Interoffice Memorandum

May 25, 2017

TO: Mayor Teresa Jacobs
-AND-
Board of County Commissioners

FROM: Jon V. Weiss, P.E., Director
Community, Environmental and Development Services Department

CONTACT: Renzo Nastasi, AICP, Manager, Transportation Planning Division
407 836-8070

SUBJECT: June 6, 2017 – Public Hearing
Sand Lake Road Roadway Conceptual Analysis (RCA) Study

The Transportation Planning Division of the Orange County Community, Environmental and Development Services Department has completed the Sand Lake Road RCA Study. The total length of the study corridor is 1.3 miles, extending from Apopka Vineland Road to Turkey Lake Road.

The portion of the corridor between Apopka Vineland Road and Della Drive is developed primarily with residential land uses with some commercial uses. The corridor west of Della Drive is primarily developed with multiple shopping centers, office/retail uses and a number of high-end restaurants. Nicknamed "Restaurant Row", it serves as a principal commercial destination for many locals, visitors and conventioneers from the International Drive and Convention Center District.

The purpose of the study was to identify cost-feasible operational enhancements to the corridor, based on a context sensitive approach, in order to balance the safety and mobility needs of all users in the corridor.

The operational enhancements recommended under the Preferred Alternative are consistent with Comprehensive Plan Objectives T1.1, T1.3, T2.1 and T3.1 and relevant implementing policies. These objectives speak to the implementation of the adopted 2030 Long Range Transportation Plan (LRTP) and a multimodal transportation system that provides mobility infrastructure and services for all users. This segment of Sand Lake Road is identified on the County's 2030 LRTP as a Planned County Roadway.

The study was reviewed with the Local Planning Agency (LPA) at its May 18, 2017 public hearing, and the LPA made a recommendation of approval.

The Transportation Planning Division would like to present the results of the study to the Board of County Commissioners at its June 6, 2017 public hearing to request approval of the study recommendations and find it consistent with the Comprehensive Plan.

A copy of the LPA recommendation letter and the Final Draft Sand Lake Road RCA Report is attached for your review and consideration. The backup documentation for this item has been delivered under separate cover.

ACTION REQUESTED: Approval of findings and recommendations of the Sand Lake Road Roadway Conceptual Analysis Study, approval to proceed with final design, right of way acquisition and construction, and make a finding of consistency with the Comprehensive Plan. District 1

JVW/RN/aw

SAND LAKE ROAD STUDY

ORANGE COUNTY GOVERNMENT FLORIDA

June 2017

Sand Lake Road Roadway Conceptual Analysis Report Final Draft

Prepared by: HDR

Prepared for: Orange County, FL

HDR

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Table of Contents

List of Tables

List of Figures

List of Appendices

Abbreviations

AADT	Average Annual Daily Traffic
CFR	Code of Federal Regulation
CRA	Community Redevelopment Agency
EDC	Economic Development Council
EPA	United States Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
LOS	Level of Service
MARAD	United States Maritime Administration
MHW	Mean High Water
mph	miles per hour
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
OGT	Office of Greenways and Trails
SIS	Strategic Intermodal System
TPO	Transportation Planning Organization
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
vpd	vehicles per day

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Executive Summary

ES.1 Introduction

Orange County conducted a Roadway Conceptual Analysis (RCA) for the Sand Lake Road Corridor between Turkey Lake Road and Apopka Vineland Road. This analysis also includes operational considerations for Wallace Road.

The objective of this RCA was to identify a range of prospective roadway improvements needed to address current and future transportation needs along the corridor. The options presented in this report will undergo extensive analysis and documentation in an attempt to produce the foundation for design recommendations. This RCA report summarizes essential components of the study including public involvement, data collection, traffic analysis, roadway design, drainage and environmental impacts, and corridor analysis.

ES.2 Purpose and Need

The purpose of the Sand Lake Road Study is to identify cost-feasible operational enhancements to the corridor, based on a context-sensitive analysis, in order to balance the safety and mobility needs of all mode users in the corridor. The existing conditions along the corridor necessitate improvements based on several factors, including travel time savings, completeness of the street, pedestrian/bicycle safety, and drainage accommodations. The current and projected traffic demand on the facility suggests the need to increase vehicular capacity. Additionally, the study corridor is limited in its accommodation for pedestrians and bicyclists. Proposed improvements identified this study are intended to improve travel conditions and enhance community elements of Sand Lake Road. This Study will also make recommendations for conceptual improvements to Wallace Road.

ES.3 Existing Conditions

The Sand Lake Road corridor consists of a straight 1.3 mile roadway, divided by four lanes with frequent right turn lanes. Additional elements include moderate vertical curvature, a mix of curbed and flush edge, medians, swales and sidewalks. Traffic volumes establish clear segmentations of the corridor, with the heaviest traffic volumes occurring at far eastern end of the corridor and tapers off as traffic passes the Dr. Phillips Boulevard intersection, where approximately one-third of the traffic turns right northward onto Dr. Phillips Boulevard.

In terms of Complete Streets accommodation, the corridor currently has 5-foot sidewalks located towards the back of the right-of-way. There are no dedicated bicycle facilities, such as on-street bike lanes, and the nearest transit service stop is on Turkey Lake Road.

With respect to drainage, the existing stormwater conveyance systems associated with Sand Lake Road vary from curb inlets and storm sewer pipes to swales and side-drains that ultimately discharge to Little Sand Lake as well as to Lake Serene.

ES.4 Traffic Analysis

Detailed project traffic analyses are provided in separate documents, the Design Traffic Technical Memorandum and the Design Traffic Engineering Report. These documents provide the existing traffic conditions of the area as well as analysis of the improvement alternatives.

Traffic volