study limits. Interregional traffic from surrounding counties and municipalities to the north and northwest travel through the study corridor to access the Orlando Metropolitan Area via SR 429 and I-4. The I-4 Ultimate Improvement Project (currently under construction) includes improvements to the existing SR 414 facility that provide a limited-access facility between SR 434 and I-4 at the eastern end of the study area as well as increased I-4 capacity. The SR 414 corridor connects two Strategic Intermodal System facilities: SR 429 and I-4. On the west side of the interchange of SR 414/US 441 is a large industrial area and the Florida Central Railroad. Florida Central Railroad is a Class III railroad serving industries in Lake and Orange counties and connects to CSX Transportation railroad in Orlando. These industrial and commercial land uses generate a significant amount of truck traffic through the study corridor. The proposed improvements will improve the system to system connectivity between SR 429 and I-4 and improve regional connectivity among the surrounding areas. Additionally, the proposed project is anticipated to improve truck traffic mobility between I-4 and the industrial area at the western end of the study area, thereby supporting regional economies and interregional connectivity.

1.2.4 Multimodal Opportunities

The surrounding land use within the project limits is primarily residential. West of Gateway Drive, 5-foot-wide sidewalks are located on both sides of the existing SR 414 facility along with a 4-foot-wide undesignated bicycle lane east of Bear Lake Road. These facilities connect to nearby trails and Lake Lotus Park within the study area. The proposed improvements consider wider sidewalks and dedicated buffered bicycle lanes to enhance walking and bicycling through the corridor and improve multimodal connectivity.

A shared-use park & ride lot is located within the study area at the southeast corner of Magnolia Homes Road and SR 414. The lot shares parking spaces with Lake Lotus Park for the park's tram service and includes 33 parking spaces. This shared-use park & ride lot operates on a 'first come, first served' basis and is accessible 24 hours a day.

The Central Florida Regional Transportation Authority (also known as LYNX) provides bus transit for three counties in the region: Orange, Seminole and Osceola. There is no LYNX bus service along this segment of SR 414. However, bus service is available within the study area along SR 434 and US 441. The LYNX service along SR 414 east of the study area provides a connection to SunRail. Improved transportation facilities along the corridor will enhance access to nearby bus stops and improve multimodal connections to transit options, such as LYNX and SunRail. The Lake Lotus Park and Ride Lot is located on the south side of SR 414 (at Magnolia Homes Road) across from Lake Lotus Park. Tram service to the park from this lot is available on the weekends and during special events.

2. Existing Conditions

2.1 Existing Roadway Conditions

The existing roadway network in the study area consists of local roads, rural and urban arterials, and limited-access facilities. SR 414 is an east-west oriented facility in the study area providing regional connectivity at a boundary of Orange County and Seminole County and connecting SR 429 and I-4. The study area includes two interchanges (US 441 and SR 434), three at-grade signalized intersections (Bear Lake Road, Eden Park Road and Magnolia Homes Road) and one unsignalized at-grade intersection (Gateway Drive). The SR 414 project corridor has four bridges including one over US 441, one over Lake Bosse, one over the Little Wekiva Canal and one over SR 434. The following sections summarize the existing roadway and environmental characteristics for the study area.

2.1.1 Functional Classification

In the study area, SR 414 is functionally classified as an Urban Principal Arterial Other for the majority of the project and transitions to an Urban Principal Arterial Expressway on the western limit where it becomes the SR 414 (John Land Apopka Expressway). Table 2-1 lists the functional classifications of roadways in the study area.

Table 2-1. Existing Roadways Functional Classifications

Name of Roadway	Maintaining Agency	Functional Classification	Primary Direction	Number of Lanes
SR 414/SR 429	CFX – from Begin Project approximate MP 0.224 to MP 0.000	Urban Principal Arterial Expressway	north-south (east-west in study area)	Five – Divided (three westbound and two eastbound)
SR 414 (Maitland Boulevard)	FDOT – from MP 36.206 to End Project	Urban Principal Arterial Other	east-west	Four - Divided
US 441/SR 500	FDOT	Urban Principal Arterial Other	North-South	Four - Divided
SR 434	FDOT	Urban Principal Arterial Other	North-South	Six - Divided
Rose Avenue/Bear Lake Road	Orange County/Seminole County	Collector	North-South	Three - Undivided
Eden Park Road	Orange County/Seminole County	Collector	North-South	Three - Undivided
Magnolia Homes Road/ Lake Lotus Park Drive	Orange County/City of Altamonte Springs	Collector/Local Access	North-South	Two - Undivided
Gateway Drive	City of Altamonte Springs	Local Access	North-South	Two - Undivided

Note:

MP = mile post

2.1.2 Access Management

FDOT currently identifies the SR 414 corridor from US 441 to SR 434 as an Access Classification 3, which allows full median openings and signalized intersections with a minimum spacing of 2,640 feet and directional median openings at a minimum spacing of 1,320 feet. Minimum connection spacing is allowed at 660 feet for sections posted above 45 miles per hour. Current speed limits posted on SR 414 are between 50 mph and 55 mph. The SR 414 (John Land Apopka Expressway) limited-access facility overlapping the western end of the project study area is Access Classification 1, which allows ingress and egress only via interchanges.

2.1.3 Typical Section(s)

The existing SR 414 roadway between US 441 to SR 434 is an urban typical section approximately centered within the existing minimum ROW of 118 feet and has a closed drainage system with Type F curb to the outside and grassy swales in the median. The typical section occurs outside the interchanges between Bear Lake Road and Gateway Drive and consists of four 11-foot-wide lanes (two lanes in each direction), 4-foot-wide inside and outside shoulders and a 46-foot-wide median. All lanes slope to the outside with the inside lane at 0.02 feet per foot and the outside lane at 0.03 feet/foot, except where superelevated. Within this section are 5-foot-wide sidewalks adjacent to SR 414 on both sides (refer to Figure 2-1). There is a 1,800-foot-long section between the US 441 Interchange and Bear Lake Road that uses the same footprint of existing pavement but is striped so that each side consists of one 14-foot-wide lane and one 12-foot-wide lane (two lanes in each direction), a 46-foot-wide median and 4-foot-wide inside shoulder but no outside shoulder. There is a 12-foot-wide shared use path on the north side of SR 414 that begins in Orange County ROW at US 441 and connects into SR 414 ROW for approximately 900 feet to the west of Bear Lake Road.

The western project limit within the US 441 Interchange includes approximately 1,700 feet from the bridge over US 441 to the CFX/FDOT boundary marked by signage and the end of a median barrier wall. This area transitions from a barrier-separated, closed 26-foot-wide median to tie into the suburban 46-foot-wide median described above. This rural typical section includes 12-foot-wide lanes, 12-foot-wide inside shoulders and 10- to 12-foot-wide outside shoulders. There is a 5-foot-wide sidewalk on the south side of the limited-access ROW separated from the roadway by a fence.

The eastern project limit includes approximately 2,500 feet between Gateway Drive and the end project at SR 434 and the typical section transitions from urban to rural. This typical holds the 46-foot-wide median and includes 12-foot-wide lanes, 4-foot-wide paved inside shoulders and 8- to 10-foot-wide paved outside shoulders. There is no sidewalk on either side of SR 414 within this eastern section.

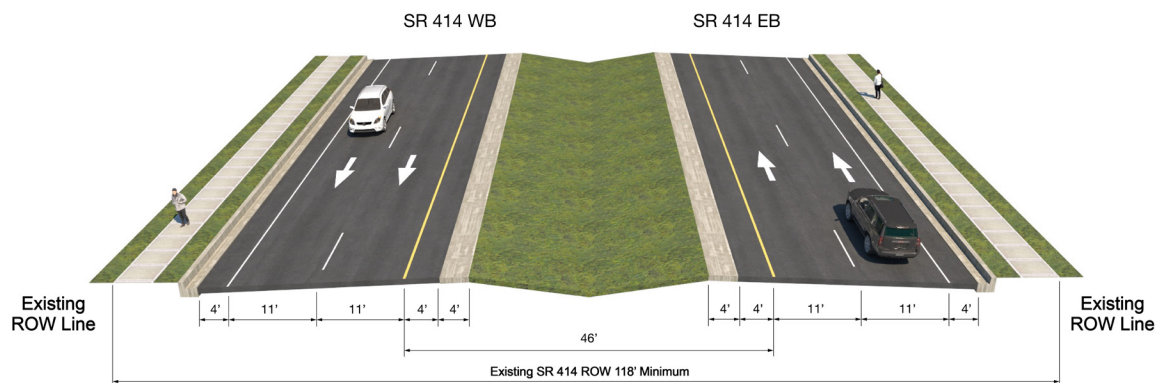


Figure 2-1. Typical Section

2.1.4 Context Classification

The FDOT context classification system applies to all FDOT highways functionally classified as arterials or collectors and ensures that projects along these highways harmonize with the surrounding land use characteristics and the intended uses of the roadway. By informing planners and engineers about the type and intensity of uses along various roadway segments, state roadways can be planned, designed and maintained to be supportive of safe and comfortable travel for their anticipated users.

Eight FDOT context classifications are used to describe unique land use contexts in Florida. The context classifications range from “C1 - Natural” to “C6 - Urban Core”. The context classification provides insight to the types of road users that can be expected, and corresponding design criteria reflect their diversity of needs. Table 2-2 and Figure 2-2 summarize the context classification determinations for the project as provided by FDOT.

Table 2-2. Context Classification Determinations

Segment	From	To	Existing Context Classification
1	Begin Project US 441 (SR 500) MP 35.965	Orange/Seminole County Line (East of Bear Lake Road) MP 36.781	C3C – Suburban Commercial
2	Orange/Seminole County Line (East of Bear Lake Road) MP 36.781	SR 414 Off Ramp MP 38.063	C3R – Suburban Residential
3	SR 414 Off Ramp MP 38.063	End Project SR 434 MP 38.442	C3C – Suburban Commercial

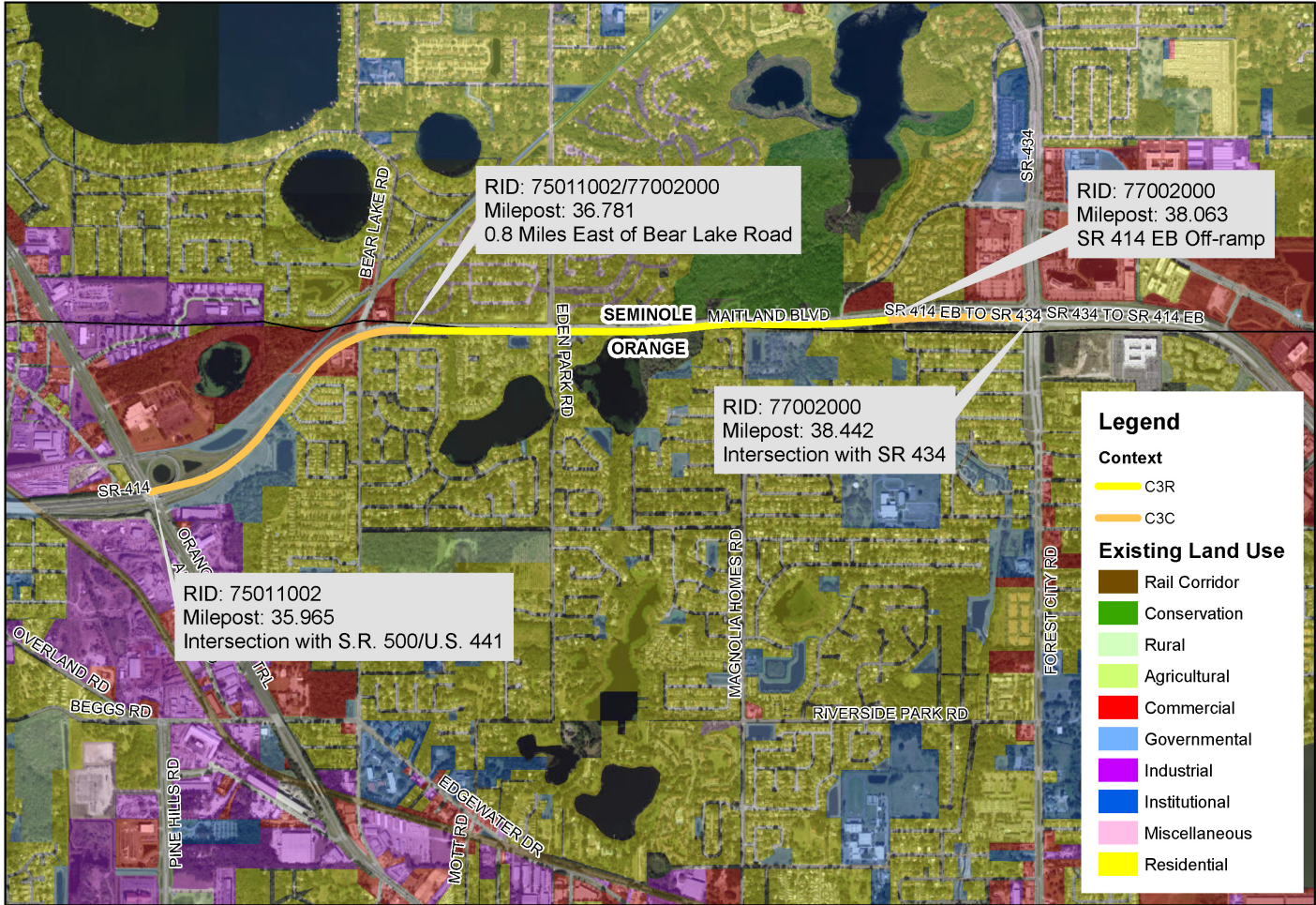
2.1.5 Pedestrian and Bicycle Facilities

Continuous sidewalks extend on both sides of SR 414 from US 441 to Gateway Drive including a 5-foot-wide, barrier-separated sidewalk on the bridges over Lake Bosse and Little Wekiva Canal. There is a 12-foot-wide shared use path from US 441 to Bear Lake Road on the north side. Sidewalk is discontinued east of Gateway Drive. There are no pedestrian accommodations on the bridge over SR 434.

Between Bear Lake Road and Gateway Drive are 4-foot-wide outside shoulders that can be used as an undesignated bicycle lane on both sides of SR 414. The bridge over Lake Bosse provides a 12-foot-wide outside shoulder and the bridge over Little Wekiva Canal provides an 8-foot-wide outside shoulder. The bridge over SR 434 contains 10-foot-wide outside shoulders, but the entrance and exit ramps at SR 434 prevent continuity of bicycle facilities.

2.1.6 Posted Speeds

Table 2-3 provides the existing posted speed limits along the existing SR 414 corridor.



SR 414 (Orange and Seminole Counties)

Current Context Classification

Date: 5/26/2020



Figure 2-2. SR 414 Current Context Classification

Table 2-3. Existing (2020) Corridor Posted Speed Limits

Corridor	From	To	Posted Speed
SR 414 (Maitland Boulevard)	US 441 (SR 500)	Gateway Drive	50 mph
SR 414 (Maitland Boulevard)	Gateway Drive	East of SR 434	55 mph

2.1.7 Right-of-Way

The ROW for SR 414 through the project limits is a minimum 118-foot width. The ROW widens at the limits of the project study area to accommodate the existing interchange footprints including ponds and ramps. Portions of the ROW are fenced and designated as limited access as indicated by the existing plans. Several neighborhoods have existing noise walls installed along the ROW also restricting access from the neighboring communities. The primary access to the ROW for pedestrian routes are at or near the intersections.

2.1.8 Geometric Elements

The information on the existing horizontal and vertical alignment of SR 414 was obtained from the available FDOT and CFX construction plans for SR 414 between US 441 and SR 434. The four primary data sources listed from west to east are:

- 1) SR 414 Extension (John Land Apopka Expressway)
 - a) CFX Project 414-211 (FY 2007)
 - b) Interchange at 414 and US 441
- 2) SR 414 (Maitland Boulevard) Original Construction
 - a) Project 77002-3508, Orange County (1995)
 - b) From east of US 441 Interchange to east of Rose Avenue/Bear Lake Road
- 3) SR 414 (Maitland Boulevard) Original Construction
 - a) Project 77002-3503, Seminole County (1995)
 - b) From east of Rose Avenue/Bear Lake Road to Gateway Drive
- 4) SR 414 and SR 434 Interchange Construction
 - a) Project 77002-3505 (FY 1997)
 - b) Interchange at SR 414 and SR 434

2.1.8.1 Horizontal Alignment

Table 2-4 lists the horizontal curves within the study limits.

Table 2-4. SR 414 Existing (2020) Horizontal Alignment

Horizontal Curve PI Station	Design Speed (mph)	Posted Speed (mph)	Degree of Curvature	Curve Direction	Radius (ft)	Curve Length (ft)	Existing Super Elevation (ft/ft)	Location
415+75.82	55	50	2°12'13"	LT	2,600.00	1,990.95	0.055	US 441
442+40.40	45	50	3°38'52"	RT	1,570.72	1,426.13	RC	Bear Lake Road
05+83.19	45	50	00°06'40"	RT	51,556.20	889.83	NC	
17+04.96	45	50	00°09'53"	LT	34,768.27	859.99	NC	Eden Park Road
36+65.30	45	50	00°50'53"	LT	6,755.80	910.77	NC	Lake Bosse Bridge
43+76.15	45	50	01°38'13"	RT	3,500.00	511.39	NC	
157+39.66	45	55	00°45'00"	LT	7,639.44	721.21	NC	east of Gateway Drive
170+30.55	45	55	00°30'00"	RT	11,459.16	1,146.16	NC	west of SR 434

Note:

PI = point of intersection

2.1.8.2 Vertical Alignment

Table 2-5 lists the vertical curves within the study limits.

Table 2-5. SR 414 Existing Vertical Alignment

Vertical Curve PVI Station	Design Speed (mph)	2020 Posted Speed (mph)	Crest/Sag/PI (C/S/PI)	Grade In (%)	Grade Out (%)	Existing Vertical Curve Length (ft)	Existing K Value	Location
408+50.00	55	50	C	(+) 0.460	(-) 3.000	1,000	289	US 441
419+00.00	45	50	S	(-) 3.000	(+) 0.527	600	170	
426+00.00	45	50	PI	(+) 0.527	(+) 0.600	N/A	N/A	
428+00.00	45	50	PI	(+) 0.600	(+) 0.964	N/A	N/A	
225+00.00	45	50	C	(+) 0.964	(+) 0.300	200	217	
230+00.00	45	50	PI	(+) 0.300	(-) 0.300	N/A	N/A	
237+25.00	45	50	PI	(-) 0.300	(+) 0.300	N/A	N/A	
240+00.00	45	50	PI	(+) 0.300	(-) 0.300	N/A	N/A	Rose Avenue/ Bear Lake Road
05+00.00	45	50	PI	(-) 0.300	(+) 0.300	N/A	N/A	
07+50.00	45	50	C	(+) 0.300	(-) 1.391	300	177	

Table 2-5. SR 414 Existing Vertical Alignment

Vertical Curve PVI Station	Design Speed (mph)	2020 Posted Speed (mph)	Crest/Sag/PI (C/S/PI)	Grade In (%)	Grade Out (%)	Existing Vertical Curve Length (ft)	Existing K Value	Location
12+00.00	45	50	PI	(-) 1.391	(-) 1.240	N/A	N/A	
18+00.00	45	50	S	(-) 1.240	(-) 0.314	300	324	Eden Park Road
23+00.00	45	50	C	(-) 0.314	(-) 2.648	300	129	
28+40.00	45	50	S	(-) 2.648	(-) 0.412	300	134	
32+50.00	45	50	S	(-) 0.412	(+) 0.667	200	185	
37+00.00	45	50	C	(+) 0.667	(-) 0.750	300	212	Lake Bosse Bridge
43+00.00	45	50	S	(-) 0.750	(+) 0.688	200	139	
51+00.00	45	50	C	(+) 0.688	(-) 0.841	200	131	Magnolia Homes
54+20.00	45	50	S	(-) 0.841	(+) 0.936	200	115	Little Wekiva Canal Bridge
155+20.00	45	55	PI	(+) 0.936	(+) 0.708	N/A	N/A	
176+65.00	45	55	S	(+) 0.708	(+) 3.987	300	91	
185+90.00	45	55	C	(+) 3.987	(-) 4.000	1040	130	SR 434

Note:

PVI = point of vertical intersection

N/A = not applicable

2.1.9 Intersections and Signalization

Three signalized intersections and one directional median opening exist at grade along the existing corridor within the limits of the project. The western project limit includes an additional two signals along US 441 within the partial cloverleaf interchange, and the eastern project limit includes one signal along SR 434 single-point urban interchange. The signals associated with the interchanges are not proposed to be impacted by the proposed improvements.

Table 2-6 summarizes the signalization of the surface street intersections within in the study area.

Table 2-6. Interchange and Intersection Signalization

Main Street	Cross Street	Maintaining Agency	Signal (Yes/No)
SR 414 (Maitland Boulevard)	US 441 (SR 500)	Orange County	Yes – two locations
SR 414 (Maitland Boulevard)	Rose Avenue/Bear Lake Road	Seminole County	Yes
SR 414 (Maitland Boulevard)	Eden Park Road	Seminole County	Yes

Table 2-6. Interchange and Intersection Signalization

Main Street	Cross Street	Maintaining Agency	Signal (Yes/No)
SR 414 (Maitland Boulevard)	Magnolia Homes Road/ Lake Lotus Park Drive	Seminole County	Yes
SR 414 (Maitland Boulevard)	Gateway Drive	FDOT	No - Directional Median Opening
SR 414 (Maitland Boulevard)	SR 434 (Forest City Road)	Seminole County	Yes – one location

2.1.10 Crash Data

Crash data from 2014 to 2018 were collected from west of US 441 to east of SR 434 using the state's Crash Analysis Reporting system. As shown in Table 2-7, 340 crashes were reported during the 5-year analysis period. Approximately two-thirds of the crashes occurred between just east of Eden Park Road and west of US 441. This area of the study corridor is characterized by residential neighborhoods, two signalized intersections and one interchange. There was no linear trend between the year and the number of crashes at each intersection. In the study area, the highest year (2016) had 90 crashes and the lowest year (2018) had 42 crashes (CDM Smith 2020b).

Table 2-7. Number of Crashes By Year (2014–2018)

Year	Total Crashes
2014	149
2015	141
2016	155
2017	140
2018	109
Total	694

Of the 694 crashes, 507 (approximately 73 percent) occurred in the intersections and 187 (approximately 27 percent) occurred at mid-block locations. The crash analysis methodology at the intersections included a 500-foot-wide buffer influence area to accurately capture all crashes. Crash injury severity is displayed in Figure 2-3. The results included two fatalities reported within the 5-year analysis period and another 164 crashes resulting in injury, whereas 528 (approximately 76 percent) crashes resulted in no injury or only property damage.

Intersection crash rates were calculated for all five intersections located within the study area. Crash rates were estimated as crashes per Million Entering Vehicles for the intersections using a methodology provided by Federal Highway Administration. Average crash rates were estimated using the total crashes that occurred in the 5-year data period at the intersections and dividing it by the number of years collected. Because traffic counts were not provided for the intersections, the average annual daily traffic approach volumes were used from FDOT's Florida Traffic Online Web Application. Table 2-8 lists the intersection crash rates.

Intersections with the highest crash rates are US 441, Bear Lake Road and Magnolia Homes Road. At US 441, approximately 38 percent of the total crashes at this intersection resulted in injury (7 percent severe) and 62 percent resulted in property damage only. At Bear Lake Road, approximately 52 percent of the total crashes at this intersection resulted in injury (10 percent severe and 1 percent fatal) and 48 percent resulted in property damage only. At Magnolia Homes Road, approximately 55 percent of the total crashes at this intersection resulted in injury (3 percent severe) and 45 percent resulted in property damage only. Further details on the crash analysis are presented in the SR 414 Expressway Extension PD&E Study *Traffic Technical Memorandum: Existing Conditions* (CDM Smith 2020b).

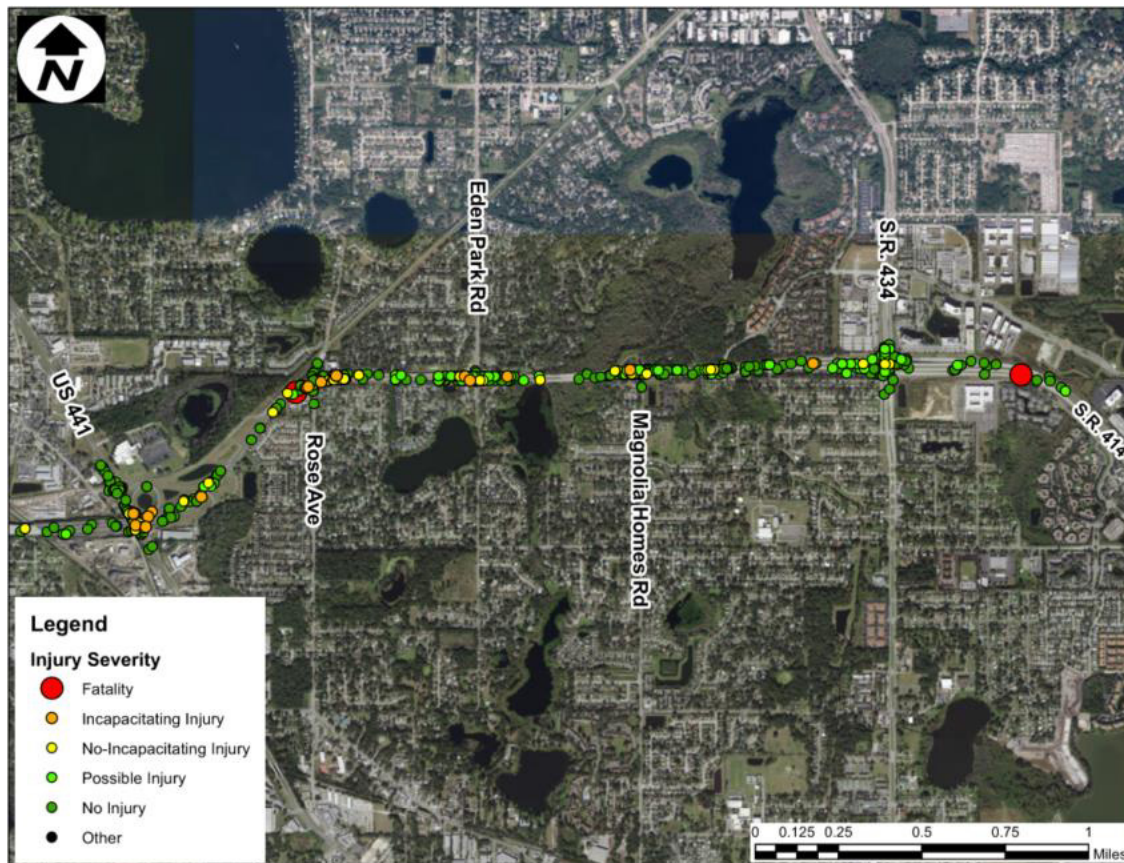


Figure 2-3. Crash Injury Severity

The mid-block crash locations are the crashes that occurred outside of the intersection influence area of 500 feet. The mid-block locations accounted for 92 crashes (approximately 27 percent) of the total crashes evaluated from the Crash Analysis Reporting system between 2014 and 2018 for the study area. The crashes were evenly distributed along the study area and not concentrated in one area. Most of the crashes were rear end, resulting in property damage only. One fatality (1 percent of all mid-block crashes) occurred, where the driver was under the influence of alcohol and driving distracted.

Table 2-8. Intersection Crash Rates

SR 414 Intersection	Total Crashes	Average Crashes ^a	AADT (Approach Volume) ^b	Intersection Crash Rate ^c	5-year Statewide Avg. Crash Rate ^d
US 441	133	26.6	39,725	1.83	0.667
Rose Avenue/Bear Lake Road	118	23.6	57,600	1.12	0.667
Eden Park Road	86	17.2	53,850	0.88	0.667
Magnolia Homes Road	79	15.8	29,150	1.49	0.667
SR 434	91	18.2	54,200	0.92	0.667

^a Crashes/Years of Data Collected^b <https://tdaappsprod.dot.state.fl.us/fto/>^c https://safety.fhwa.dot.gov/local_rural/training/fhwasa1210/s3.cfm^d Source: Florida Average Crash Rates for Suburban Spots 2013-2017, 2-3 lanes ww Div'd Raised Median 4 legs.

2.1.11 Existing Traffic Characteristics

As part of this PD&E Study, existing traffic conditions were analyzed and documented in the SR 414 Expressway Extension PD&E Study *Traffic Technical Memorandum: Existing Conditions* (CDM Smith 2020b). A summary of existing (2019) traffic characteristics in the corridor includes identification of the traffic count locations and descriptions of daily and peak-hour traffic volumes, peak-hour and traffic directional characteristics, and operational performance. This traffic analysis covers an area larger than the project study limits. For this discussion, the traffic study limits start just west of the Hiawassee Road interchange on the SR 414 corridor (John Land Apopka Expressway), which is a six-lane divided toll road. The expressway ends after the interchange with US 441, Orange Blossom Trail. Moving east, SR 414 becomes a four-lane divided arterial referred to as Maitland Boulevard, with three at-grade intersections (Rose Avenue/Bear Lake Road, Eden Park Road and Magnolia Homes Road/Lake Lotus Park Road). Further east, SR 414 is a four-lane divided expressway, built as part of the I-4 Ultimate Improvement Project. In this portion of the corridor, there are grade-separated interchanges at SR 434, Maitland Summit Boulevard and Keller Road. There are also frontage roads on both sides over much of this part of the corridor. The traffic study limits end east of Keller Road, as SR 414 connects to the I-4 Ultimate Improvement Project and proceeds to the city of Maitland farther east.

The existing traffic characteristics are influenced by the construction activities that are part of the I-4 Ultimate Improvement Project, which includes significant improvements to SR 414 just east of the project study limits. The configuration of SR 414 between SR 434 and I-4 has changed several times over the last few years because of construction activities related to the I-4 and SR 414 interchange modifications associated with the I-4 Ultimate Improvement Project. Construction activities in this area are just now coming to a close.

Traffic passing through the project corridor has endured substantial peak-period congestion along the arterial portions of the corridor between US 441 and SR 434, specifically at the signalized intersections with Bear Lake Road, Eden Park Road and Magnolia House Road. The traffic volumes along SR 414 (John Land Apopka Expressway) to the west have steadily increased, more than doubling in seven years. Traffic volumes peak in the morning (eastbound direction) and afternoon (westbound direction), serving commuters to the office parks in the Maitland Center, just east of the project study limits. Significant

delays regularly occur during the morning and evening peak hours at the signalized intersections noted above, constraining traffic volumes.

The existing traffic conditions detailed below are for calendar year 2019 and are prior to any effects the coronavirus pandemic may have on travel behavior.

2.1.11.1 Existing (2019) Traffic Counts

As part of this study, a traffic count program was conducted in October 2019 and included 72-hour directional counts at 21 locations, one 72-hour classification count, 72-hour bi-directional counts at 20 locations and 4-hour turning movement counts at nine intersections (refer to Table 2-9). Locations were from just west of the Hiawassee Road and SR 414 (John Land Expressway) interchange (approximately 3.5 miles west of the study area) to the I-4 and SR 414 interchange (approximately 2 miles east of the study area). The directional counts were located on all the expressway and ramp segments in the study area. The bi-directional traffic counts were typically taken at the undivided roadway segments, the arterial portion of SR 414 and roadways connecting to SR 414. The turning movement counts were taken at the key at-grade intersections along SR 414.

In addition, the study traffic count program was supplemented with the CFX system counts and annual traffic counts published by FDOT, Orange County and Seminole County. Traffic counts associated with these agencies include traffic counts at locations along the project corridor as well as traffic counts at other nearby locations. Both study and agency traffic counts were used in development of a planning level travel demand model (CFX Model 3.7.0).

Table 2-9. Count Program Locations

72-Hour Directional Counts (SR 414 Ramps)	72-Hour Bi-Directional Counts (Arterials)	
	Roadway	Location
EB On Ramp from US 441	Hiawassee Road	North of SR 414
EB Off Ramp to SR 434	Hiawassee Road	South of SR 414
EB On Ramp from SR 434	US 441	North of SR 414
EB Off Ramp to Maitland Summit Boulevard	US 441	South of SR 414
EB On Ramp from Maitland Summit Boulevard	Bear Lake Road	North of SR 414
EB Off Ramp to Keller Road	Rose Avenue	South of SR 414
EB On Ramp from Keller Road	SR 414	Between Bear Lake & Eden Park
EB Off Ramp to WB I-4	Eden Park Road	North of SR 414
EB On Ramp from Lake Lucien Drive to WB I-4	Eden Park Road	South of SR 414
EB Off Ramp to EB I-4		Between Eden Park & Lake Lotus Park
WB On Ramp from EB I-4	SR 414	North of SR 414
WB On Ramp from WB I-4	Lake Lotus Park Road	South of SR 414
WB I-4 Off Ramp to North Lake Destiny Road	Magnolia Homes Road	Between Lake Lotus Park & Gateway
WB Off Ramp to Keller Road	SR 414	North of SR 414
WB On Ramp from Keller Road	Gateway Drive	North of SR 414
WB Off Ramp to Maitland Summit Blvd.	SR 434	North of SR 414

Table 2-9. Count Program Locations

72-Hour Directional Counts (SR 414 Ramps)	72-Hour Bi-Directional Counts (Arterials)	
WB On Ramp from Maitland Summit Blvd.	SR 434	South of SR 414
WB SR 414 to Gateway Drive	Maitland Summit Drive	North of SR 414
WB Off Ramp to SR 434	Maitland Summit Drive	South of SR 414
WB On Ramp from SR 434	Keller Road	North of SR 414
WB Off Ramp from U.S. 441	Keller Road	South of SR 414
<i>4-Hour Turning Movement Counts (at-grade intersections)</i>	<i>72-Hour Classification Counts</i>	
Hiawasse Road and SR 414	SR 414 East of SR 434	
U.S. 441 and SR 414 EB Ramps		
U.S. 441 and SR 414 WB Ramps		
Bear Lake Road (Rose Avenue) and SR 414		
Eden Park Road and SR 414		
Magnolia Homes Road (Lake Lotus Park) and SR 414		
SR 434 and SR 414		
Maitland Summit Boulevard and SR 414		
Keller Road and SR 414		

Notes:

EB = eastbound

WB = westbound

2.1.11.2 2019 Annual Average Daily Traffic

The daily traffic from the various traffic count locations were used to develop existing (2019) AADT for roadways in the traffic count study area (refer to Figure 2-4). Generally, traffic volumes on SR 414 increase from west to east. The traffic volume on SR 414 (John Land Apopka Expressway) at the Coral Hill Toll Plaza was 50,360 vehicles per day and the traffic volume on SR 414 to the west of the I-4 interchange was 84,180 vehicles per day. Between these traffic count locations, the largest daily traffic volume was 59,910 vehicles per day, which occurred on SR 414 at the eastern project limit just east of SR 434. Figure 2-4 indicates that there are imbalances in traffic volume by direction, which most likely result from persistent peak-period congestion along the project corridor. Peak-period congestion typically results in diversion of traffic away from the corridor to other routes.

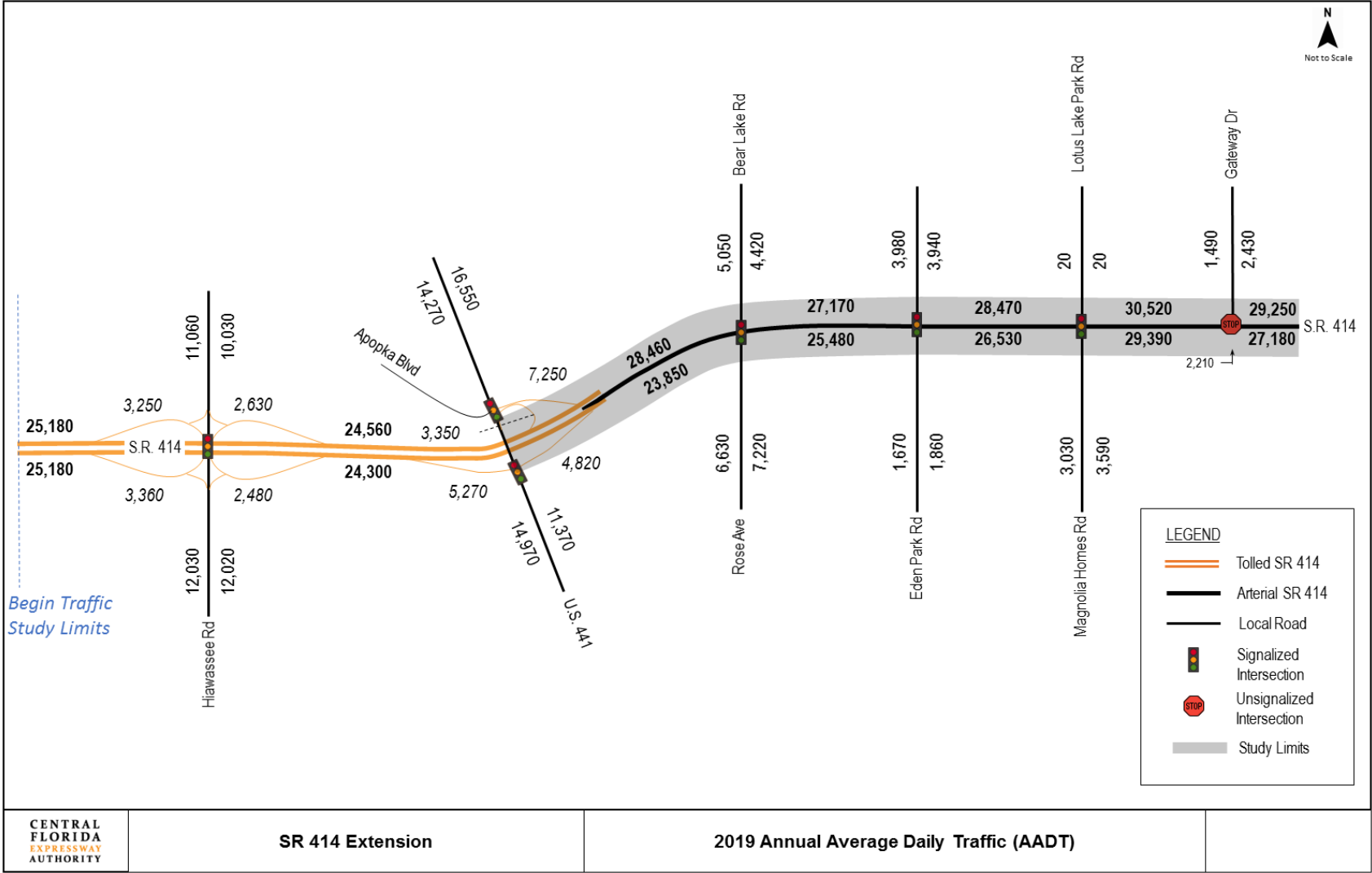


Figure 2-4a. 2019 Average Annual Daily Traffic

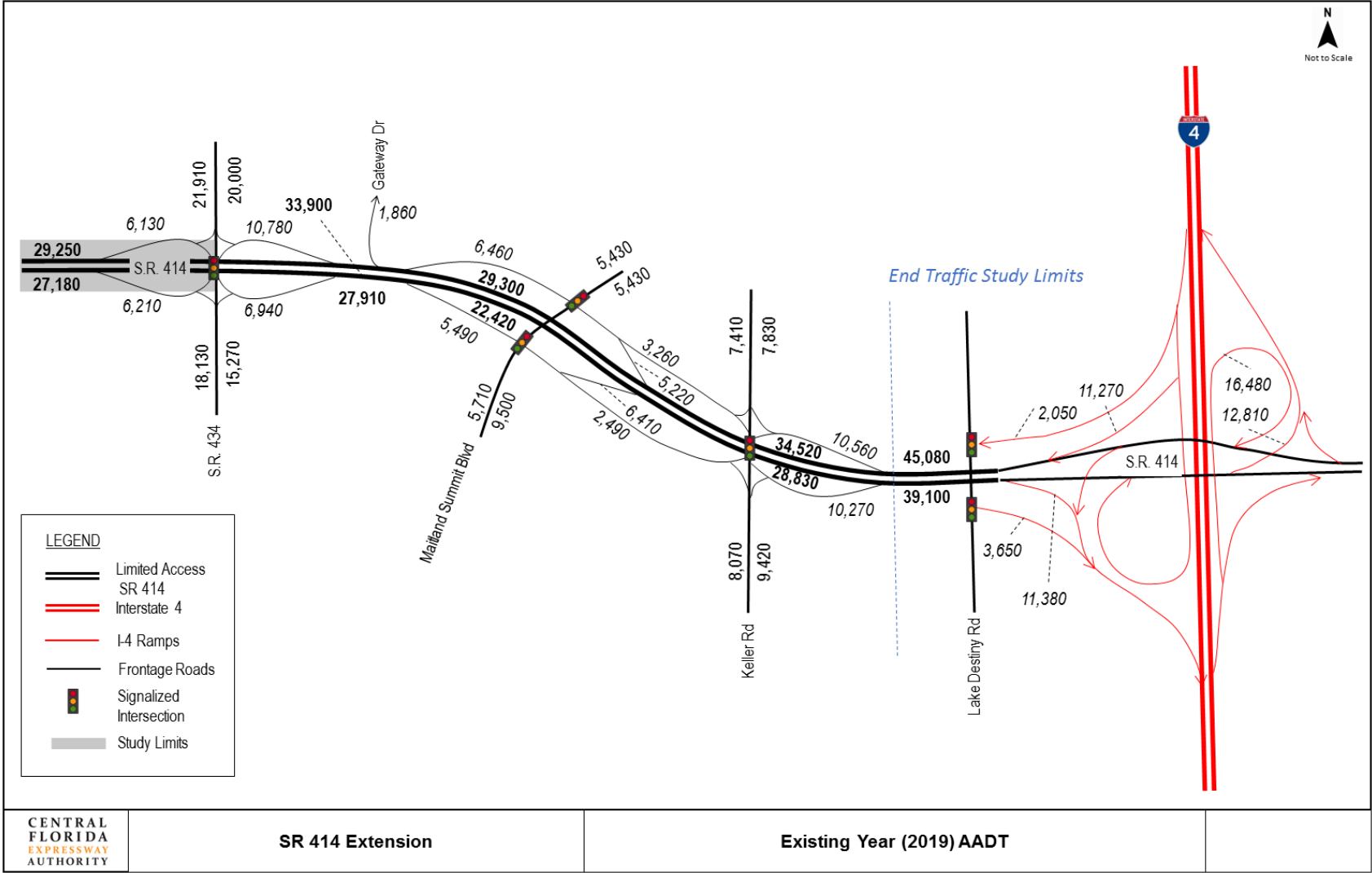


Figure 2-4b. 2019 Average Annual Daily Traffic

2.1.11.3 Traffic Peaking and Directionality Characteristics

The portion of the SR 414 (John Land Apopka Expressway) near the Coral Hills Toll Plaza remains uncongested, even with the extraordinary growth in recent years. Using the average traffic counts collected on three weekdays during the second week of March 2019, traffic at the Coral Hills Toll Plaza peaks between 7:00 a.m. to 8:00 a.m. and between 5:00 p.m. to 6:00 p.m. The overall peak hour occurs in the PM. Figure 2-5 shows the hourly distribution of traffic at the Coral Hills Toll Plaza. The proportion of traffic in the peak hour (K) was 9.7 percent, and the directional split (D) was 69.8 percent in the morning peak hour and 65.4 percent in the evening peak hour. Based on these data, twice as much traffic occurs in the peak direction as in the off-peak direction during both morning and afternoon peak hours.

Farther east in the corridor, the peaking and directional characteristics of traffic are muted by severe and recurring congestion. Figure 2-6 contains the hourly distribution of traffic on SR 414 east of the interchange with SR 434. Using the average of traffic counts collected on three weekdays in October 2019, the peak direction near the intersection is eastbound in the morning and westbound in the evening, but the peak hours are disturbed by congestion. The morning peak hour is spread over 4 hours beginning at 6:00 a.m., while the evening peak occurs at 3:00 p.m. but spreads over an approximate 6-hour period. There appears to be a significant operational problem in the westbound direction as the traffic appears to decrease at 5:00 p.m. (which occurred in all three days) but then increased again at 6:00 p.m. Traffic volumes during the middle of the day is slightly more than 1,000 vehicles per day in both directions. The proportion of traffic in the peak hour (K) was 7.4 percent. The directional split (D) was 62.2 percent in the morning peak hour and 62.5 percent in the evening peak hour.

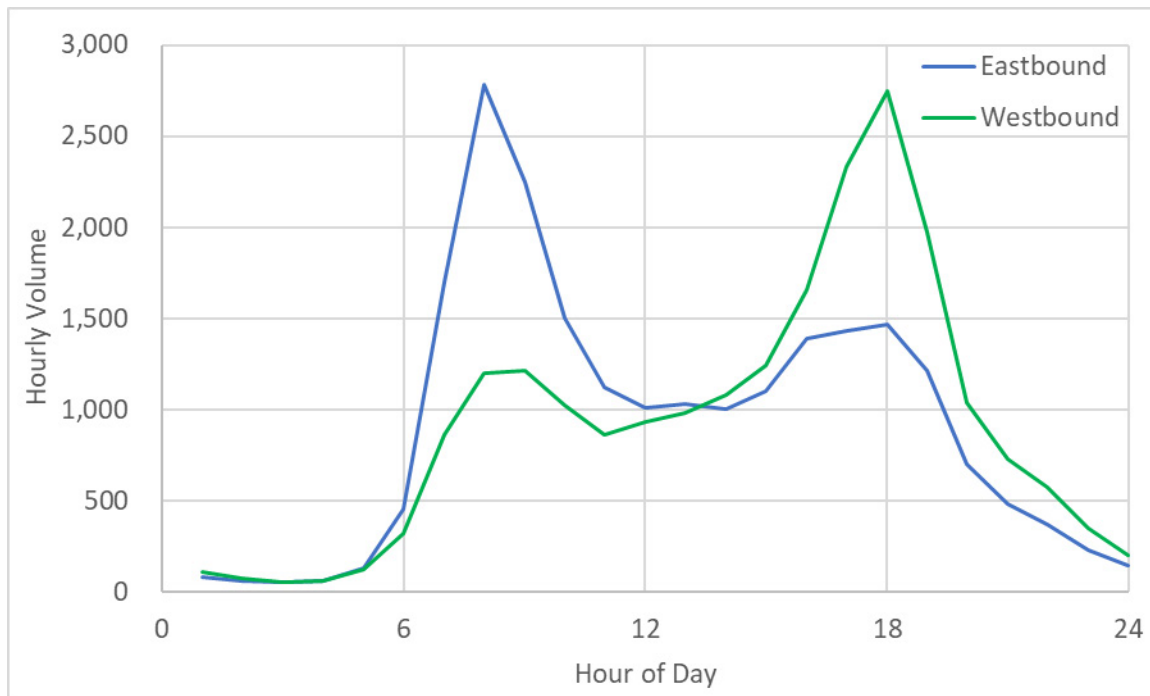


Figure 2-5. Hourly Distribution of Traffic at Coral Hills Toll Plaza

Source: Average of hourly traffic from March 12 to 14, 2019 (Tuesday to Thursday), CFX Counts

2.1.11.4 2019 Peak-Hour Traffic (with Turning Movements)

Figure 2-7 shows the peak-hour volumes (both morning and evening) taken from traffic counts for roadway segments; Figure 2-7 also includes the morning and evening peak-hour turning movement volumes at all at-grade intersections along SR 414. The peak-hour direction of flow is eastbound in the morning and westbound in the evening within the traffic study limits. At the western limits of the project during the morning peak hour, traffic queues were observed to extend from the Rose Avenue/ Bear Lake Road signalized intersection to the US 441 bridge. Similarly, at the eastern end of the project during the evening peak hour, traffic queues were observed to extend from the Magnolia Homes Road signalized intersection to the SR 434 on-ramps. East of the traffic study limits (east of Keller Road), the peak-hour directions switch so that westbound is the peak direction in the morning and eastbound in the evening, which likely indicates that the Maitland Center office parks (between Maitland Summit Boulevard and Lake Destiny Road) are a major destination.

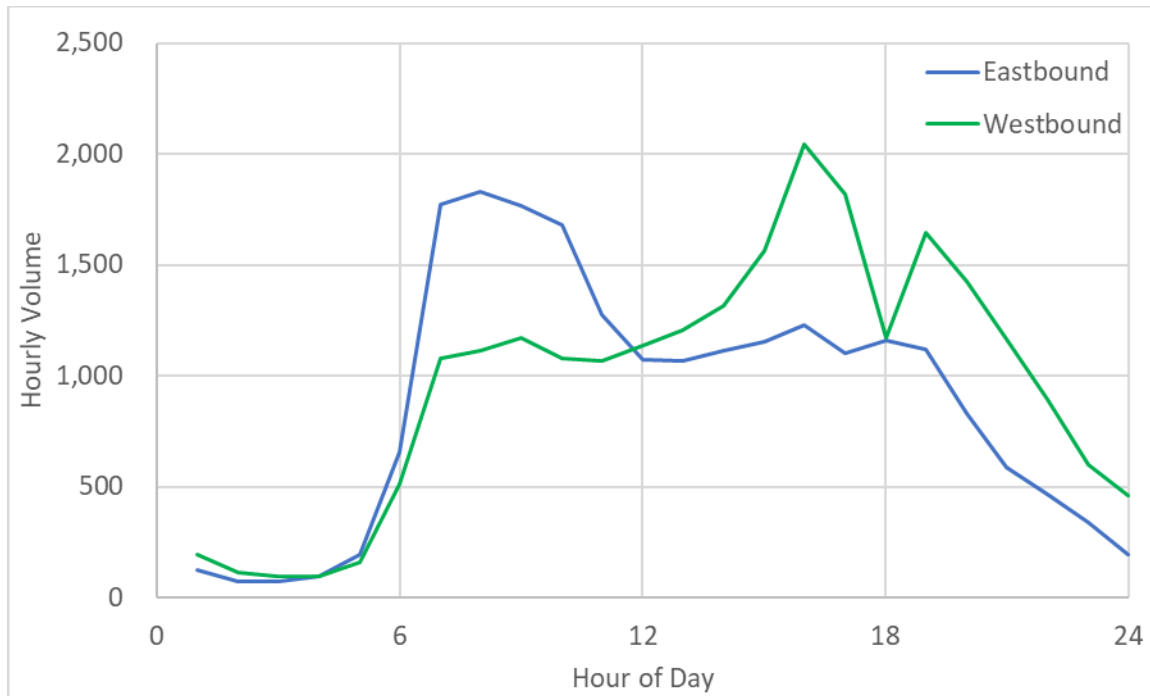


Figure 2-6. Hourly Distribution of Traffic on SR 414, east of SR 434

Source: Average of hourly traffic from October 22 to 24, 2019 (Tuesday to Thursday), Traffic Counts

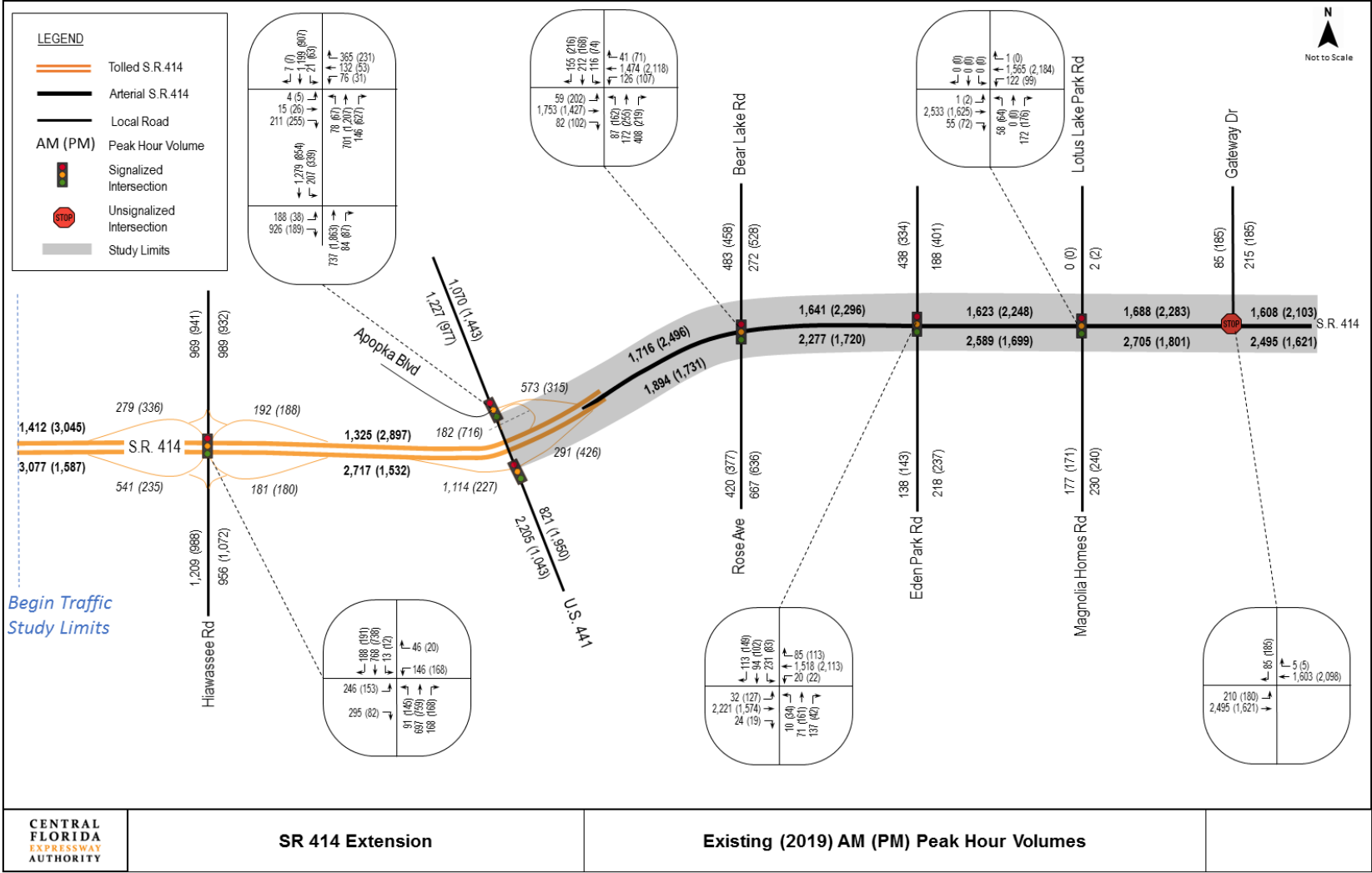


Figure 2-7a. Existing (2019) AM (PM) Peak-Hour Volumes

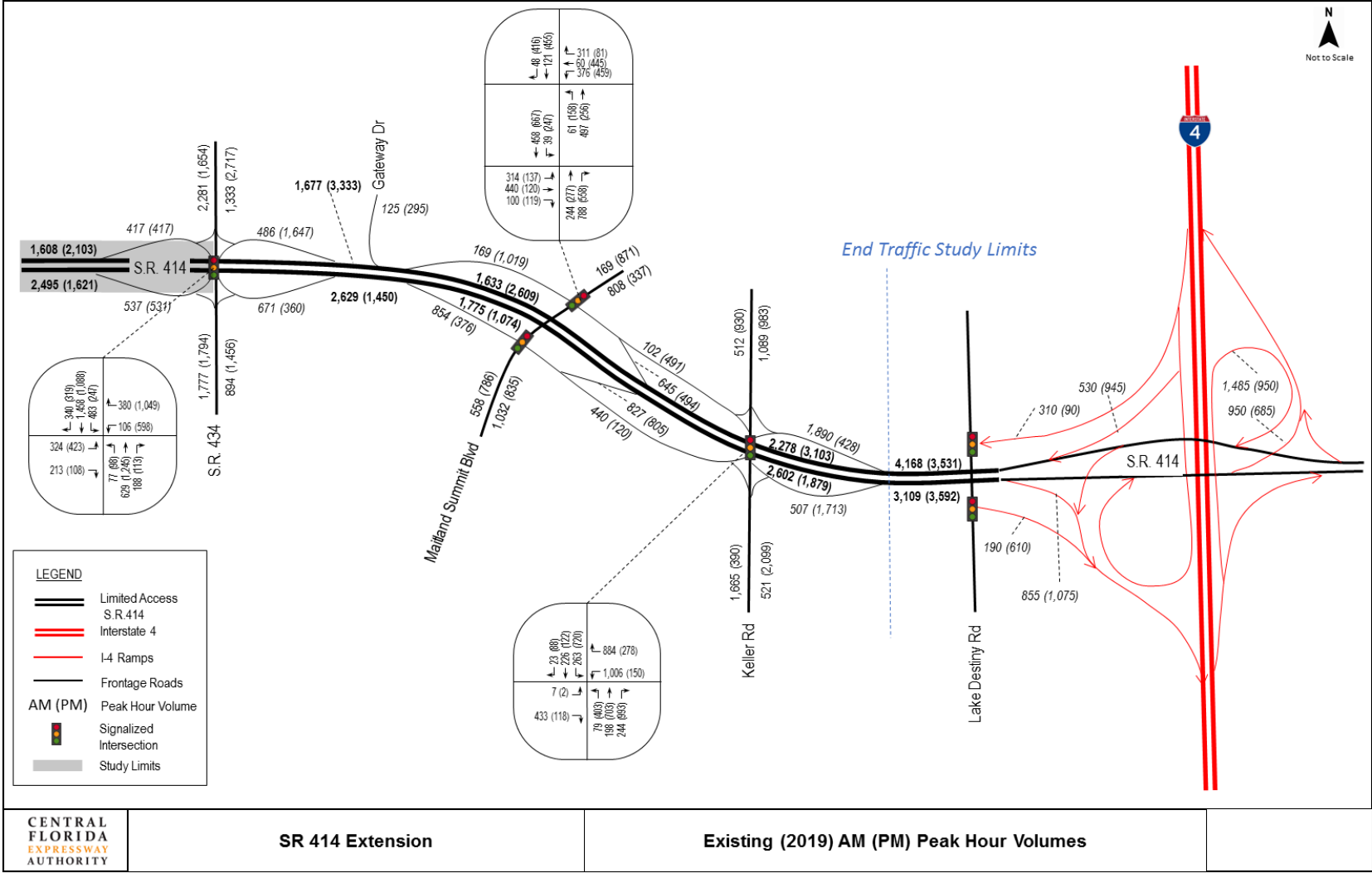


Figure 2-7b. Existing (2019) AM (PM) Peak-Hour Volumes

2.1.12 Existing Operational Performance

Per Policy 000-525-006 Level of Service Targets for the State Highway System, the adopted FDOT LOS for state roads is LOS D. The LOS D volume (or capacity) depends on the type of facility and the number of lanes. Table 2-10 lists the volume-to-capacity ratio at the adopted LOS for all roadway segments in the study area. The volume-to-capacity ratios presented are for traffic volumes during the day (daily, AADT), morning peak hour (AM Peak) and evening peak hour (PM Peak). The only segments in the corridor for which the volume exceeds the capacity (highlighted in red) and the volume-to-capacity ratio is greater than one are at the arterial portions of SR 414, US 441 and Keller Road south of SR 414.

The LOS D volume thresholds in Table 2-10 are based on 2012 FDOT Quality/Level of Service and represent the existing traffic volumes the corridor can service and continue to maintain LOS D. The LOS D volume thresholds change as the facility type changes along the corridor (west to east), from Expressway to Class 1 Arterial to Uninterrupted Highway. The bottom portion of the table, highlighted in gray, contains the LOS D volume results from roadways classified as arterials and connectors that intersect with SR 414 within the traffic study area.

A traffic analysis using Synchro v. 10 software was completed to evaluate the LOS operations at the signalized intersections in the traffic study corridor. Using the existing signal timings and turning movement counts, the traffic delay and LOS was determined for each of the movements through the intersections in the morning peak hour and evening peak hour (refer to Table 2-11 and Table 2-12, respectively).

To better understand the merging, diverging or weaving operations, a weave analysis was conducted and is documented in the *Project Traffic Analysis Report* (CFX 2021h).

The analysis of the roadway segments and stand-alone intersections can be misleading because it may not reflect the traffic operational issues routinely experienced. The reason is that the turning movement counts only count the traffic that clears the intersection, not the unmet demand, as there is significant queuing of traffic in the morning and evening peak hours. Cross street delays and left-turning movements on the arterial section of SR 414 are generally over the LOS standards because of long cycle lengths to accommodate the SR 414 through movements. As noted in Section 2.1.12.3, the SR 414 arterial peak-hour volumes are spread over multiple hours because of congestion and signal progression delays.

Table 2-10. 2019 Performance of Roadway Segments

Location	Facility Type	Lanes	LOS "D" Service Volume		Volume			V/C		
			Daily 2-Way	Peak Hour Peak Dir	Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak
S.R. 414, west of Hiawassee Rd	Expressway	6L	116,600	5,500	50,360	3,077	3,045	0.43	0.56	0.55
S.R. 414, btw Hiawassee Rd and U.S. 441	Expressway	6L + 2Aux	136,600	6,500	48,860	2,717	2,897	0.36	0.42	0.45
S.R. 414, btw U.S. 441 and Bear Lake Rd	Class I Arterial	4L	39,800	2,000	52,310	1,894	2,496	1.31	0.95	1.25
S.R. 414, btw Bear Lake Rd and Eden Park Rd	Class I Arterial	4L	39,800	2,000	52,650	2,277	2,296	1.32	1.14	1.15
S.R. 414, btw Eden Park Rd and Magnolia Homes Rd	Class I Arterial	4L	39,800	2,000	55,000	2,589	2,248	1.38	1.29	1.12
S.R. 414, btw Magnolia Homes Rd to Gateway Dr	Class I Arterial	4L	39,800	2,000	59,910	2,705	2,283	1.51	1.35	1.14
S.R. 414, btw Gateway Dr to S.R. 434 Ramps	Class I Arterial	4L	39,800	2,000	56,430	2,495	2,103	1.42	1.25	1.05
S.R. 414, btw S.R. 434 Ramps	Uninterrupted Highway	4L	65,600	3,240	44,090	1,830	1,170	0.67	0.56	0.36
S.R. 414, btw S.R. 434 Ramps and Maitland Summit Blvd Ramps	Uninterrupted Highway	4L + 2Aux	82,000	4,050	61,810	2,629	3,333	0.75	0.65	0.82
S.R. 414, btw Maitland Summit Blvd Ramps	Uninterrupted Highway	4L	65,600	3,240	51,720	1,775	2,609	0.79	0.55	0.81
S.R. 414, btw Maitland Summit Blvd East Ramps to Keller Rd East Ramps	Uninterrupted Highway	4L + 2 Aux	82,000	4,050	63,350	2,602	3,103	0.77	0.64	0.77
S.R. 414, btw Keller Rd Ramps and I-4 Ramps	Uninterrupted Highway	4L + 4Aux	114,700	5,670	84,180	4,168	3,592	0.73	0.74	0.63
Hiawassee Rd, south of S.R. 414	Class I Arterial	4L	39,800	2,000	24,050	1,209	1,072	0.60	0.60	0.54
Hiawassee Rd, north of S.R. 414	Class I Arterial	4L	39,800	2,000	21,090	989	941	0.53	0.49	0.47
U.S. 441, south of S.R. 414	Class I Arterial	4L	39,800	2,000	26,340	2,205	1,950	0.66	1.10	0.98
U.S. 441, north of S.R. 414	Class I Arterial	4L	39,800	2,000	30,820	1,227	1,443	0.77	0.61	0.72
Rose Ave, south of S.R. 414	Collector	2L	15,930	790	13,850	667	636	0.87	0.84	0.81
Bear Lake Rd, north of S.R. 414	Collector	2L	13,320	680	9,470	483	528	0.71	0.71	0.78
Eden Park Rd, north of S.R. 414	Collector	2L	13,320	680	3,530	218	237	0.27	0.32	0.35
Eden Park Rd, south of S.R. 414	Collector	2L	13,320	680	7,920	438	401	0.59	0.64	0.59
Magnolia Homes Rd, south of S.R. 414	Collector	2L	13,320	680	6,620	230	240	0.50	0.34	0.35
Lake Lotus Park Rd, north of S.R. 414	Driveway	2L			40	2	2			
Gateway Dr, north of S.R. 414	Collector	2L	13,320	680	3,920	215	185	0.29	0.32	0.27
S.R. 434, south of S.R. 414	Class I Arterial	4L	39,800	2,000	33,400	1,777	1,794	0.84	0.89	0.90
S.R. 434, north of S.R. 414	Class I Arterial	6L	59,900	3,020	41,910	2,281	2,717	0.70	0.76	0.90
Maitland Summit Dr, south of S.R. 414	Collector	4L	29,160	1,470	15,210	1,032	835	0.52	0.70	0.57
Maitland Summit Dr, north of S.R. 414	Collector	4L	29,160	1,470	10,860	808	871	0.37	0.55	0.59
Keller Rd, south of S.R. 414	Collector	4L	29,160	1,470	17,490	1,665	2,099	0.60	1.13	1.43
Keller Rd, north of S.R. 414	Collector	4L	29,160	1,470	15,240	1,089	983	0.52	0.74	0.67

Source: 2012 FDOT Quality/Level of Service Generalized Service Volume Tables (FDOT 2020a)

Table 2-11. 2019 Intersection Operation Analysis – Morning Peak (8:00 a.m. to 9:00 a.m.)

Intersection	Delay/ LOS	Eastbound			Westbound			Northbound			Southbound			Overall
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Hiawasse Rd @ S.R. 414 Ramps	Delay LOS	79 E	36 D		68 E	0 A		66 E	26 C	3 A	62 E	27 C	3 A	32.5 C
U.S. 441@ S.R. 414 Eastbound Ramps	Delay LOS	79 E		358 F					19 B	3 A	73 E	5 A		111.6 F
U.S. 441@ S.R. 414 Westbound Ramps	Delay LOS	45 D	61 E	14 B	49 D	79 E	16 B	95 F	15 B	0 A	68 E	27 C	0 C	25.9 C
S.R. 414 @ Bear Lake Rd	Delay LOS	186 F	65 E	2 A	171 F	29 C	0 C	110 F	126 F	110 F	113 F	131 F	18 B	65.8 E
S.R. 414 @ Eden Park Rd	Delay LOS	155 F	24 C	0 C	174 F	29 C	2 A	122 F	128 F	46 D	192 F	112 F	30 C	39.6 D
S.R. 414 @ Magnolia Homes Rd	Delay LOS	8 A	15 B	1 A	207 F	5 A	0 C	172 F	96 F			119 F		21.8 C
S.R. 434 @ S.R. 414 Ramps	Delay LOS	66 E		11 B	60 E		13 B	95 F	42 D	5 A	222 F	44 D	4 A	57.6 E
Maitland Summit Blvd @ S.R. 414 EB Ramps	Delay LOS	60 E	52 D	8 A					50 D	5 A	22 C	2 A		25.3 C
Maitland Summit Blvd @ S.R. 414 WB Ramps	Delay LOS				70 E	62 E	10 A	24 C	2 A			76 E	6 A	30.5 C
Keller Rd @ S.R. 414 Ramps	Delay LOS	85 F		52 D	72 E		3 A	67 E	60 E	6 A	87 F	70 E	0 A	46.2 D

Table 2-12. 2019 Intersection Operation Analysis – Afternoon Peak (5:00 p.m. to 6:00 p.m.)

Intersection	Delay/ LOS	Eastbound			Westbound			Northbound			Southbound			Overall
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Hiawasse Rd @ S.R. 414 Ramps	Delay LOS	74 E		4 A	76 E		0 A	71 E	27 C	3 A	65 E	27 C	3 A	31.4 C
U.S. 441@ S.R. 414 Eastbound Ramps	Delay LOS	57 E		8 A					21 C	3 A	302 F	5 A		44.3 D
U.S. 441@ S.R. 414 Westbound Ramps	Delay LOS	54 D	75 E	21 C	57 E	82 F	21 C	112 F	7 A	2 A	98 F	17 B	0 C	16.6 B
S.R. 414 @ Bear Lake Rd	Delay LOS	155 F	47 D	7 A	207 F	106 F	1 A	127 F	161 F	62 E	112 F	147 F	40 D	90.2 F
S.R. 414 @ Eden Park Rd	Delay LOS	144 F	28 C	0 A	202 F	39 D	2 A	138 F	177 F	2 A	177 F	124 F	42 D	47.5 D
S.R. 414 @ Magnolia Homes Rd	Delay LOS	16 B	37 D	8 A	167 F	30 C	0 C	114 F	26 C			89 F		36.4 D
S.R. 434 @ S.R. 414 Ramps	Delay LOS	92 F		4 A	74 E		160 F	87 F	48 D	1 A	91 F	41 D	4 A	73.2 E
Maitland Summit Blvd @ S.R. 414 EB Ramps	Delay LOS	85 F	71 E	14 B					67 E	7 A	34 C	2 A		25.3 C
Maitland Summit Blvd @ S.R. 414 WB Ramps	Delay LOS				46 D	58 E	9 A	11 B	3 A			63 E	13 B	36.9 D
Keller Rd @ S.R. 414 Ramps	Delay LOS	85 F		5 A	134 F		4 A	86 F	52 D	19 B	73 E	19 B	1 A	46.6 D

2.1.13 Existing Intelligent Transportation Systems Equipment

The existing ITS system backbone fiber optic cable is installed along eastbound and westbound of Maitland Boulevard (SR 414) from west of Overland Road and continues east past US 441. The existing conduit system on SR 414 eastbound and westbound consists of eight 1-inch-diameter high-density polyethylene conduits. There is an existing closed-circuit television camera and a walk-in dynamic message sign and associated equipment located on SR 414 westbound within the project limits east of US 441. There is existing FDOT and Seminole County fiber optic cable on the south side of SR 414 between Bear Lake Road and Magnolia Homes Road. The cable crosses over to the north side of SR 414 between Magnolia Homes Road and SR 434. The traffic signals in the project limits are maintained by Seminole County and there is an ongoing project to upgrade the traffic signal controllers to Advanced Traffic Controllers type controllers. Table 2-13 lists the existing ITS equipment in the study area.

Table 2-13. Existing ITS Equipment

Equipment Type	Direction	Roadside or Median	Structure Type
CCTV	WB	Roadside	Pole
CCTV	WB	Roadside	Pole
DMS	WB	Roadside	Full Span
CCTV	EB	Intersection (Magnolia Homes Rd)	Traffic Signal Pole
MVDS	EB	Intersection (Magnolia Homes Rd)	Traffic Signal Pole
MVDS	WB	Intersection (Magnolia Homes Rd)	Traffic Signal Pole
CCTV	EB	Intersection (Eden Park Rd)	Traffic Signal Pole
MVDS	WB	Intersection (Eden Park Rd)	Traffic Signal Pole
MVDS	EB	Intersection (Eden Park Rd)	Traffic Signal Pole
CCTV	WB	Intersection (Bear Lake Rd)	Traffic Signal Pole
MVDS	EB	Intersection (Bear Lake Rd)	Traffic Signal Pole
VDS-AVI	EB	Intersection (Bear Lake Rd)	Traffic Signal Pole

Source: CFX As-Built for SR 414 Maitland Boulevard Extension (CFX 414-211) and inventory data from <http://www.cflsmartroads.com/tools.html> (FDOT 2020b)

Notes:

MVDS = microwave vehicle detection system

2.1.14 Drainage and Hydrology

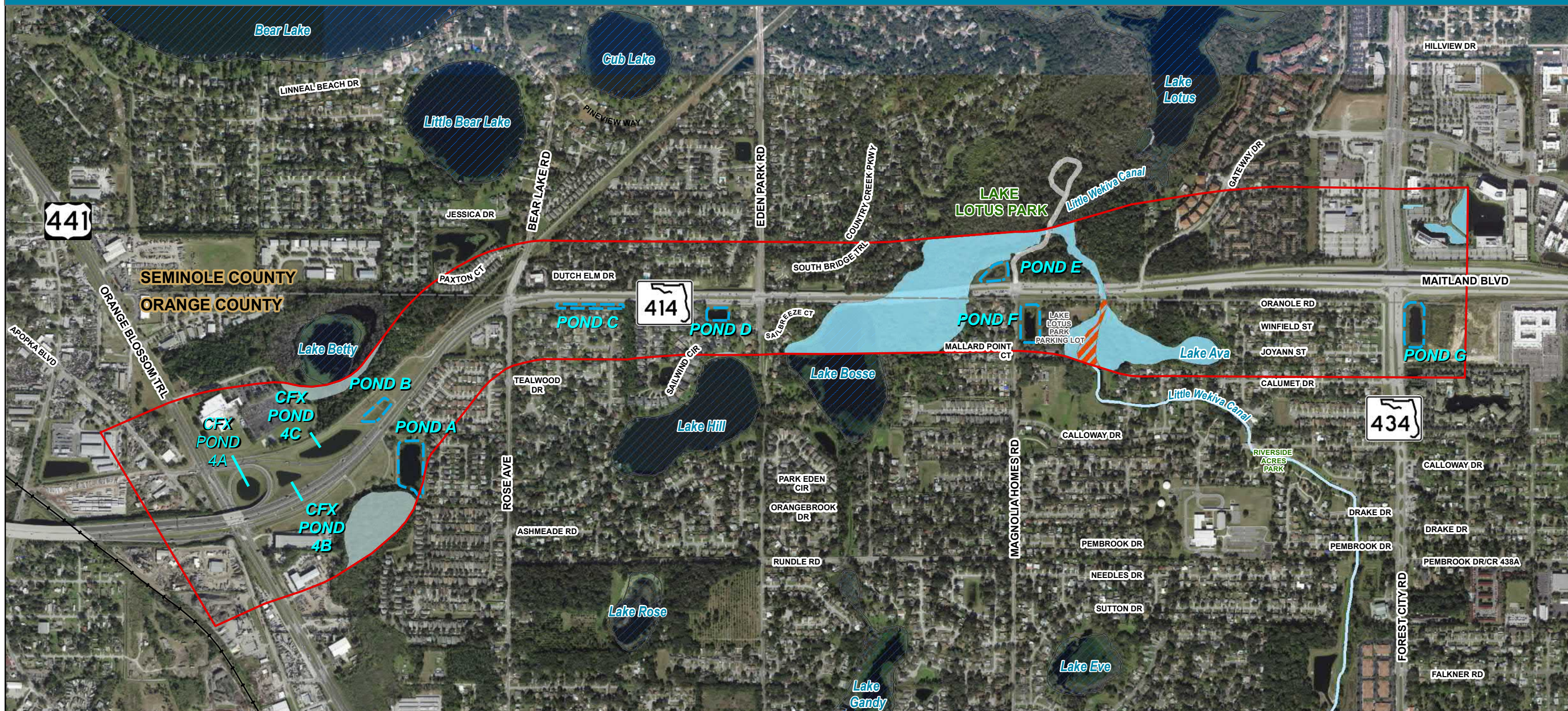
The project is located within the Little Wekiva River Watershed, which is within the jurisdiction of the St. Johns River Water Management District. The study area contains several surface water bodies and lakes, such as Lake Bosse and the Little Wekiva Canal. The Little Wekiva Canal is an artificial canal system that flows primarily in a northerly direction into the Little Wekiva River. The Little Wekiva River is outside of the study area north of the Little Wekiva Canal (north of Lake Lotus). The existing SR 414 roadway is located within the both open and closed basins, and stormwater runoff is treated in multiple permitted stormwater treatment ponds. Portions of the stormwater discharge to Lake Bosse and the Little Wekiva Canal, and the remainder discharges to existing wetlands.






The majority of the study area is located within the Little Wekiva Canal Basin, which the Florida Department of Environmental Protection identifies as Water Body Identification Number 3004. The Little Wekiva Canal Basin is impaired for coliforms, biological oxygen demand, and dissolved oxygen. There is an adopted FDEP Basin Management Action Plan for the Little Wekiva River Basin for reducing nitrates, total phosphorus and dissolved oxygen. Further, the study area falls within Wekiva Spring and Rock Springs, both of which are an Outstanding Florida Spring. The Wekiva Spring and Rock Springs have a pending BMAP for the reduction of nitrates and total phosphorus. Because of the BMAPs, application of additional treatment volume and anti-degradation standards may be required. The study area is also located within the Wekiva River Hydrologic Basin and Wekiva Recharge Protection Basin and is subject to special treatment requirements. An Environmental Look Around is part of this study to find opportunities for joint-use pond opportunities. Potential nearby regional treatment facilities includes the Little Wekiva River - Lake Lotus Park Regional Stormwater Treatment Facility, which is currently in design by the Orange County Environmental Protection Division.

The study corridor has two existing bridge crossings including Lake Bosse, FDOT Bridge No. 770075 (MP 37.5) and the Little Wekiva Canal, FDOT Bridge No. 770074 (MP 37.8). Drainage along the existing SR 414 is characterized by a series of roadside ditches and closed storm sewer collection system with curb and gutter to convey runoff to existing CFX and FDOT ponds. The existing CFX ponds along the study corridor include Ponds 4A, 4B and 4C, and the existing FDOT ponds include Ponds A, B, C, D, E, F and G (Pond G was transferred to another owner). Figure 2-8 shows the pond locations. The *Pond Siting Report* documents the specific details of these ponds and determine what modifications may be needed for the proposed improvements as well as any new ponds or joint-use pond opportunities (CFX 2021g).




2.1.15 Floodplains and Regulatory Floodways

The Federal Emergency Management Agency's Flood Insurance Rate Maps for Seminole County, Community Panel Numbers 12117C0145F and 12117C0140F, dated September 28, 2007, and Orange County Community Panel Numbers 12095C0140F and 12095C0145F, dated September 25, 2009, indicates that a portion of the SR 414 roadway lies within the 100-year floodplain areas Zone AE and Zone A. The Zone AE base flood elevation ranges from 63 to 65 feet and is located in the vicinities of Lake Bosse and Little Wekiva Canal. Zone A is located in the vicinity of the SR 414 and US 441 Interchange and has no base elevation but includes a 1 percent chance of flooding. Most of the study area lies in floodplain area Zone X, which is an area of minimal flood hazard. Figure 2-8 shows the floodplain areas.



 County Boundary  Existing Lake
 Rail  FDOT Ponds
 Study Area

Flood Hazard Areas - Flood Zones

 A - Areas with a 1% annual chance of flooding (no base elevation)
 AE - Areas where base flood elevations are provided
 Regulatory Floodway



0 1,000 Feet

Data Sources: FDOT,
Seminole County,
Orange County, FGDL, ESRI
Rails-to-Trails Conservancy, FEMA

Based on review of FEMA FIRM maps, there is one designated regulatory floodway located south of the Orange County-Seminole County border near the Lake Lotus Park parking lot and is identified in the FEMA Flood Insurance Study for Orange County (FEMA 2018) as the Little Wekiva River Regulatory Floodway. No impact to this regulatory floodway is expected as its limits end before the SR 414 ROW. The drainage evaluation in the *Location Hydraulics Report* documents any impacts to the regulatory floodway (CFX 2021e). Should the regulatory floodway be impacted, a FEMA No-Rise Certification is required. SJRWMD required floodplain criteria includes a no net reduction of floodplain storage within the 100-year floodplain, and the storage standards for the Wekiva River Hydrologic Basin must be met. Several regional hydraulic models in addition to the FEMA Flood Insurance Study are available for the Little Wekiva Watershed including the Little Wekiva Watershed Model Refinement (referenced in CDM Smith and Pegasus Engineering 2016) and the Little Wekiva River Watershed Management Plan Final Report (CDM 2005).

2.1.16 Geotechnical Investigation

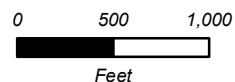
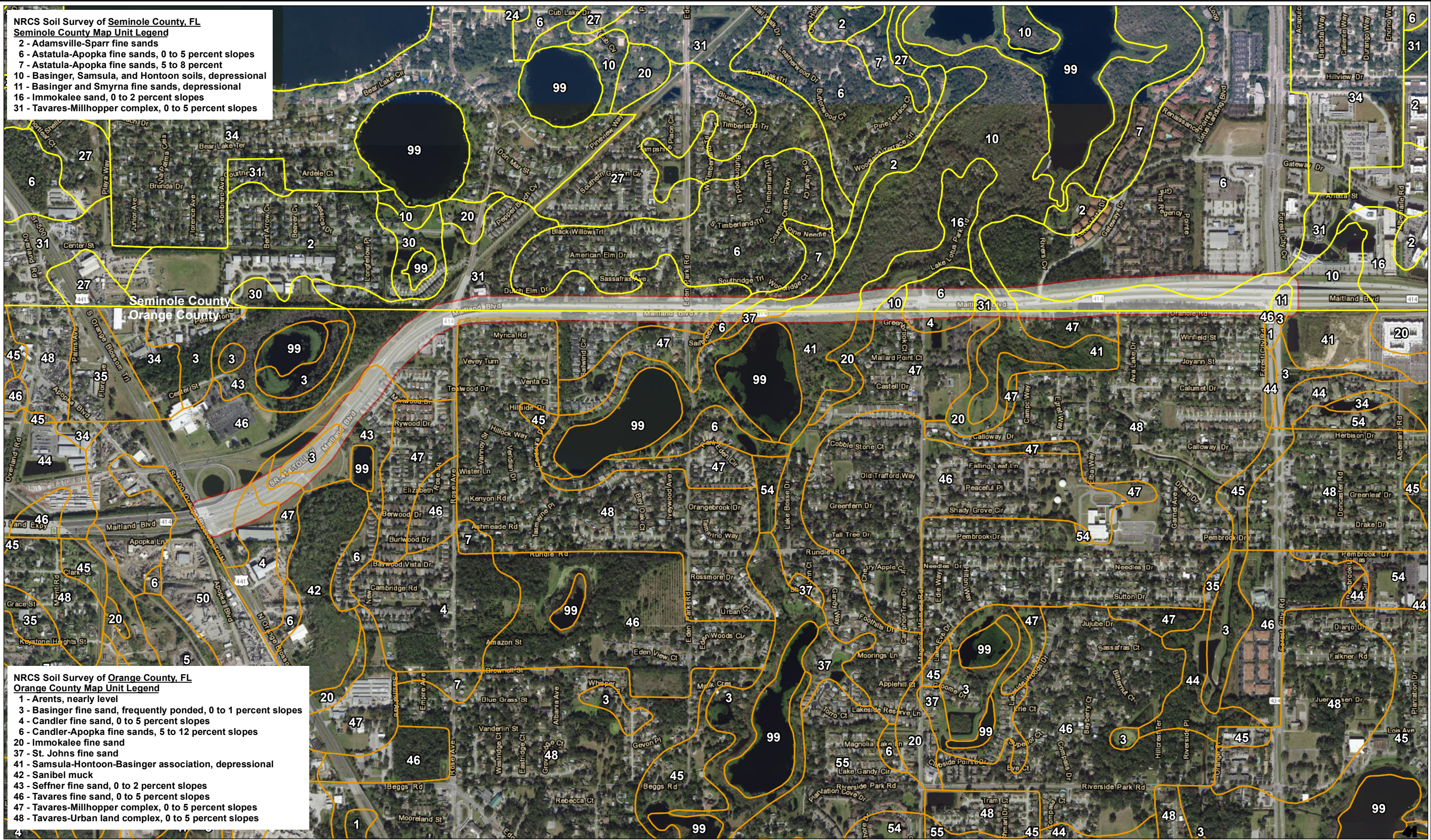
Near-surface soils in upland areas are moderately well-drained sands (A-3 and A-2-4; refer to Figure 2-9) with seasonal high groundwater levels between 3.5 and 6 feet deep. However, organic soil (muck) is present within wetlands, specifically at Lake Bosse, which contains muck deposits extending to extreme depths. The SR 414 Bridge at Lake Bosse is supported on open-ended pipe piles. Because of the soft muck at some foundation locations, the piles were driven to depths greater than 400 feet to achieve bearing.

2.1.17 Lighting

The existing lighting in the study area is limited, as detailed in Table 2-14.

Table 2-14. Existing Lighting

Name of Roadway	From	To	Location of Lighting
SR 414 (Maitland Boulevard) Mainline	within US 441 Interchange		Both sides (north and south)
SR 414 (Maitland Boulevard) Ramps	within US 441 Interchange		Both Sides
SR 414 (Maitland Boulevard) Mainline	east of US 441 Interchange	SR 434	None
Eastbound Exit to SR 434	Ramp Gore	Side street	Right side (south)
Westbound Entrance from SR 434	Ramp Gore	Side street	None
Rose Avenue/Bear Lake Road	South of Intersection		Co-located with utility poles
Eden Park Road	South of Intersection		Co-located with utility poles
Magnolia Homes Road/Lake Lotus Park Drive	South of Intersection		Co-located with utility poles



ENGINEER OF RECORD: GARY L. KUHN
P.E. LICENSE NO. 38704
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS, INC.
919 LAKE BALDWIN LANE
ORLANDO, FL 32814
PHONE (407) 898-1818
CERTIFICATE OF AUTHORIZATION No. 005882

SR 414 MAITLAND BLVD.
EXPRESSWAY EXTENSION
US 441 TO SR 434

ROAD NO.	PROJECT NO.
SR 414	414-227



Figure 2-9
NRCS SOIL SURVEY MAP

SHEET
NO.

2.1.18 Utilities

The existing utility facilities include electric, gas, water, sewer and communications. As part of this PD&E Study, notification letters and information requests were coordinated with major utilities along or crossing the existing ROW. Table 2-15 lists utilities owners and contact information as identified from a preliminary Sunshine One call in both Orange and Seminole counties.

Table 2-15. Existing Utilities

Utility	County	Contact Information	Utility Type
AT&T	Seminole	Nancy Spence 770.918.5424	Fiber communication lines
AT&T/Distribution	Orange Seminole	Dino Farruggio 561.997.0240	Telephone
Black & Veatch Orlando 1F	Seminole	John Walker 913.458.2516	Fiber
Central Florida Expressway Authority	Orange	Carnot Evans 321.354.9757 cevens@dewberry.com	Fiber
CenturyLink (Lumen, Terra Technologies, and Embarq)	Seminole	Robert Godek 407.374.0465 Rob.m.godek@centurylink.com Heather Blackburn Heather.blackburn@lumen.com Eric Walls 407.907.9284 ewalls@terratechllc.net relocations@centurylink.com	Fiber, Telephone
Charter Communications	Orange Seminole	Timothy Ross Timothy.ross@charter.com Tracey Domostoy Tracey.domostoy@charter.com	Fiber, Telephone, CATV
City of Altamonte Springs	Orange Seminole	Franklin Cabrera 407.571.8342	Fiber, Water, Electric, Sewer
City of Winter Park	Seminole	Jason Riegler/ For Water & Wastewater 407.599.3355 jriegler@cityofwinterpark.org	Water, Electric, Sewer
Comcast Communication/ Prev. LK CNTY CBLV	Orange Seminole	Wade Mathews 352.516.3824	CATV
Duke Energy	Orange Seminole	Stephanie Olmo 407.905.3376 Stephanie.olmo@duke-energy.com Sam Keiser Sam.kaiser@duke-energy.com deftdistributiongo@duke-energy.com	Electric - Distribution
Duke Energy Fiber	Orange Seminole	Mark Hurst 727.820.5208 Mark.hurst@duke-energy.com	Fiber
Duke Energy- Transmission	Orange	Scott Vanvelzor	Electric- Transmission

Table 2-15. Existing Utilities

Utility	County	Contact Information	Utility Type
	Seminole	813-909-1241 svanvelzor@pike.com Nick Brana 407-942-9727 Nick.Brana@Duke-Energy.com deftransmissiongov@duke-energy.com	
Lake Apopka Natural Gas	Orange	Mingo Colon 407.656.2734 mcolon@langd.org	Gas
MCI (Verizon)	Seminole	MCIU01 Investigations 469.886.4091	Fiber, Communication lines
Orange County Public Works	Orange Seminole	Matthew Shipley 407.836.7814	Fiber, Traffic Signals
Orange County Utilities	Orange Seminole	Christina Crosby Christina.crosby@ocfl.net	Water
Orange County Utilities-Waste Water	Orange Seminole		Wastewater
Seminole County Traffic Engineering	Seminole	John Brown 407.665.5644 Jbrown02@seminolecountyfl.gov	Signalization
Seminole County	Orange Seminole	Matthew Clark (UAO Rep.) 407.665.2118 Mclark02@seminolecountyfl.gov Paul Zimmerman (UAO Rep.) 407.665.2040 pzimmerman@seminolecountyfl.gov David McBroom (UAO Field Rep.) 407.416.1575 dmcbbroom@seminolecountyfl.gov	Reclaimed Water, Water, Sewer
TECO Peoples Gas-Orlando	Seminole	Joan Domning 813.275.3783 jdomning@tecoenergy.com	Gas
Zayo Group	Orange Seminole	Henry Klobucar 406.490.6138 Henry.klobucar@zayo.com Dean Pate Dean.pate@zayo.com Tess Bentayou Tess.bentayou@zayo.com	Fiber

Source: Sunshine One Call <https://www.sunshine811.com>

Notes

CATV = cable access television

2.1.19 Existing Pavement Conditions

The original pavement was placed in 1991 based on the date of construction plans. The pavement within the western portion of the project limits from US 441 to Bear Lake Road (MP 0–0.224 and MP 36.206–36.655) was paved in 2010. The pavement from Bear Lake Road to SR 434 (MP 36.655–38.442) was paved in 2002, which was likely part of the reconstruction for the interchange at SR 434.

FDOT provided the All System Pavement Condition Forecast in May 2020 to document the current condition of pavement along SR 414 in the study area. Table 2-16 lists the pavement condition of SR 414 as of 2020. Any rating less than or equal to 6.0 is considered deficient and there are no existing pavement deficiencies identified.

Table 2-16. Existing Pavement Condition

Begin MP	End MP	County	Direction	Fiscal Year of Paving	Crack	Rutting Condition	Ride
0	0.224	Orange	SR 414 EB	(2021)*	(9.0)	(>8.0)	(8.1)
0	0.224	Orange	SR 414 WB	(2021)*	(10.0)	(>8.0)	(8.2)
36.206	36.655	Orange	SR 414 EB	(2010)	10.0	>8.0	7.1
36.206	36.655	Orange	SR 414 WB	(2010)	10.0	>8.0	7.9
36.655	36.781	Orange	SR 414 EB & WB	(2002)	10.0	>8.0	-
36.781	38.442	Seminole	SR 414 EB & WB	(2002)	8.0	>8.0	7.7

Source: FDOT's All System Pavement Condition Forecast, May 2020

* Asterisks represent paving identified during January 2021 site visit. Pavement ratings reflect the pre-paving condition.

2.2 Existing Bridges

2.2.1 Overview

There are four existing bridges within the project study area (refer to Table 2-17). Bridge No. 750743 carries eastbound and westbound SR 414 over US 441, Bridge No. 770074 carries eastbound and westbound SR 414 over Lake Bosse, Bridge No. 770075 carries eastbound and westbound SR 414 over Little Wekiva Canal (also referenced as Little Wekiva River Bridge) and Bridge No. 770083 at the eastern project limit carries SR 414 over SR 434.

The SR 414 bridge over US 441 is included for project consistency as there are no structural modifications proposed in the Preferred Alternative. However, there are striping changes as shown in the Concept Plans.

The SR 414 bridge over Lake Bosse was constructed in 2000 and is a six-span structure with two 11-foot-wide lanes in each direction, a 13.5-foot-wide inside shoulder in each direction next to the 19-foot-wide raised median, 12-foot-wide outside shoulders and a 5-foot-wide barrier-separated sidewalk in each direction.

The SR 414 bridge over Little Wekiva Canal was constructed in 2000 and is a single-span structure that has two 11-foot-wide lanes in each direction, a 13.5-foot-wide inside shoulder in each direction next to the 19-foot-wide raised median, 8-foot-wide outside shoulders and a 5-foot-wide, barrier-separated sidewalk in each direction. The bridge spans over the Little Wekiva Canal as well as a sidewalk and tram path from the parking lot to Lake Lotus Park.

The SR 414 bridge over SR 434 was constructed in 2000 and is a divided single-span structure that has two 12-foot-wide lanes, 12-foot-designated for future lane and 10-foot-wide outside shoulders in each direction and a 22-foot-wide median with a 19-foot-wide raised median. The bridge spans over SR 434 and is part of a single-point urban interchange.

Table 2-17. Existing Bridge Structures

Bridge No.	Mile Marker ^a	Route Carried	Bridge Over	Min. Vertical Clearance (feet)	Direction	Total Bridge Length (feet)	Deck Width (feet)	Number of Lanes
750743	MP 0.224 to 0.262	SR 414	US 441	16.5 feet	EB and WB	192.42	137.89	three WB + Ramp two EB + Lane Taper
770074	MP 37.400 to 37.534	SR 414	Lake Bosse	3.1 feet above El. 63.8 NGVD	EB and WB	700.00	129.00	2 per direction
770075	MP 37.805 to 37.818	SR 414	Little Wekiva Canal and Tram Pathway	4.8 feet (Above El. 66.8 NGVD) 10 feet (Tram) 8 feet (Sidewalk)	EB and WB	68.90	120.70	2 per direction
770083	MP 38.359 to 38.406	SR 414	SR 434	16.4 feet	EB and WB	244.80	117.80	2 per direction

^a From FDOT Straight Line Diagram

Note:

NGVD = National Geodetic Vertical Datum of 1929

2.2.2 Current Condition and Year of Construction

Table 2-18 describes the four existing bridge structures in the SR 414 corridor. Existing bridge information was obtained from a field review, available data and plans. The sufficiency rating is derived from a formula that methodically evaluates factors that indicate the structure's ability to remain in service. A rating of 100 percent represents an entirely sufficient bridge, and a rating of 0 percent represents an entirely deficient bridge. Standard practice indicates that structures with a sufficiency rating of 80 percent or less require some rehabilitation, and those less than 50 percent require replacement.

All four bridges listed in Table 2-18 are classified as having a structural sufficiency rating of 90 percent or higher and none are listed as functionally obsolete.

Table 2-18. Current Structure Condition and Year of Construction

Bridge No.	Mile Marker	Route Carried	Bridge Over	Year Built/Widened	Inspection Date	Sufficiency Rating (%)	Health Index
750743	MP 0.262 to MP 0.224	SR 414	US 441	2009	2019	90.2	99.79
770074	MP 37.400 to MP 37.534	SR 414	Lake Bosse	2000	2019	92.7	95.11
770075	MP 37.805 to MP 37.818	SR 414	Little Wekiva Canal	2000	2019	96.3	99.82
770083	MP 38.359 to MP 38.406	SR 414	SR 434	2000	2018	100	99.94

Source: FDOT Straight Line Diagram

2.3 Environmental Characteristics

A desktop review of the environmental resources that included social, natural and physical characteristics within the study area was performed and is presented in the following sections.

2.3.1 Land Use

Adjacent land uses and cover types along SR 414 and adjacent to the study area consist of a diverse mixture of developed properties, natural and altered uplands, wetlands and surface water. During a site visit conducted in May 2020, these areas were assessed, with a focus on the natural vegetative communities for potential use by federal- and state-listed wildlife.

The *St. Johns River Water Management District Florida Land Use Cover Classification System (FLUCCS), 2014* along with field verification was used to classify the various land uses and land covers within the study area. Figure 2-10 presents the Existing Land Use map.

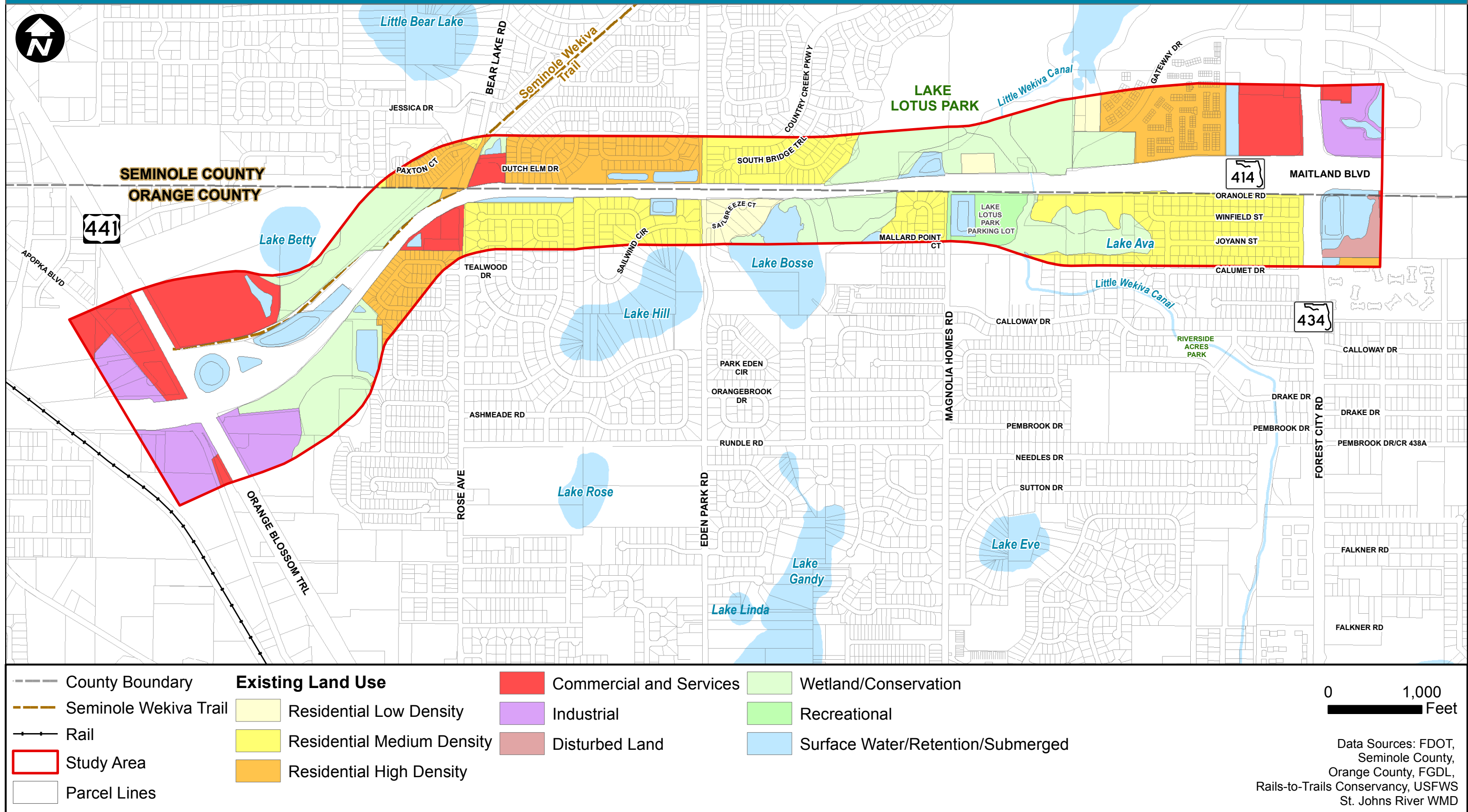
Developed areas include Residential (FLUCCS 1100, 1200, 1300), Commercial (FLUCCS 1400, 1490), Light Industrial (FLUCCS 1550), Heavy Industrial (FLUCCS 1560), Parks and Zoos (FLUCCS 1850), Roads (FLUCCS 8140) and Electrical Power (FLUCCS 8320). Upland areas (vegetated) include Herbaceous Upland Non-forested (FLUCCS 3100), Upland Coniferous Forests (FLUCCS 4100), Pine Mesic Oak (FLUCCS 4140), Upland Hardwood Forests (FLUCCS 4200) and Upland Mixed Coniferous/Hardwood (FLUCCS 4340).

Wetlands and surface waters include Streams and Waterways (FLUCCS 5100), Lakes (FLUCCS 5200), Reservoirs (FLUCCS 5300), Wetland Forested Mix (FLUCCS 6300), Freshwater Marshes (FLUCCS 6410), Emergent Aquatic Vegetation (FLUCCS 6440), Mixed Scrub-Shrub Wetland (FLUCCS 6460) and Surface Water Collection Basins (FLUCCS 8370).

SR 414 Expressway Extension Project Development and Environment (PD&E) Study

CFX Project No. 414-227

Figure 2-10
Land Use/Land Cover



2.3.2 Cultural Features and Community Services

2.3.2.1 Cultural Resources

A desktop review of the SR 414 study corridor was conducted to identify any recorded or unrecorded cultural resources within 500 feet of the roadway and 750 feet of the intersection at SR 434 and the interchange at US 441. The Florida Master Site File database, historic maps, modern aerials and the Seminole County and Orange County Property Appraisers' databases were examined as part of the desktop review.

The FMSF database (updated April 2020) indicates that one linear resource and three historic structures are located within the project study area (refer to Table 2-19 and Figure 2-11). All three historic structures have been previously determined ineligible for the National Register of Historic Places by the State Historic Preservation Officer. The linear resource, the SCL Railroad (8OR10661/8SE02138), has been recorded in both Orange and Seminole counties. Although portions of this linear resource have been determined eligible for the NRHP, the segments in proximity to the study area have lost the majority of their historical integrity, as determined in a 2013 survey conducted by SEARCH Inc. (FMSF Survey No. 19908). The SHPO concurred with this finding in a letter dated April 15, 2020.

The Seminole County and Orange County Property Appraisers' databases were examined to identify any parcels containing unrecorded structures of historic age (that is, constructed prior to 1976). A total of 94 parcels were identified within the project study area, as shown on Figure 2-11.

One archaeological site also has been recorded within the study area. The Little Wekiva East archaeological site (8SE01663) is a low-density prehistoric ceramic scatter. The site is located within the ROW of SR 414 at Gateway Drive (refer to Figure 2-12). This site was determined to be ineligible by the SHPO for the NRHP.

Table 2-18. Previously Recorded Historic Resources within the SR 414 Expressway Extension Study Area

FMSF No.	Address		Year Built	Surveyor Recommendation	SHPO Evaluation
Historic Structures					
8OR04359	3070 Apopka Road		circa 1925	Ineligible for NRHP	Ineligible for NRHP
8OR10350	3900 Joyann St.		circa 1960	Ineligible for NRHP	Ineligible for NRHP
8OR11020	8201 N. Orange Blossom Trail		circa 1957	Ineligible for NRHP	Ineligible for NRHP
FMSF No.	Name	Period of Significance		SHPO Evaluation	
Linear Resources					
8OR10661/ 8SE01238	SCL Railroad/ CSX Railroad	American 19th century; American 20th century		Ineligible for the NRHP/Eligible for the NRHP (ineligible within study area)	

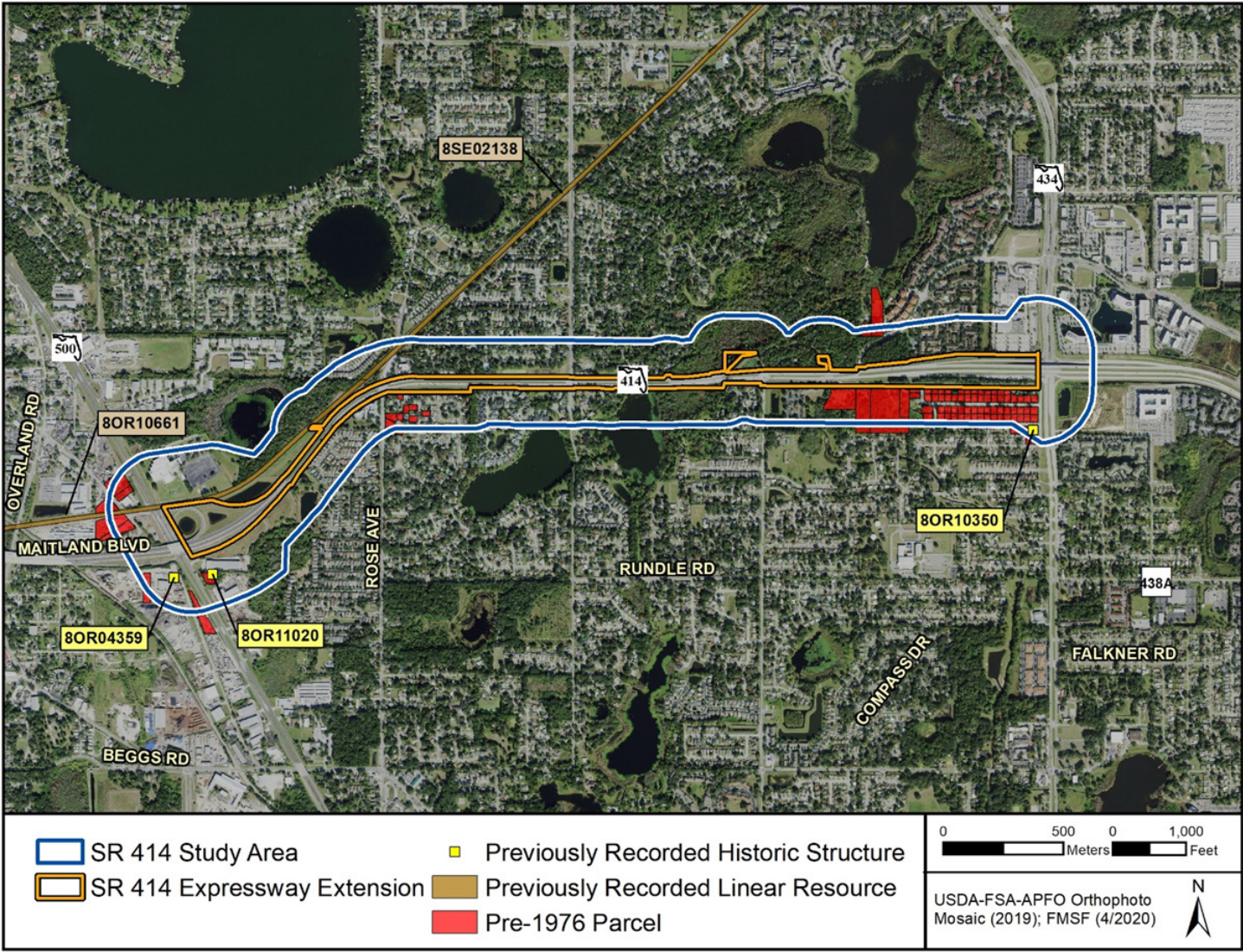


Figure 2-11. Previously Recorded Historic Resources and Parcels Containing Unrecorded, Historic-age Buildings Within 500 feet of the SR 414 Expressway Extension

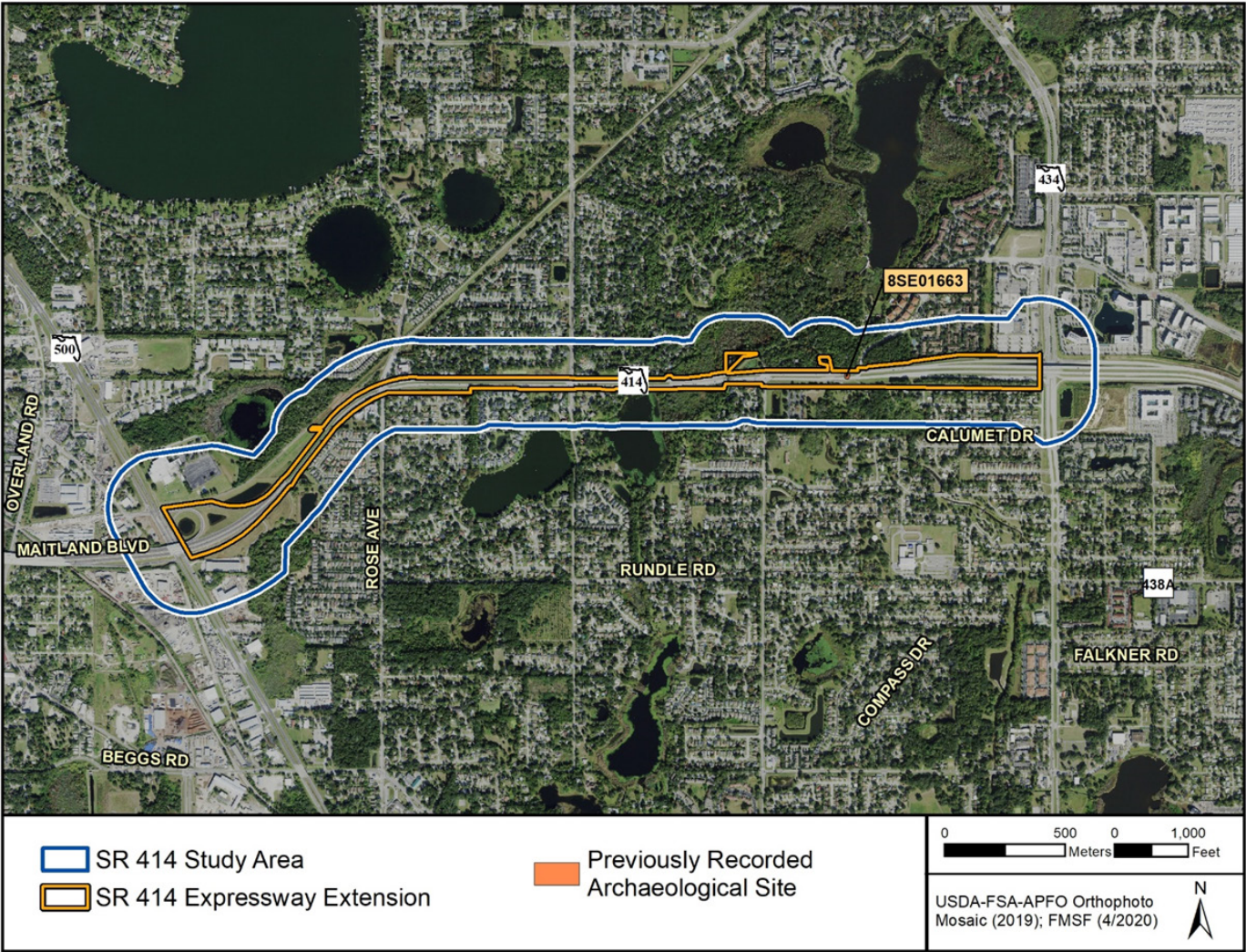


Figure 2-12. Previously Recorded Archaeological Sites Within 500 feet of the SR 414 Expressway Extension

2.3.2.2 Community Facilities

Community facilities include both private and public places that are important to the community. Public facilities include government buildings, fire and emergency protection, police protection, healthcare facilities, social service facilities, intermodal facilities, business districts and maintenance of public facilities, such as schools, community centers and cultural facilities. Private facilities may include health-care facilities, schools, religious places of worship, theme parks, grocery stores, major attractors, cemeteries, historic places and other significant quality-of-life features. A field visit was performed in April 2020 to collect corridor information including nearby social resources that could be potentially impacted by the proposed project. The field data along with a desktop review of the study area indicates that there are two community facilities within the study area: a pharmacy and the Lake Lotus Park parking lot.

Table 2-20 presents community facilities within or near the study area. Figure 2-13 presents the community facility locations.

2.3.2.3 Parks and Recreation

Lake Lotus Park is located within the study area and is a nature preserve owned and operated by the city of Altamonte Springs. The park is located adjacent to SR 414 to the north. The preserve encompasses approximately 150 acres including 120 acres of woods and wetlands. Lake Lotus Park includes picnic areas, an enclosed pavilion, an education center and a 1-mile-long trail. Weekday parking is available inside the park. However, tram service is available from the offsite parking area on the south side of SR 414 on Magnolia Homes Road on weekends and during special events. FDOT owns the offsite parking area for the park, but it is leased by the city of Altamonte Springs.

Riverside Acres Park is just south of the study area along the Little Wekiva Canal. Operated by Orange County Parks and Recreation, the park encompasses 8.1 acres and includes a playground, trails, picnic tables and fishing.

2.3.3 Wetlands and Surface Waters

The U.S. Fish and Wildlife Service National Wetlands Inventory map (USFWS 2020a) and the SJRWMD FLUCCS codes in the 5000 and 6000 series were used for the initial mapping effort presented on Figure 2-14. Surface waters are derived from these data as well as photo-interpretation of current aerial photographs from ArcGIS maps by Esri. Field surveys conducted in May 2020 to validate the FLUCCS data included wetland reconnaissance observations and subsequent edits to wetland classifications.

Surface waters associated with Lake Bosse, Lake Betty and Lake Lotus occur within proximity to the SR 414 ROW. These systems are hydrologically contiguous with Little Wekiva Canal, which crosses under SR 414 via Bridge No. 770075. Additional hydrologic connectivity of the Lake Bosse flow way is maintained under Bridge No. 770074.

A Natural Resources Evaluation was conducted to identify potential impacts to wetlands and surface waters and evaluated for each viable alternative and avoidance and minimization measures (CFX 2021f).

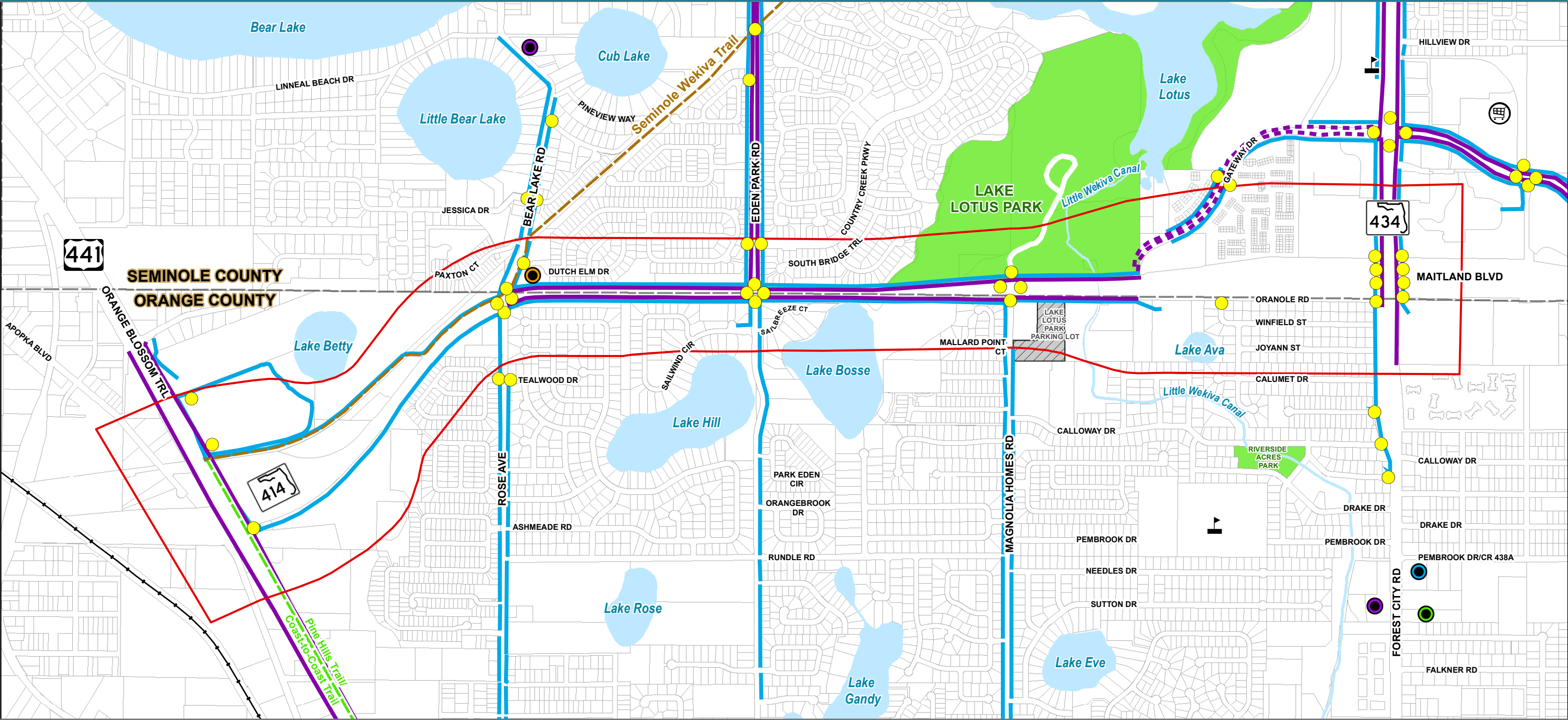
Table 2-19. Community Facilities In or Near the Study Area

Name	Location	Proximity to Study Area
<i>Pharmacies</i>		
CVS Drug Store and Pharmacy	1401 Dutch Elm Drive	Within the study area
<i>Public Facilities</i>		
Lake Lotus Park Parking Lot	Magnolia Homes Road	Within the study area
<i>Schools</i>		
Seminole State College – Altamonte Springs	850 SR 434	0.3 miles north of the study area
Riverside Elementary School	3125 Pembroke Drive	0.2 miles south of the study area
Forest City Adventist School	7563 Forest City Road	0.7 miles north of the study area
<i>Day Care Facilities</i>		
La Petite Academy of Orlando Day Care Center	2650 Pembroke Drive	0.4 miles south of the study area
<i>Grocery Stores</i>		
Publix Supermarket	851 SR 434	0.2 miles south of the study area
<i>Churches</i>		
Circle Community Church	2200 Pembroke Drive	0.4 miles south of the study area
Spirit of Joy Ministries	8310 Forest City Road	0.5 miles south of the study area
Time of Refreshing Christian Church	7919 Magnolia Homes Road	0.8 miles south of the study area
Compass Community Church	9635 Bear Lake Road	0.4 miles north of the study area
St Andrews Presbyterian Church	9913 Bear Lake Road	0.6 miles north of the study area
Forest City Seventh-day Adventist Church	7601 Forest City Road	0.7 miles north of the study area
Mt Tabor Ame Church	685 Oaklondo Drive	0.6 miles north of the study area
Pentecostal Church of God	560 Hillview Drive	0.4 miles north of the study area
<i>Assisted Living Facilities</i>		
Green Tree Assisted Living	8207 Forest City Road	0.5 miles south of the study area
Beggs Pointe Assisted Living Facility	4711 Beggs Road	0.8 miles south of the study area

SR 414 Expressway Extension Project Development and Environment (PD&E) Study

CFX Project No. 414-227

Figure 2-13
Social Information



Existing Crosswalks	Proposed Trail	Parks	Assisted Living Facilities	Grocery Stores
Existing Sidewalk	County Boundary	Lake Lotus Park Parking Lot	Churches	Schools
Existing Bicycle Lanes	Rail	Water	Day Care Facilities	
Proposed Bike Improv.	Study Area	Parcel Lines	Pharmacies	
Existing Trail				

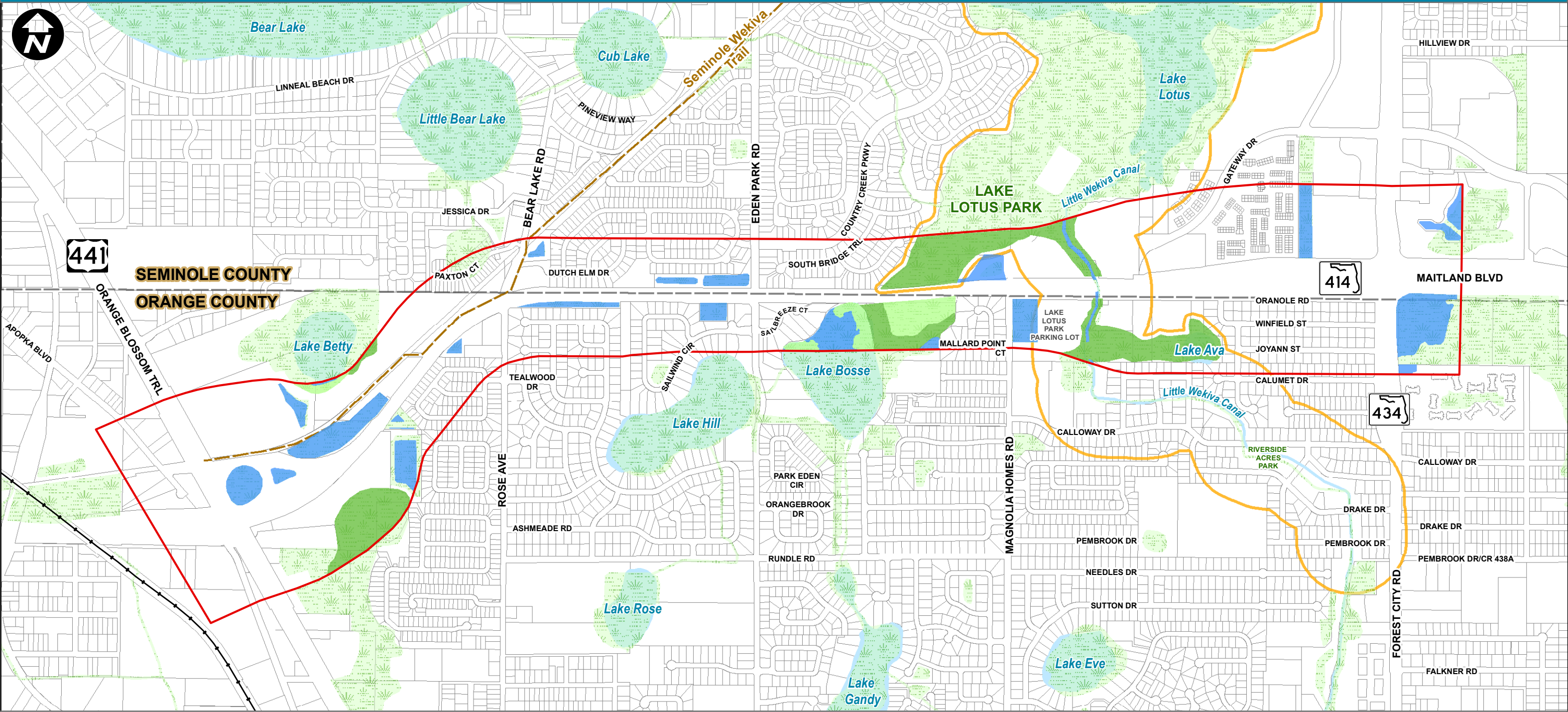
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Data Sources: FDOT,
Seminole County,
Orange County, FGDL,
Rails-to-Trails Conservancy

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Figure 2-14
Natural Resources



- County Boundary
- Seminole Wekiva Trail
- Rail
- Study Area
- Water
- Parcel Lines
- Little Wekiva RHPZ
- National Wetlands Inventory (revised 5-1-20)

- Wetlands Shown in Project Area**
- 5100; 5200; 5300; 8370 Surface Water/Retention
 - 6300 Forested Wetlands
 - 6410; 6440; 6460 Nonforested Wetlands

0 1,000
Feet

Data Sources: FDOT, ESA,
Seminole County,
Orange County, FGDL,
Rails-to-Trails Conservancy, USFWS

2.3.4 Listed Species

The project is situated within a developed, suburban corridor. Land use mapping from the SJRWMD and field reconnaissance indicates residential uses predominate the land surrounding the proposed project. Wildlife habitat with the potential to support protected wildlife species occurs within the study area, including wetland and upland habitat. The Little Wekiva Canal downstream of SR 414 (Maitland Boulevard) is in a SJRWMD Riparian Habitat Protection Zone associated with the Wekiva River Hydrologic Basin. The RHPZ is established to conserve biodiversity in the Wekiva ecosystem and restricts development activities that degrade ecosystem functions, including land clearing, construction of dwellings and other buildings, and alteration of surface water flows. The highest quality wildlife habitat within the study area is associated with Lake Lotus Park, which contains forested wetlands, marshes and upland forested systems. During the NRE, potential RHPZ impacts were evaluated for each viable alternative.

Several federally listed plant species have the potential to occur in the project area based on review of the USFWS Information for Planning and Consultation Portal (USFWS 2020b). A survey of federally listed plant species for spring was conducted in early May 2020; no federally listed plant species (based on the Information for Planning and Consultation report) were observed within the study area.

State-listed species with reasonable potential to occur in the study area include the gopher tortoise (*Gopherus polyphemus*), Florida sandhill crane (*Antigone canadensis pratensis*), state-listed wading birds, Florida pine snake (*Pituophis melanoleucus mugitus*), short-tailed snake (*Lampropeltis extenuata*) and southeastern American kestrel (*Falco sparverius paulus*). During the NRE, a species-specific survey for gopher tortoises was conducted within upland habitat in the project ROW and at the locations for proposed pond alternatives. The survey identified the potential for the gopher tortoise to occur in the study area, and also for protected commensal species, such as the eastern indigo snake and Florida pine snake. Sandhill cranes have been previously documented foraging in the project vicinity. Survey of herbaceous marsh wetlands during the nesting season was conducted to identify potential nesting areas.

The Florida Fish and Wildlife Conservation Commission records indicate a bald eagle nest (No. OR084), occurs to the south of the project limits on the east side of Lake Bosse. This nest was last surveyed by FWC in 2017 and was documented as an active nest; the Florida Audubon Society last surveyed this nest in 2019 and documented it as occupied. The existing SR 414 ROW is approximately 900 feet from the documented location of this nest. However, the proposed project is outside of the 330-foot-wide primary and 660-foot-wide secondary protective zones of the nest; therefore, no permitting is expected to be required for this nest. FWC records indicate a historic bald eagle nest (No. OR026) is located along the south side of SR 414 just east of the US 441 and SR 414 Interchange. This nest was last recorded as active in 1993 (FWC 2020). The area surrounding the historic eagle nest has since been cleared and developed into the Rose Pointe Subdivision.

Black bears are well-documented within the area and one mortality has been documented within this segment of SR 414. In 2015, a vehicle collision killed a juvenile black bear on SR 414, west of the SR 434 and SR 414 intersection. A general wildlife survey of the study area was performed during the NRE. However, the potential for habitats to support additional protected species is low because of the highly developed residential and commercial nature of the corridor.

Table 2-21 includes a list of federal- and state-listed species with the potential to occur in the study area.

Table 2-20. Federal- and State-Listed Species With Potential to Occur in the Study Area

Scientific Name	Common Name	Status
Reptiles		
<i>Drymarchon corais couperi</i>	Eastern Indigo Snake	FT
<i>Gopherus polyphemus</i>	Gopher Tortoise	FC
<i>Lampropeltis extenuate</i>	Short-tailed Snake	ST
<i>Neoseps reynoldsi</i>	Sand Skink	FT
<i>Pituophis melanoleucus mugitus</i>	Florida Pine Snake	ST
Birds		
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	ST
<i>Aphelocoma coerulescens</i>	Florida Scrub-jay	FT
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	ST
<i>Egretta caerulea</i>	Little Blue Heron	ST
<i>Egretta tricolor</i>	Tri-colored heron	ST
<i>Falco sparverius paulus</i>	Southeastern American Kestrel	ST
<i>Mycteria americana</i>	Wood Stork	FT
<i>Platalea ajaja</i>	Roseate Spoonbill	ST
<i>Rostrhamus sociabilis plumbeus</i>	Everglade Snail Kite	FE
Plants		
<i>Bonamia grandiflora</i>	Florida Bonamia	FT
<i>Chionanthus pygmaeus</i>	Pygmy Fringe-tree	FE
<i>Clitoria fragrans</i>	Pigeon Wings	FT
<i>Deeringothamnus pulchellus</i>	Beautiful Pawpaw	FE
<i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i>	Scrub Buckwheat	FT
<i>Lupinus aridorum</i>	Scrub Lupine	FE
<i>Paronychia chartacea</i>	Papery Whitlow-wort	FT
<i>Polygonella myriophylla</i>	Sandlace	FE
<i>Prunus geniculata</i>	Scrub Plum	FE
<i>Nolina brittoniana</i>	Britton's Beargrass	FE
<i>Warea amplexifolia</i>	Wide-leaf Warea	FE

Notes:

FC = Federal Candidate

FE = Federally designated Endangered and State-listed

FT = Federally designated Threatened and State-listed

ST = State-designated Threatened

2.3.5 Unique Characteristics

A segment of the Little Wekiva River is listed as a state of Florida Outstanding Florida Water. However, the Outstanding Florida Water segment occurs where the river flows through the Wekiva River Aquatic Preserve, which is approximately 5 miles north of the project study area. As noted previously, the SJRWMD Little Wekiva River RHPZ falls within the study area. No other unique natural resources characteristics fall within the study area.

2.4 Physical Environment

2.4.1 Air Quality

The study area is in both Seminole and Orange counties and is designated by the U.S. Environmental Protection Agency to be in attainment of the National Ambient Air Quality Standards for all of the criteria air pollutants (ozone, nitrogen dioxide, particulate matter [2.5 micrometers in diameter and 10 micrometers in diameter]), sulfur dioxide, carbon monoxide, and lead. As such, the State Implementation Plan conformity requirements of the Clean Air Act conformity are not applicable to the project.

2.4.2 Noise

There are two land uses within the project study area for which there are Noise Abatement Criteria and for which there is a potential for future predicted traffic noise with the improvements to approach, meet or exceed the NAC—residences and park land (Lake Lotus Park). The residences are considered Activity Category B land uses and the park is considered an Activity Category C land use. Figure 2-15 shows the locations of these existing land uses. Existing FDOT highway traffic noise barriers stand between SR 414 and most of the residences. The barriers are considered in the noise analysis of the No-Build Alternative (for which the existing barriers would remain) and one Build Alternative.

2.4.3 Contamination

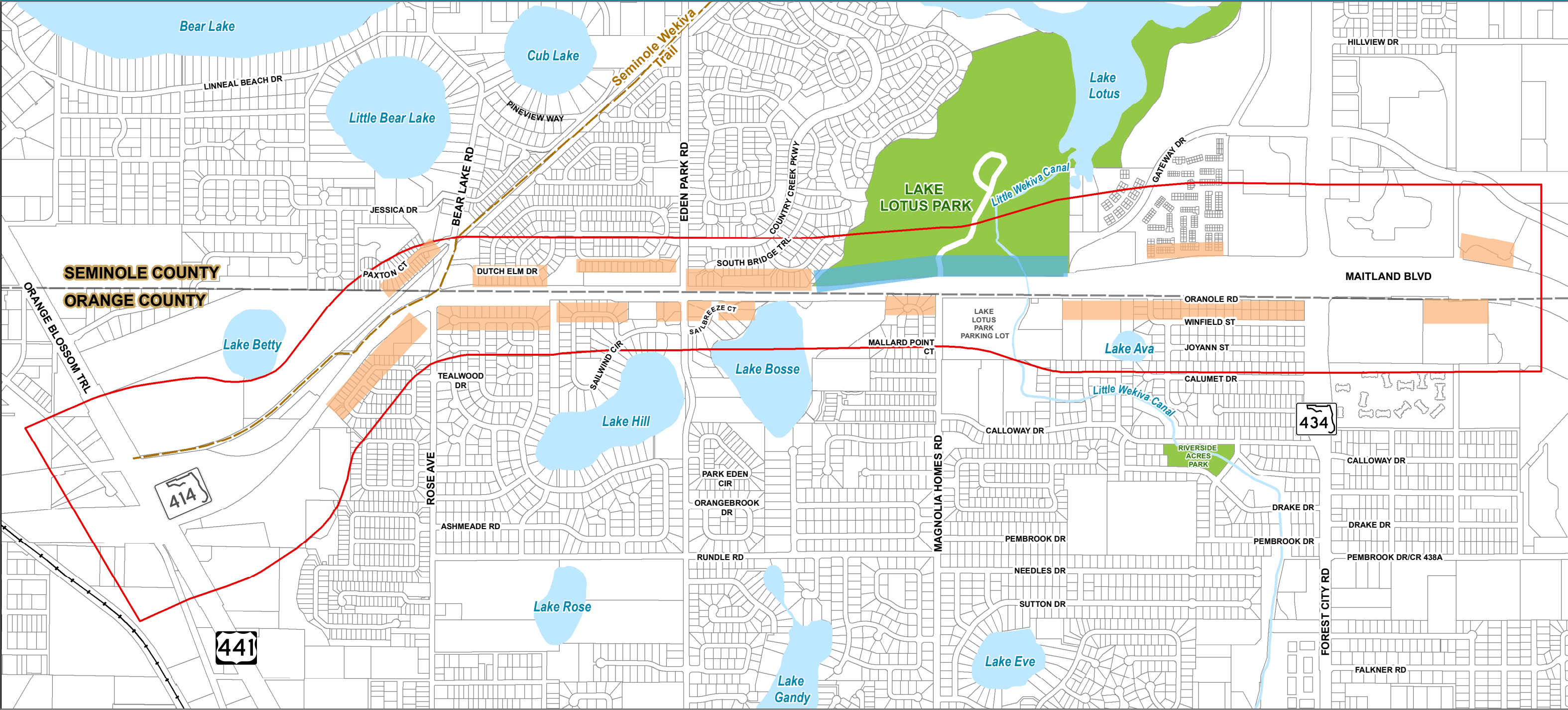
A desktop analysis of the study area was performed to identify and address any contaminated sites that possess a high degree of potential contamination involvement to the proposed project. The project elements that could be impacted by soil and/or groundwater contamination include:

- ROW acquisition
- Soil excavation for drainage improvements
- Soil excavation for pavement construction
- Soil excavation for mast arm signal pole foundations
- Soil excavation for bridge foundation construction including pilecaps and drilled shafts
- Excavation dewatering

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Figure 2-15
Potential Noise Impact Areas



- County Boundary
- Seminole Wekiva Trail
- Rail
- Study Area
- Parks
- Water
- Parcel Lines

Noise Abatement Criteria Activity Categories

- Category B (Residences)
- Category C (Parks)



0 1,000
Feet

Data Sources: FDOT,
Seminole County,
Orange County, FGDL,
Rails-to-Trails Conservancy

The contamination screening study area consists of all potentially contaminated sites within 500 feet, all non-landfill solid waste sites within 1,000 feet, and all solid waste landfills, Comprehensive Environmental Response, Compensation, and Liability Act or National Priorities List sites within 0.5 miles from the outside edge of the existing SR 414 ROW. FDEP Map Direct and OCULUS databases (FDEP 2020a and 2020b) were queried for facilities within the study area that would be considered a major project constraint. If a facility within the study area has the potential as a major project constraint, supplemental research was performed to determine the current regulatory status. The contamination screening desktop evaluation indicated 25 sites with potential risk of contamination impacts to the proposed project. Upon review of the databases, none of the sites identified was considered to be a major constraint to the project. Table 2-22 lists the potential contamination sites within the contamination screening study area, and Figure 2-16 shows their locations.

Table 2-21. Potential Contamination Sites

Site No.	Site Name and Address	Hazardous Waste (HW) Petroleum Product (P)	Description
1	Commercial Lighting 8130 N. Orange Blossom Trail	HW	As of January 4, 2007, this site operates as a Conditionally Exempt Small Quantity Generator. FDEP inspections document a parts washer onsite that had been moved outside and is no longer in use and improper oil handling procedures that were corrected. No contamination impacts were documented in the public file.
2	Orlando Paving – Lockhart 8150 Apopka Blvd.	HW/P	As of November 1990, this site operates as a Conditionally Exempt Small Quantity Generator. Old tanks were removed and new tanks were installed in May 2020. No documented violations or releases of hazardous materials or petroleum products have been reported for this property.
3	Cheap Dave’s Auto Salvage 3070 Apopka Blvd.	HW/P	A Phase II Activities Update, dated May 2000, documents an elevated organic vapor analyzer reading (90 parts per million), no secondary containment for used oil and fuel storage areas, and a site stormwater design that may result in an offsite discharge. The assessment reported some soil cleanup level exceedances, but reportedly did not reveal a substantial risk for environmental impacts.
4	RJ Salvage 2914 Apopka Blvd.	HW	A July 2005 compliance assistance visit requested waste disposal records and cleanup of fluid releases noted across the property. No specific releases were noted as significant or reported for regulatory action.
5	Martinez Auto Salvage 2914 A Apopka Blvd.	HW	During an inspection on March 12, 2005, the site was noted to have areas that were not in compliance. On Jan. 30, 2012, the corrective actions were completed and the site was found to be in compliance. No contamination impacts were documented in the public file.
6	JLC Outdoors Inc 8130 N. Orange Blossom Trail	HW	March 2007 through Feb. 2019 inspections indicate this site operates as a Small Quantity Generator. No contamination impacts were documented in the public file.
7	Landers Auto Recycling 3024 Apopka Blvd.	HW	As of April 25, 2007, this site operates as a Conditionally Exempt Small Quantity Generator. During an inspection on Dec. 29, 2003, one oil tank was moved from another property to this site. No contamination impacts were documented in the public file.
8	7-Eleven Food Store #33049 8243 N. Orange Blossom Trail	P	No inspections or assessment information was available within the public record regarding the removal of the storage tanks. No contamination impacts are reported at this location. This site was redeveloped as part of the SR 414 on-ramp.
9	Leutz Property 2940 S. Apopka Blvd.	HW/P	As of Sept. 2003, this site operates as a Non-Handler of Hazardous Waste. In April 2004, a Site Screening Plan and Source Removal Report documents

Table 2-21. Potential Contamination Sites

Site No.	Site Name and Address	Hazardous Waste (HW) Petroleum Product (P)	Description
			total petroleum hydrocarbons remaining in surface soils in an area of concrete pavement onsite. An FDEP Project Close Letter, dated July 29, 2004, concurred with the conclusion that total petroleum hydrocarbons would not leach out of the concrete. FDEP did not require any additional action be performed regarding this matter. This property was redeveloped as part of the construction of SR 414.
10	Central Environmental Services 2722 Apopka Blvd.	HW	This was a waste tire facility that had the tires removed in 2017. No contamination impacts were documented in the public file.
11	Vallencourt Property 2924 S. Apopka Blvd.	HW/P	An FDEP Hazardous Waste Inspection Report, dated Sept. 2003, documents two 55-gallon drums and a 500-gallon aboveground storage tank of used oil onsite. Used oil releases were observed around the drums and storage tank. The property was redeveloped as part of the construction of SR 414.
12	AAG Imports – Vacant 2876 Apopka	HW	As of March 15, 2007, this site operated as a Small Quantity Generator. As of Oct. 10, 2018, this site is vacant.
13	Sunrise Landscape Supply 8188 N. Orange Blossom Trail	HW	An FDEP Hazardous Waste Inspection Report, dated July 23, 2010, documents a 150-gallon aboveground storage tank and 55-gallon drums and pails containing used oil and hydraulic oil. Concrete and soil was observed to be stained surrounding the tank and containers. The oil was reported as removed in August 2010.
14	AAAA Truck & Van Used Parts Inc. 2773 S. Apopka Blvd.	HW	On Dec. 4, 2003, the site was found to possibly have hazardous waste and used oil discharged to the surrounding area. However, on Jan. 7, 2004, FDEP determined no further assessment was required.
15	Northrop Grumman Systems Corp 2787 S. Orange Blossom Trail	HW/P	In response to an April 20, 1987, discharge, a Supplemental Soil Assessment Letter Report, dated Oct. 2003, indicates that all soil analytical results were below Cleanup Target Levels with no impacted groundwater detected. Subsequently, FDEP issued the property a Site Rehabilitation Completion Order, dated May 2004. A 2017 Hazardous Waste Inspection found the facility in compliance at that time.
16	East Coast Tank Service 8015 N. Orange Blossom Trail	HW/P	This site is listed as being part of the Superfund Enterprise Management System Archive. The public file does not contain any record of documented contamination impacts at this location. This site was formerly located beneath the northeastern quadrant of the existing SR 414 and US 441 interchange.
17	Historical Atlantic Coast Line Railroad – Sylvan Lake to Oakland	HW	The railroad intersects South Orange Blossom Trail approximately 640 feet north of the SR 441 and SR 414 intersection and runs parallel to SR 414.
18	7-Eleven Food Store #32862 8830 Rose Ave.	P	As of Nov. 2, 2000, two unleaded gas tanks are onsite. During the most recent inspection on Oct. 21, 2019, this site was found to be compliant. No contamination impacts were documented in the public file.
19	CVS Pharmacy #3757 1401 Dutch Elm Drive	HW	As of May 17, 2012, this site operates as a Conditionally Exempt Small Quantity Generator. No contamination impacts were documented in the public file.

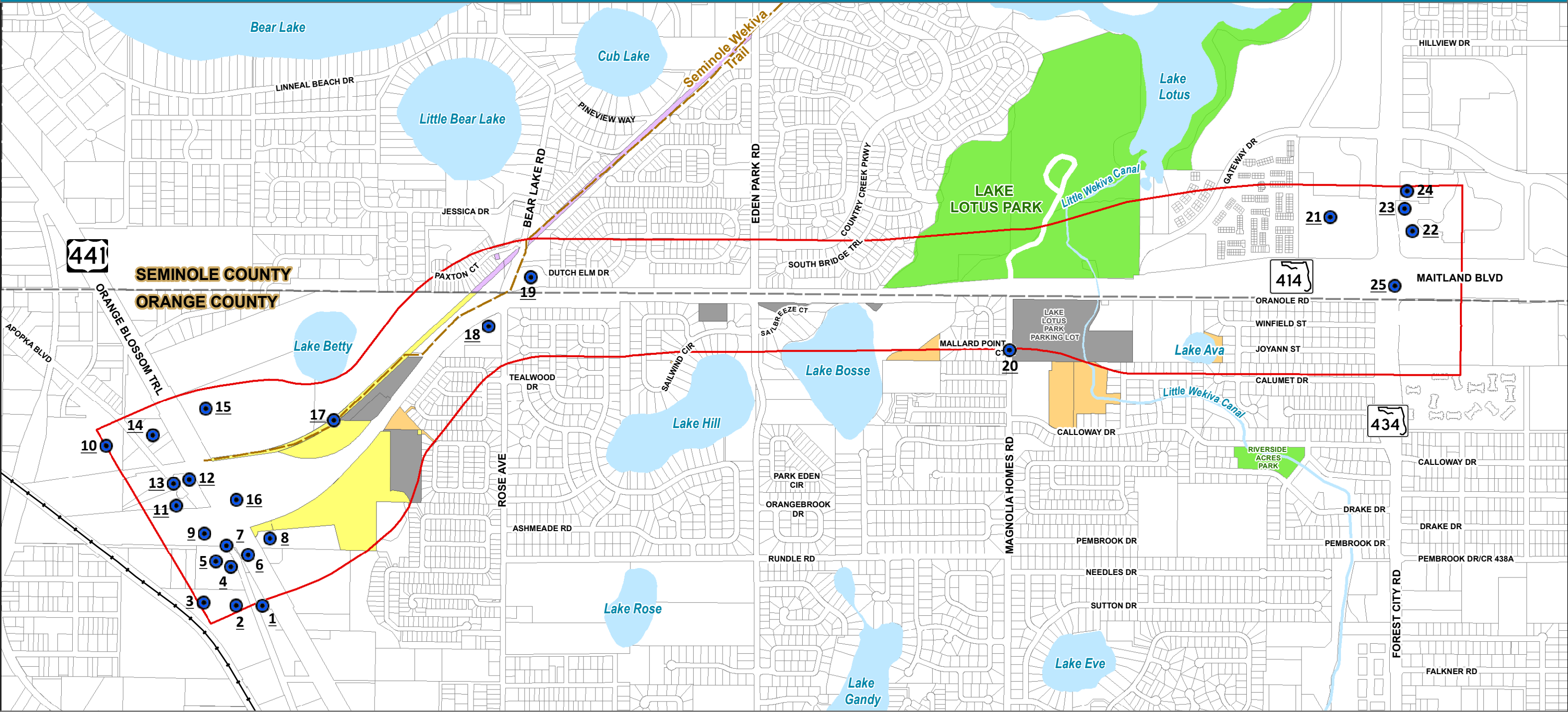
Table 2-21. Potential Contamination Sites

Site No.	Site Name and Address	Hazardous Waste (HW) Petroleum Product (P)	Description
20	Lake Lotus Parking Lot 8903 Magnolia Homes Road	HW	In 2019 and 2020 this site was approved as a disaster debris management site for Orange County. No contamination impacts were documented in the public file.
21	Classic Drivers Mart 940 S. State Road 434	HW/P	As of Jan. 29, 2001, this site operates as a Conditionally Exempt Small Quantity Generator. During the most recent inspection on Nov. 28, 2016, this former car dealership site was closed. No contamination impacts were documented.
22	Adventist Health Headquarters 900 Hope Way	P	This site operates as a health care administration office. An emergency diesel generator with a 1,350-gallon diesel aboveground storage tank is currently in service. No violations or releases have been reported for this facility.
23	Edwin N Cuevas, DMV 9439 S. State Road 434	HW	As of May 15, 2007, this site operates as a Small Quantity Generator. No violations have been reported for this facility.
24	Circle K #7114 9415 Forest City Road	P	A discharge was reported on July 6, 1993. Low levels of groundwater contamination were discovered during the removal of the tanks. Based on the lack of contamination found during groundwater sampling in April 2016, a No Further Action was recommended for this site.
25	Former Laxton's Ideal Service Station 9401/9503 SR 434	P	This site appears to have operated as a gas station in aerial photographs from 1965 through 1981. The former facility has been redeveloped as a highway overpass. Contamination impacts were remediated during the construction of the Maitland Boulevard intersection.

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**Figure 2-16
Contamination**



- County Boundary
- Seminole Wekiva Trail
- Rail
- Study Area
- Parks
- Water
- Parcel Lines
- Potential Contamination Site
- FDOT Parcels
- CFX Parcels
- Orange County Parcels
- Seminole County Parcels



0 1,000 Feet

Data Sources: FDOT,
Seminole County,
Orange County, FGDL,
Rails-to-Trails Conservancy

2.5 Consistency with Regional and Local Transportation Planning

Planning consistency of the proposed project is documented in various local planning documents. A brief explanation of each follows. Consistency with the following local comprehensive plans is being coordinated during the PD&E Study:

- CFX. The project is currently listed in the CFX Visioning + 2040 Master Plan (CFX 2016) and in the Five-Year Work Plan FY 2022 - 2026, adopted May 2021 (CFX 2021d). The project is fully funded, pending the results of this PD&E Study. The design phase is funded in FY 2022/23 and the construction phase is funded in FY 2025/26.
- MetroPlan Orlando. The project is listed in MetroPlan Orlando's adopted Transportation Improvement Program adopted July 7, 2021, as a CFX project that is fully funded (Management Number 99223), pending the results of this PD&E Study. The design phase is funded in FY 2022/23 and the construction phase is funded in FY 2025/26.

Comments were received on the Advanced Notification Package, dated April 27, 2020, from the city of Altamonte Springs on June 1, 2020. The city noted they have supported this project since they learned of it through MetroPlan Orlando in 2017. They further commented with requests to not decrease the amount of parking area at the Lake Lotus Park and Ride lot, to maintain the bridge access for the service road under the Little Wekiva Canal bridge so they can maintain their tram service from the parking area to the park and to consider adding a multiuse path at least 10 feet wide on the north side of the project corridor to improve pedestrian and bicycle access to nearby recreational areas.

2.5.1 Surrounding Projects

Review of regional and local government comprehensive plans indicate that there are multiple surrounding projects or studies near the proposed SR 414 project. Figure 2-17 shows programmed transportation projects adjacent to the study area. Table 2-23 presents the surrounding project details. The MetroPlan Orlando 2040 LRTP notes that Bear Lake Road is a constrained corridor from SR 414 to SR 436.

2.5.2 Population

The study corridor is in unincorporated Orange County, Seminole County and the cities of Altamonte Springs and Maitland. Based on information collected from the U.S. Census Bureau (2020), both Orange and Seminole counties are anticipated to experience tremendous growth. In 2010, approximately 1.1 million people resided in Orange County and 422,000 people resided in Seminole County. By 2045, the population of Orange and Seminole counties is expected to increase to approximately 1.9 million residents and 589,000 residents, respectively. This represents a population increase of 42 percent and 28 percent for Orange County and Seminole County, respectively. Additional U.S. Census Bureau data has been gathered to determine the potential effects of the proposed improvements on populations living in the study area. Figure 2-18 summarizes the study area 2015 Census Block Group Demographics. Table 2-24 provides study area demographic data.

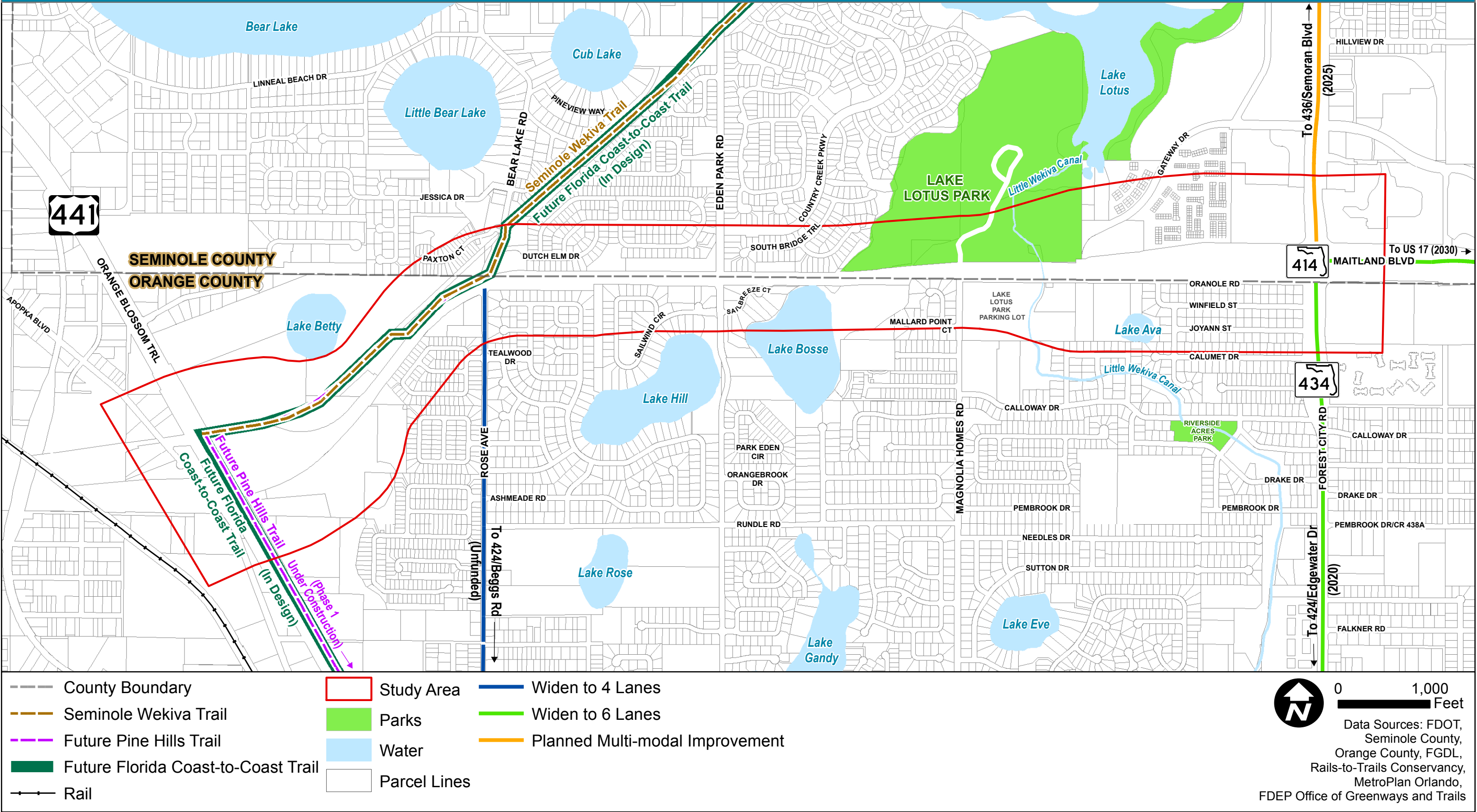


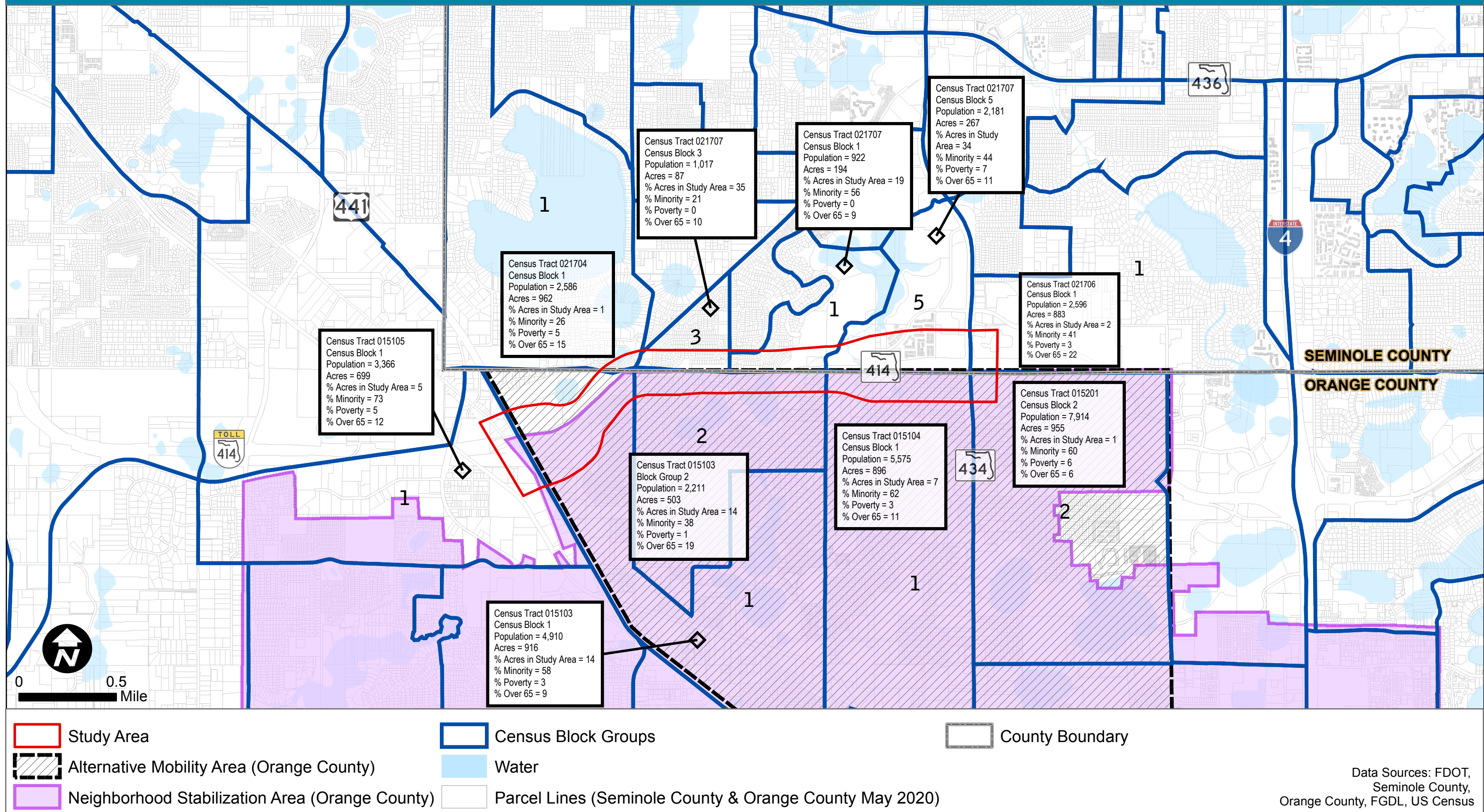
Table 2-22. Surrounding Projects

Project	From	To	Improvement	Documented Agency Plan
SR 434 Roadway Improvement	Maitland Boulevard	SR 436	Multimodal Context-Sensitive Improvements	MetroPlan 2040 LRTP Cost Feasible Project (2030)
SR 434 Roadway Improvement	SR 424/ Edgewater Drive	Orange/Seminole County Line	Widen to 6 lanes	MetroPlan Transportation Improvement Plan FY 2020–2024 Federal & State Funded Regionally Significant State Highway Projects
SR 414 Roadway Improvement	Orange County Line	Maitland Boulevard	Widen to 6 lanes	MetroPlan 2040 LRTP Cost Feasible Project (2040)
SR 414 Roadway Improvement	Bear Lake Road	Orange/Seminole County Line	Widen to 6 lanes	MetroPlan TIP FY 2020–2024 Unfunded Prioritized Project List
Rose Avenue Roadway Improvement	Beggs Road	Maitland Boulevard	Widen to 4 lanes	MetroPlan 2040 LRTP Unfunded Needs
Florida Coast-to-Coast Trail	St. Petersburg	Titusville	New Trail	FDEP Office of Greenways and Trails, May 2018, Funded
Pine Hills Trail	Alhambra Road (Pine Hills)	North of SR 414 (to connect with the existing Seminole Wekiva Trail)	New Shared Use Path	MetroPlan TIP FY 2020–2024 Unfunded Prioritized Project List (Phase 1 of 3 Under Construction)
US 441 Transit Service	Apopka	Downtown Orlando	Enhanced Bus Express Service	MetroPlan 2040 LRTP Transit Element 5 Cost Feasible Plan (2036)

Table 2-23. Study Area 2015 Census Data

Block Group ^a	Tract	Population	Area (acre)	Population Density	% Acres in Study Area	% Minority	% Poverty	% Over 65
1	021704	2,586	962	2.7	1%	26%	15%	15%
1	021707	922	154	6.0	19%	56%	0%	9%
3	021707	1,017	87	11.7	35%	21%	0%	10%
5	021707	2,181	267	8.2	34%	44%	19%	11%
1	021706	2,596	883	2.9	2%	41%	10%	22%
1	015105	3,366	699	4.8	5%	73%	22%	12%
1	015103	4,910	916	5.4	14%	58%	10%	9%
2	015103	2,211	503	4.4	14%	38%	3%	19%
1	015104	5,575	896	6.2	7%	62%	12%	11%
2	015201	7,914	955	8.3	1%	60%	16%	6%

^a Refer to Figure 2-18 for map of block groups.



Census block groups in the study area range in population density from 2.7 to 11.7 persons per acre, for an average of 6.1 persons per acre. In comparison, Orange County population density is 2.1 persons per acre and Seminole County population density is 2 persons per acre. The greatest population density in the study area is Census Block 3, Tract 021707, which is located on the north side of the study area (Seminole County), west of Lake Lotus Park. According to the U.S. Census Bureau, if a family's total income is less than the family's threshold, then that family and every individual in it is considered in poverty. Official poverty thresholds do not vary geographically, but they are updated for inflation using the Consumer Price Index. Poverty in the block groups within the study area averages 10.7 percent, which is below both the Orange County and Seminole County poverty rate of 17 percent and 12.1 percent, respectively. Residents over the age of 65 are considered transportation-disadvantaged and require special transportation considerations because of limited mobility opportunities. Approximately 9 percent of Orange County is older than 65, while 13.7 percent of Seminole County is older than 65. By comparison, residents over the age of 65 in the block groups associated with the study area averages 10.7 percent. Minorities are defined as persons who identify as Black or African-American, American Indian and Alaska Native, Asian, or Native Hawaiian and Other Pacific Islander. Orange County has a 56 percent minority population, while Seminole County is at 20.4 percent. Minority residents average 47.9 percent in the block groups associated with located the study area, with higher populations of minority residents on the south side of SR 414 (Orange County).

As shown on Figure 2-18, south of SR 414 is an Orange County Alternative Mobility Area. Orange County AMAs have lower impact fees than other areas of the county and are exempt from transportation concurrency requirements. The AMA was established to promote urban development and redevelopment and to maximize the use of existing public infrastructure, as noted in the Orange County Comprehensive Plan.

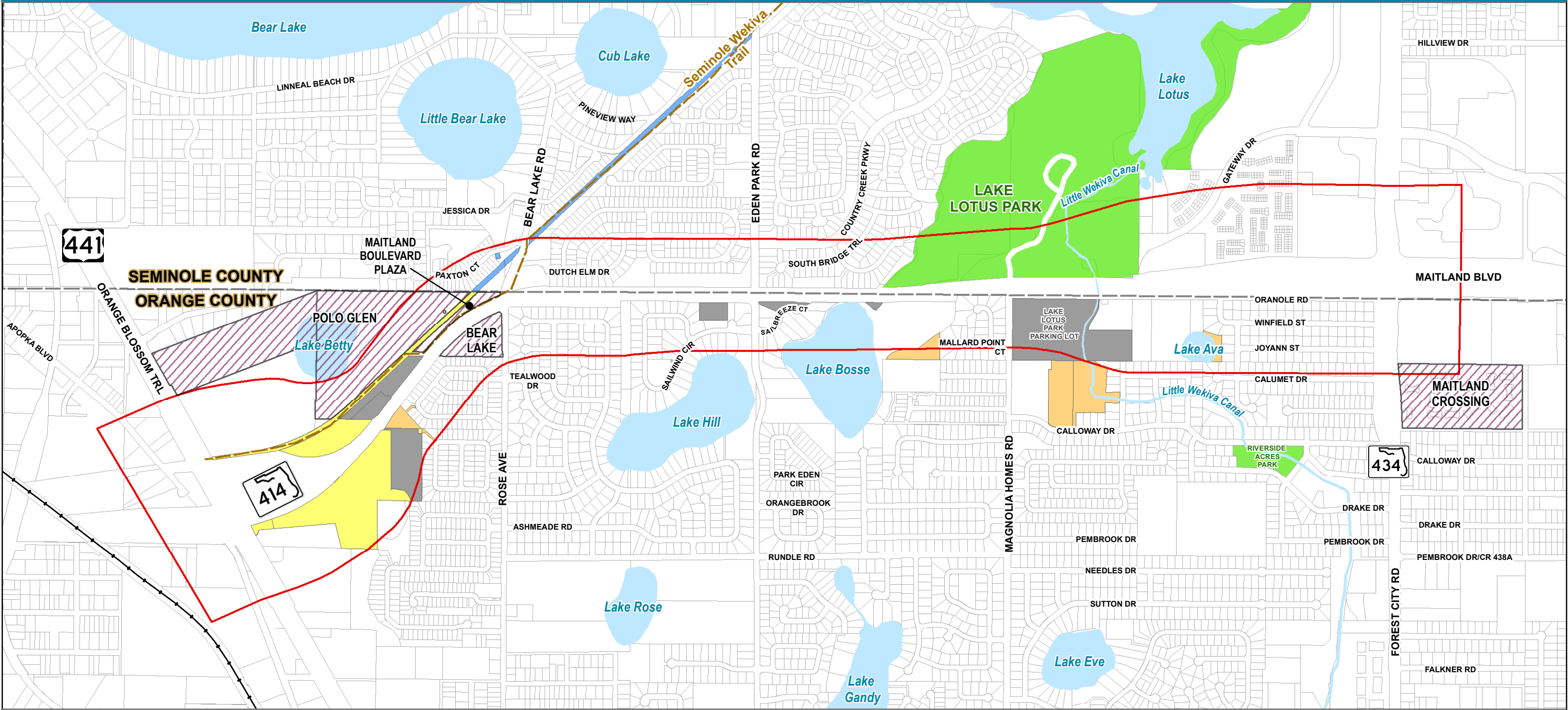
An Orange County Neighborhood Stabilization Area (Pine Hills) is also located south of the project corridor, overlapping a portion of the AMA (refer to Figure 2-18). The Neighborhood Stabilization Program was created by the Housing and Economic Recovery Act of 2008 to respond to rising residential foreclosures and property abandonment. The main purpose of the Neighborhood Stabilization Program is to stabilize neighborhoods negatively impacted by foreclosures.

2.5.3 Planned Developments

Review of the Orange and Seminole county comprehensive plans revealed the planned development projected near the project area. Figure 2-19 presents the locations of the planned developments. There is only one location designated for planned development that remains unimproved, the Polo Glen Planned Development. This planned development is on the north side of SR 414 near the US 441 interchange and is approved as a 366-unit apartment complex.

2.5.4 Modal Interrelationships

The study area is supported by different modes and services of travel along the SR 414. Refer to Figure 2-13 existing and proposed pedestrian and bicycle facilities.



2.5.4.1 Pedestrians and Bicyclists

As noted earlier and as presented on Figure 2-13, continuous sidewalks extend along both sides of SR 414 from US 441 to Gateway Drive. Further, sidewalks extend along all of the cross streets within the study area. The sidewalks discontinue at Gateway Drive, which limits pedestrian access to SR 434.

Undesignated bicycle lanes are present between Bear Lake Road and Gateway Drive through the use of wide shoulders along both sides of SR 414 (4 feet wide along the mainline and 8 feet wide along the bridges). In addition, bicycle lanes are present north of the study area at Eden Park Road and SR 434. Bicycle lanes are planned along Gateway Drive from SR 414 to SR 434.

Opportunities for both pedestrians and bicyclists to cross SR 414 at signed or marked locations exist at all intersections within the study area.

2.5.4.2 Transit

There are no LYNX routes along SR 414, but service routes are present along SR 434 and US 441 in the study area.

- **23 – Winter Park/Springs Village** provides service along SR 434 from the Springs Village Shopping Center in Altamonte Springs to Edgewater Drive and Winter Park, Monday through Saturday every 60 minutes. This route makes a connection with the Winter Park SunRail Station and includes a *superstop* where riders can transfer to four other bus service routes.
- **106 – N US 441/Apopka** provides service along US 441 from the LYNX Central Station in downtown Orlando to Apopka, every 30 minutes Monday through Saturday and every 50 minutes on Sundays. Service is not regular and is offered between 5:25 a.m. and 7:05 p.m. Mondays through Saturdays. This route has two superstops where riders can transfer to four other bus service routes at one stop and five at the other.
- **434 – SR 434 Crosstown** is just north of the study area and provides service from the Seminole State College Altamonte Springs Campus to the University of Central Florida every 60 minutes, Monday through Saturday. The 434 bus service makes a connection at the Longwood SunRail Station and includes a superstop at the University of Central Florida.

2.5.4.3 Trails

The Seminole Wekiva Trail is adjacent to the north side of the corridor just west of Bear Lake Road. The trail begins southwest of the SR 46 and I-4 interchange in Seminole County and ends at the west end of the project study corridor at US 441 and SR 414. The trail was constructed on former railroad ROW and is 14 miles long. A section of the trail north of the study corridor at the Wekiva River is also a designated part of the Florida National Scenic Trail.

The Florida Coast-to-Coast Trail, planned by the FDEP Office of Greenways and Trail, is planned through the study area along the same corridor as the Pine Hills Trail. The trail is approximately 250 miles long and links St. Petersburg (west coast) to Titusville (east) coast, and includes most of the 51-mile-long East Central Regional Rail Trail. The Phase III Design Plans (dated April 29, 2020, from the Hiawassee Road/Clarcona Ocoee Road intersection to the termination of the Seminole Wekiva Trail within the study area) were submitted to CFX for review by FDOT District 5. Concepts for this PD&E Study include accommodating this trail.

The Pine Hills Trail (refer to Figure 2-19) is planned as an 8-mile-long, multiuse regional trail from Pine Hills (southwest of the study area) to the Seminole Wekiva Trail. The trail is being developed in three phases along an existing 100- to 200-foot-wide Florida Power & Light powerline corridor in its alignment from State Road 50/Colonial Drive north to the Seminole Wekiva Trail at Rose Avenue. Phase 1 construction was planned to be complete in 2018. Phase 3 is planned along the same corridor as the Coast-to-Coast Trail. On July 22, 2020, an email communication from Orange County Public Works noted that the Coast-to-Coast Trail is being designed by FDOT District 5 and encompasses Orange County's Phase 3 plans for the Pine Hills Trail, and therefore will be the same facility. In addition to the connection to the Coast-to-Coast Trail and Seminole Wekiva Trail, the Pine Hills Trail provides a connection to the West Orange Trail, Lake County's trail system via Clarcona Ocoee Road and joins the Shingle Creek Trail at its terminus at Colonial Drive (SR 50).

3. Design Controls and Standards

The SR 414 Expressway Extension PD&E Study incorporates project elements with various design requirements. The existing four-lane SR 414 (Maitland Boulevard) facility will remain an at-grade urban principal arterial with local access and will be maintained by FDOT and applying FDOT standards. The proposed expressway extension will be a limited-access facility and will apply CFX standards. The development of this project is guided by the CFX, American Association of State and Highway Transportation Officials, FDOT and National Cooperative Highway Research Program design criteria and guidance listed below:

- *CFX Design Guidelines* (CFX 2021a)
- *CFX Signing and Pavement Marking Details and CADD Files* (CFX 2021i)
- *CFX ITS Design Standards* (CFX 2021c)
- *A Policy on Geometric Design of Highway and Streets* (AASHTO 2011a)
- *Roadside Design Guide* (AASHTO 2011b)
- *Research Report 835: Guidelines for Implementing Managed Lanes* (TRB 2016)
- *FDOT Design Manual* (FDOT 2021c)
- *FDOT Standard Plans for Road and Bridge Construction* (FDOT 2021d)
- *FDOT Drainage Manual* (FDOT 2021e)

Tables 3-1 through 3-3 list design criteria for all the facilities proposed in the SR 414 PD&E Study.

Table 3-1. SR 414 (Maitland Boulevard) (Urban) Design Criteria

Roadway Classification: Context Classification:	Urban Principal Arterial Other C3R-Suburban Residential and C3C-Suburban Commercial	Source		Comments
		FDOT ^a	CFX ^b AASHTO ^c	
Design Traffic				
Proposed Design Speed	45 mph (Existing Posted Speed = 50 - 55 mph therefore 50 mph criteria is also provided in tables)	-	-	Consistent with As Built Design Speed (Field Review)
Access Class	3	X		Straight-Line Diagram 75011002 & 77002000
Allowable Design Speed	35 - 55 mph	X		FDM Ch. 201, Table 201.5.1 Note: As-Built Construction Plans at 45 mph
	min. 30 mph for Major Urban Arterial		X	AASHTO pg. 2-58 (FDM Ch. 122, Table 122.5.1)
Design Vehicle	WB-62FL/ WB-67	X		FDM Ch. 201, Section 201.6.2
Design Year	2045		X	Scope of Services
Lane, Median & Border Widths				
Travel Lanes & Aux. Lanes	12 ft @ 50 mph 11 ft @ 45 mph	X		FDM Ch. 210, Table 210.2.1
	10 ft - Urban Arterial		X	AASHTO pg. 7-29 (FDM Ch. 122, Table 122.5.2)
Bicycle Lane	7 ft buffered lane (min. 4 ft) 7 ft buffered keyhole (min. 5 ft)	X		FDM Ch. 223, Section 223.2.1.1 and Section 223.2.1.3
Lane Configuration	4 (2/direction)		X	Scope of Services
Cross Slope	-0.02, -0.02, -0.03 Turn Lane, Bike Lane, match adj. thru lane	X		FDM Ch. 210, Figure 210.2.1
	Minimum 0.015		X	AASHTO pg. 7-29 (FDM Table 122.5.11)
Cross Slope - Bridge Section	-0.02 (no slope break)	X		FDM Ch. 260, Section 260.4
Max Lane Rollover	4.0% between adjacent through lanes; 5.0% between through lane & Aux. lane	X		FDM Ch. 210, Section 210.2.4 & Table 210.2.2
Shared Use Path	12 ft (Std.), Minimum 10 ft	X		FDM Ch. 224, Table 224.4
Median Width	30 ft @ 50 mph 22 ft @ 45 mph (19.5 ft @ 45 mph w/ constrained R/W) min. 30 ft to provide U-turns	X		FDM Ch. 210, Table 210.3.1 & FDM Ch. 212, Table 212.9.1
	29 ft @ 50 mph 14 ft @ 45 mph	X		FDM Ch. 210, Table 210.7.1
Sidewalk and Back slope				
Sidewalk Width	6 ft (up to 8 ft when demand is demonstrated) min. 5 ft, or passing sections required	X		FDM Ch. 222, Table 222.1.1
			X	AASHTO pg. 4-56
Drop-off Hazard for Pedestrians	Protection required if conditions meet Case 1 or Case 2 within 2 ft of the path edge	X		FDM Ch. 222, Figure 222.4.1
Front and Back slope (Curbed)	1:2 or to suit property owner. Not flatter than 1:6.	X		FDM Ch. 215, Table 215.2.3
Drop-off Hazard (D _s ≤ 45mph)	6 ft or greater with a slope steeper than 1:3 within 22 ft of the travel way requires protection	X		FDM Ch. 215, Figure 215.3.3
Roadway Shoulder Widths				
Median/Left Shldr (not curbed)	8 ft Total/ 0 ft Paved Pave 4-ft in sag V.C; low side of SE none - Urban Arterial	X		FDM Ch. 210, Table 210.4.1
	4 ft - Rural Arterial, 4-lane divided		X	AASHTO pg. 4-10, pg. 7-13 (FDM Table 122.5.3)
Median/Left Shldr adjacent to Barrier Wall	6 ft min. @ 50 mph	X		FDM Ch. 260, Figure 260.1.1
	10 ft adj to continuous barrier 2.5 ft @ Curbed 45 mph			FDM Ch. 210, Table 210.4.1 FDM Ch. 260, Figure 260.1.3
Outside Cross Slope	-0.06%	X		FDM Ch. 210, Section 210.4.1
Median/Left Cross Slope	-0.05%	X		FDM Ch. 210, Section 210.4.1
Bridge Shoulder Widths				
Outside	4.0 ft (Existing median sep.) 2.5 ft min.; 7' with bike lane; 8 ft for bridges >500 ft @ 45 mph	X		FDM Ch. 260, Table 260.9.1 FDM Ch. 260, Figure 260.1.4
Median/Left	1.5 ft (Existing median sep.) 2.5 ft min. (Proposed median barrier); 6 ft for 2-lane bridges >500 ft @ 45 mph	X		FDM Ch. 260, Table 260.9.1 FDM Ch. 260, Figure 260.1.4
Roadside Slopes				
Front Slope	Height of Fill - Rate 0-5 ft - 1:6 5-10 ft - 1:6 to CZ, then 1:4 10-20 ft - 1:6 to CZ, then 1:3 > 20 ft - 1:2 with guardrail	X		FDM Ch. 215, Table 215.2.3
Back Slope	1:4 or 1:3 with standard width trapezoidal ditch and 1:6 front slope.	X		FDM Ch. 215, Table 215.2.3
Transverse Slope	1:10 (freeway) 1:4 (others)	X		FDM Ch. 215, Table 215.2.3

Table 3-1. SR 414 (Maitland Boulevard) (Urban) Design Criteria

Roadway Classification: Context Classification:	Urban Principal Arterial Other C3R-Suburban Residential and C3C-Suburban Commercial	Source		Comments
		FDOT ^a	CFX ^b AASHTO ^c	
Grades				
Max Grade (Flat Terrain)	6.0% @ 45-50 mph	X	X	FDM Ch. 210, Table 210.10.1 AASHTO pg. 7-29
Max Change Grade Change w/o Vertical Curve	0.60% @ 50 mph 0.70% @ 45 mph	X		FDM Ch. 210, Table 210.10.2
Req'd Base Clearance	3 ft	X		FDM Ch. 210, Sect 210.10.3
Minimum Distance between VPI's	250 ft	X		FDM Ch. 210, Sect 210.10.1.1
Minimum Grade	0.30%	X		FDM Ch. 210, Sect 210.10.1.1
Sight Distance				
Min. Stopping Sight Distance	425 @ 50 mph 360 @ 45 mph		X	AASHTO Table 3-1, pg. 3-4 (FDM Table 122.5.7)
Decision Sight Distance (B-Stop on Urban, E-Direction change on Urban)	910 ft, 1,030 ft @ 50 mph 800 ft, 930 ft @ 45 mph		X	AASHTO Table 3-3, pg. 3-7
Horizontal Curves				
Max Deflection w/o Horizontal Curve	0° 45' 00"	X		FDM Ch. 210, Section 210.8.1
Max Deflection Through Intersection	3° 00' @ 45 mph	X		FDM Ch. 212, Table 212.7.1
Max Superelevation (emax)	e max 10% @ 50 mph e max 5% @ 45 mph	X		FDM Ch. 210, Table 210.9.1
Transitions	80/20 transition split (50/50 min)	X		FDM Ch. 210, Section 210.9.1
Slope Rate	1:150 @ 45 mph (emax=0.05) 1:200 @ 50 mph (emax=0.10; 2-Lane)	X		FDM Ch. 210, Table 210.9.3
Length of Curve	Desired 750 ft @ 50 mph 675 ft @ 45 mph not less than 400ft	X		FDM Ch. 210, Table 210.8.1
Compound Curve Ratio	1.5:1 Open Highways ; 2:1 Turning Roadways	X		FDM Ch. 210, Section 210.8.2.2
Max Curvature	10° @ 50 mph (e max 10%) 8° 15' @ 45 mph (e max 5%)	X		FDM Ch. 210, Table 210.9.1 and Table 210.9.2
Max Curvature for NC (0.02)	R= 8,337 ft @ 50 mph R= 2,083 ft @ 45 mph	X		FDM Ch. 210, Table 210.9.1 and Table 210.9.2
Lane Drop Taper	L = WS @ >= 45 mph	X		FDM Ch. 210, Section 210.2.5
Vertical Curves				
K Crest	136 @ 50 mph 98 @ 45 mph	X	X	FDM Ch. 210, Table 210.10.3 (FDM Table 122.5.8)
Min Length Crest Curve	300 ft @ 50 mph 135 ft @ 45 mph	X		FDM Ch. 210, Table 210.10.4
K Sag	96 @ 50 mph 79 @ 45 mph	X	X	FDM Ch. 210, Table 210.10.3 (FDM Table 122.5.8)
Min Length Sag Curve	200 ft @ 50 mph 135 ft @ 45 mph	X		FDM Ch. 210, Table 210.10.4
Clear Zone				
Travel Lanes	24 ft	X		FDM Ch. 215, Table 215.2.1
Auxiliary Lanes	14 ft	X		FDM Ch. 215, Table 215.2.1
Vertical Clearance				
Roadway over Roadway	16'-6"	X	X	FDM Ch. 260, Table 260.6.1 AASHTO pg. 7-38, 10-21
Overhead Sign Structure	17'-6" (new signs) 17'-0" (existing)	X	X	FDM Ch. 210, Section 210.10.3 AASHTO pg. 7-7, 38, 8-4
Overhead DMS	19'-6" (new signs) 19'-0" (existing)	X		FDM Ch. 210, Section 210.10.3
New Signal Span Wire/Mast Arm	17'-6" (new signs) 17'-0" (existing)	X		FDM Ch. 210, Section 210.10.3
Drainage	Min. 2 ft between the design flood stage and the lower members of the bridge	X		FDM Ch. 260, Section 260.8.1

Table 3-1. SR 414 (Maitland Boulevard) (Urban) Design Criteria

Roadway Classification: Context Classification:	Urban Principal Arterial Other C3R-Suburban Residential and C3C-Suburban Commercial	Source		Comments
		FDOT ^a	CFX ^b AASHTO ^c	
Lateral Offsets				
Conventional Lighting	20 ft from Travel Lane @ 50 mph 4 ft from face of curb @ 45 mph	X		FDM Ch. 215, Table 215.2.2
ITS Pole and Above Ground Fixed Objects	Outside Clear Zone @ 50 mph 4 ft from face of curb @ 45 mph	X		FDM Ch. 215, Table 215.2.2
Traffic Control Overhead Sign Supports	Outside Clear Zone	X		FDM Ch. 215, Table 215.2.2
Aboveground Utilities - Existing	Not required to be relocated unless the edge of traveled way is being moved closer; or they have been hit 3 times in 5 years	X		FDM Ch. 215, Table 215.2.2
Aboveground Utilities - New or Relocated	Outside Clear Zone @ 50 mph 4.0 feet @ 45 mph	X		FDM Ch. 215, Table 215.2.2
Canal Hazards	Not less than 60 ft from edge of travel @ 50 mph Not less than 40 ft from edge of travel @ 45 mph	X		FDM Ch. 215, Section 215.3.2
Bridge Piers and Abutments	Outside Clear Zone @ 50 mph; The greater of the following @ 45 mph: 16 ft from edge of travel (nearest lane); 4 ft from face of curb (if outside aux); 6 ft from edge of aux lane (if median aux)	X		FDM Ch. 215, Table 215.2.2

^a FDOT Design Manual (2021)

^b Central Florida Expressway Authority Design Guidelines (2021)

^c AASHTO Greenbook (2011)

Table 3-2. SR 414 Expressway Extension Design Criteria

Roadway Classification: Context Classification:	Limited Access Express Lanes C3R-Suburban Residential and C3C-Suburban Commercial	Source		Comments
		FDOT ^a	CFX ^b AASHTO ^c FHWA ^d	
Design Traffic				
Design Speed - Express Lanes	50 mph	X		Scope of Services
Design Vehicle	WB-62FL/ WB-67	X		FDM Ch. 201, Section 201.6.2
Design Year	2045		X	Scope of Services
Lane, Median & Border Widths				
Express Lanes	12 ft	X		FDM Ch. 211, Section 211.2
Cross Slope	-0.02, -0.02	X		FDM Ch. 211, Figure 211.2.1
Cross Slope - Bridge Section	-0.02 uniform slope; two-way traffic may be crowned	X		FDM Ch. 260, Section 260.4
Max Breakover at Terminals D ₃ >35mph	5.00%	X		FDM Ch. 211, Table 211.2.2
Min. Median Width	26 ft with barrier	X		FDM Ch. 211, Table 211.3.1
	4 - 6 ft, constrained Continuous viaduct should be min. shldr + barrier		X	AASHTO, pg. 7-14, pg. 8-16
Border Width	Min. 10 ft from back of roadside barrier for maintenance	X		FDM Ch. 211, Section 211.6.1
Express Lane Shoulder Widths				
1-lane Outside Shldr	12 ft Total/ 10 ft Paved (apply Travel Lane criteria)	X		FDM Ch. 211, Table 211.4.1
1-lane Median/Left Shldr	8 ft Total/ 4 ft Paved (apply Travel Lane criteria)	X		FDM Ch. 211, Table 211.4.1
2-lane Outside Shldr	14 ft Total/ 12 ft Paved		X	CFX Ch. 211, Section 211.4
2-lane Median/Left Shldr	12 ft Total/ 12 ft Paved		X	CFX Ch. 211, Section 211.4
Outside Cross Slope	-0.06	X		FDM Ch. 211, Section 211.4.2
Median/Left Cross Slope	-0.05	X		FDM Ch. 211, Section 211.4.2
Bridge Shoulder Widths				
1-lane	6 ft Inside/ 12 ft outside	X	X	FDM Ch. 260, Figure 260.1.1 CFX Ch. 211, Section 211.4
2-lane	6 ft Inside (Min.)/ 12 ft outside		X	CFX Ch. 260, Figure 260.1.1 CFX Ch. 211, Section 211.4
Roadside Slopes				
Front Slope	1:6 for fill to 5' 1:6 to clear zone & 1:4 for fills 5' to 10' 1:6 to clear zone & 1:3 for fills 10' to 20' 1:3 with guardrail for fills over 20' and must include shoulder gutter		X	CFX Section 306.5, pg. 3-14
Back Slope	1:4 or 1:3 with standard width trapezoidal ditch and 1:6 front slope.	X		FDM Ch. 215, Table 215.2.3
Transverse Slope	1:10 (freeway) 1:4 (others)	X		FDM Ch. 215, Table 215.2.3
Grades				
Max Grade (Flat Terrain)	4.00%	X		FDM Ch. 211, Table 211.9.1
Max Change Grade Change w/o Vertical Curve	0.60%	X		FDM Ch. 210, Table 210.10.2
Minimum Distance between VPI's	5 x Design Speed = 250 ft		X	CFX Ch. 211, Section 211.9.1
Sight Distance				
Min. Stopping Sight Distance (for Expressways)	425 ft	X	X	AASHTO Table 3-1, pg. 3-4 & FDM Ch. 211, Table 211.10.2
Decision Sight Distance (B-Stop on Urban, E-Direction change on Urban)	910 ft, 1030 ft		X	AASHTO Table 3-3, pg. 3-8

Table 3-2. SR 414 Expressway Extension Design Criteria

Roadway Classification: Context Classification:	Limited Access Express Lanes C3R-Suburban Residential and C3C-Suburban Commercial	Source		Comments
		FDOT ^a	CFX ^b AASHTO ^c FHWA ^d	
Horizontal Curves				
Max Deflection w/o Horizontal Curve	0° 45' 00"	X		FDM Ch. 211, Section 211.7.1
Max Superelevation (emax)	0.10	X		FDM Ch. 210, Section 210.9
Transitions	80/20 transition split (50/50 min)	X		FDM Ch. 210, Section 210.9.1
Slope Rate	1:200	X		FDM Ch. 210, Table 210.9.3
Length of Curve	1,500 ft, not less than 750 ft @50 mph	X		FDM Ch. 211, Table 211.7.1
Compound Curve Ratio	1.5:1 Open Highways ; 2:1 Turning Roadways	X		FDM Ch. 210, Section 210.8.2.2
Max Curvature	8° 15' (e max 10%)	X		FDM Ch. 210, Table 210.9.1 and Table 210.10.1
Max Curvature for NC (0.02)	R= 8,337 ft	X		FDM Ch. 210, Table 210.9.1 and Table 210.10.1
Lane Drop Taper	L = WS @ >= 45 mph	X		FDM Ch. 210, Section 210.2.5
Vertical Curves				
K Crest	185 (Int.), 136 (Exp.)	X	X	FDM Ch. 211, Table 211.9.2 CFX requires Interstate criteria unless approved by CFX Chief of Infrastructure
	84		X	AASHTO Table 3-34, 3-36, 6-3 (FDM Ch. 122, Table 122.5.8)
Min Length Crest Curve	1,000 ft 1,800 (within Interchanges)	X		FDM Ch. 211, Table 211.9.3
	Reduction in vertical curve length can be approved by CFX Chief of Infrastructure.		X	CFX Ch. 211 Footnote Table 211.9.3
K Sag	115 (Int.), 96 (Exp.)	X	X	FDM Ch. 211, Table 211.9.2 CFX requires Interstate criteria unless approved by CFX Chief of Infrastructure
	96		X	AASHTO Table 6-3, pg. 6-4 (FDM Ch. 122, Table 122.5.8)
Min Length Sag Curve	800 ft	X		FDM Ch. 211, Table 211.9.3
	Reduction in vertical curve length can be approved by CFX Chief of Infrastructure.		X	CFX Ch. 211 Footnote Table 211.9.3
Clear Zone				
Travel Lanes	24 ft	X		FDM Ch. 215, Table 215.2.1
Auxiliary Lanes	14 ft	X		FDM Ch. 215, Table 215.2.1
Vertical Clearance				
Roadway over Roadway Travel Lanes and Bike Lanes and/or Shoulders	16'-6"	X		FDM Ch. 260, Table 260.6.1
Roadway over Roadway Median Under Bridge	14'-0" Concrete Barrier = 0 ft. setback Guardrail = 5 ft. setback from face of barrier	X		FDM Ch. 260, Figure 260.6.5
Overhead Sign Structure	17'-6" (new signs) 17'-0" (existing)	X		FDM Ch. 210, Section 210.10.3
Overhead DMS	19'-6" (new signs) 19'-0" (existing)	X		FDM Ch. 210, Section 210.10.3
New Signal Span Wire/Mast Arm	17'-6" (new signs) 17'-0" (existing)	X		FDM Ch. 210, Section 210.10.3
Lateral Offsets				
Conventional Lighting	20 ft from Travel Lane	X		FDM Ch. 215, Table 215.2.2
ITS Pole and Above Ground Fixed Objects	Outside Clear Zone	X		FDM Ch. 215, Table 215.2.2
Traffic Control Overhead Sign Supports	Outside Clear Zone	X		FDM Ch. 215, Table 215.2.2
Aboveground Utilities - Existing	Not required to be relocated unless the edge of traveled way is being moved closer; or they have been hit 3 times in 5 years	X		FDM Ch. 215, Table 215.2.2
Aboveground Utilities - New or Relocated	Outside Clear Zone	X		FDM Ch. 215, Table 215.2.2
Canal Hazards	Not less than 60 ft from edge of travel	X		FDM Ch. 215, Section 215.3.2
Bridge Piers and Abutments	Outside Clear Zone	X		FDM Ch. 215, Table 215.2.2

^a FDOT Design Manual (2021)

^b Central Florida Expressway Authority Design Guidelines (2021)

^c AASHTO Greenbook (2011)

Table 3-3. Interchange and Slip Ramp Design Criteria

Roadway Classification	Interchange Ramps and Slip Ramps	Source		Comments
		FDOT ^a	CFX ^b AASHTO ^c	
Design Traffic				
Design Speed	50 mph - Directional and Slip Ramps 35 mph - Outer Cloverleaf 30 mph - Loop	X		FDM Ch. 201, Table 201.5.2
Design Vehicle	WB-62FL/ WB-67	X		FDM Ch. 201, Section 201.6.2
Lane & Border Widths				
1-Lane Ramp	15 ft	X		FDM Ch. 211, Section 211.2.1
2-Lane Ramp	12 ft	X		FDM Ch. 211, Section 211.2.1
Cross Slope	-0.02	X		FDM Ch. 211, Figure 211.2.1
Max Breakover at Terminals	5% for D _s ≥ 35mph; 6% for D _s < 35mph	X		FDM Ch. 211, Table 211.2.2
Border Width	Min. 10 ft from back of roadside barrier for maintenance	X		FDM Ch. 211, Section 211.6.1
Ramp Shoulder Widths				
Without Shoulder Gutter				
1-lane Outside Shldr	6 ft Total/ 4 ft Paved	X		FDM Ch. 211, Table 211.4.1
1-lane Median/Left Shldr	6 ft Total/ 2 ft Paved	X		FDM Ch. 211, Table 211.4.1
2-lane Outside Shldr	12 ft Total/ 10 ft Paved (Interstate)	X		FDM Ch. 211, Table 211.4.1
2-lane Median/Left Shldr	8 ft Total/ 4 ft Paved (Interstate)	X		FDM Ch. 211, Table 211.4.1
Shoulder Cross Slopes				
Outside	-0.06	X		FDM Ch. 211, Section 211.4.2
Median/Left	-0.05	X		FDM Ch. 211, Section 211.4.2
Bridge Shoulder Widths				
Outside	1 Lane Ramp 6 ft 2 Lane Ramp 10 ft	X		FDM Ch. 260, Figure 260.1.1
Median/Left	6 ft	X		FDM Ch. 260, Figure 260.1.1
Roadside Slopes				
Front Slope	1:6 for fill to 5' 1:6 to clear zone & 1:4 for fills 5' to 10' 1:6 to clear zone & 1:3 for fills 10' to 20' 1:3 with guardrail for fills over 20' and must include shoulder gutter		X	CFX Section 306.5, pg. 3-14
Back Slope	1:4 or 1:3 with standard width trapezoidal ditch and 1:6 front slope.	X		FDM Ch. 215, Table 215.2.3
Transverse Slope	1:10 (freeway) 1:4 (others)	X		FDM Ch. 215, Table 215.2.3
Grades				
Max. Grade (Flat Terrain)	5% @ 50 mph 7% @ 30 mph	X		FDM Ch. 211, Table 211.9.1
Max Grade Change Without Vertical Curve	0.6% @ 50 mph 1.0% @ 30 mph	X		FDM Ch. 210, Table 210.10.2
Req'd Base Clearance	3 ft	X		FDM Ch. 210, Section 210.10.3
Sight Distance				
Min. Stopping Sight Distance	425 ft @ 50 mph 200 ft @ 30 mph	X	X	FDM Ch. 211, Table 211.10.2
Decision Sight Distance (B-Stop on Urban, E-Direction change on Urban)	910 ft, 1030 ft @ 50 mph 490 ft, 620 ft @ 30 mph		X	AASHTO Table 3-3, pg. 3-7
Entrance/Exit Ramps				
Ramp Terminals	Entrance - Parallel w/ 300 ft Taper Exit - Taper at 4 deg break		X	CFX Section 211.13
Spacing between terminals	500 ft between EXIT and ENT 1,000 ft between EXIT-EXIT or ENT-ENT		X	AASHTO Figure 10-68
L _{acceleration} (45 mph to 50 mph)	-		X	AASHTO Table 10-3
L _{deceleration} (50 mph to 45 mph)	175 ft		X	AASHTO Table 10-5

Table 3-3. Interchange and Slip Ramp Design Criteria

Roadway Classification	Interchange Ramps and Slip Ramps	Source		Comments
		FDOT ^a	CFX ^b AASHTO ^c	
Horizontal Curves				
Max Deflection w/o Horizontal Curve (no Curb and Gutter)	2° 00' 00" @ 30 mph 0° 45' 00" @ 50 mph	X		FDM Ch. 211.7.1
Max Superelevation (emax)	0.10	X		FDM Ch. 210, Section 210.9
Transitions	80/20 transition split (50/50 min)	X		FDM Ch. 210, Section 210.9.1
Slope Rate	1:200 @ 50 mph 1:175 @ 30 mph	X		FDM Ch. 210, Table 210.9.3
Length of Horizontal Curve	750 ft @ 50 mph 675 FT @ 45 mph min. 400 ft	X		FDM Ch. 211, Table 211.7.1
Compound Curve Ratio	1.5:1 Open Highways ; 2:1 Turning Roadways	X		FDM Ch. 210, Section 210.8.2.2
Max Curvature	8° 15' @ 50 mph 24° 45' @ 30 mph	X		FDM Ch. 210, Table 210.9.1 and Table 210.10.1
Max Curvature for NC (0.02)	R= 8,337 ft @ 50 mph R= 3,349 ft @ 30 mph	X		FDM Ch. 210, Table 210.9.1 and Table 210.10.1
Vertical Curves				
K Crest	136 @ 50 mph 31 @ 30 mph	X		FDM Ch. 211, Table 211.9.2
Min Length Crest Curve	300 ft @ 50 mph 90 ft @ 30 mph	X		FDM Ch. 211, Table 211.9.3
K Sag	96 @ 50 mph 37 @ 30 mph	X		FDM Ch. 211, Table 211.9.2
Min Length Sag Curve	200 ft @ 50 mph 90 ft @ 30 mph	X		FDM Ch. 211, Table 211.9.3
Clear Zone				
Multilanes	24ft @ 50mph 12ft @ 30 mph	X		FDM Ch. 215, Table 215.2.1
Single lane	14 ft @ 50 mph 10 ft @ 30 mph	X		FDM Ch. 215, Table 215.2.1
Vertical Clearance				
Roadway over Roadway	16'-6"	X		FDM Ch. 260, Table 260.6.1
Overhead Sign Structure	17'-6" (new signs) 17'-0" (existing)	X		FDM Ch. 210, Section 210.10.3
Overhead DMS	19'-6" (new signs) 19'-0" (existing)	X		FDM Ch. 210, Section 210.10.3
New Signal Span Wire/Mast Arm	17'-6" (new signs) 17'-0" (existing)	X		FDM Ch. 210, Section 210.10.3
Drainage	Min. 2 ft between the design flood stage and the lower members of the bridge	X		FDM Ch. 260, Section 260.8.1
Lateral Offsets				
Conventional Lighting	20 ft from Travel Lane, or Clear Zone width whichever is less	X		FDM Ch. 215, Table 215.2.2
ITS Pole and Above Ground Fixed Objects	Outside Clear Zone	X		FDM Ch. 215, Table 215.2.2
Traffic Control Overhead Sign Supports	Outside Clear Zone	X		FDM Ch. 215, Table 215.2.2
Aboveground Utilities - Existing	Not required to be relocated unless the edge of traveled way is being moved closer; or they have been hit 3 times in 5 years	X		FDM Ch. 215, Table 215.2.2
Aboveground Utilities - New or Relocated	Outside Clear Zone	X		FDM Ch. 215, Table 215.2.2
Canal Hazards	Not less than 60 ft from edge of travel	X		FDM Ch. 215, Section 215.3.2
Bridge Piers and Abutments	Outside Clear Zone	X		FDM Ch. 215, Table 215.2.2

^a FDOT Design Manual (2021)

^b Central Florida Expressway Authority Design Guidelines (2021)

^c AASHTO Greenbook (2011)

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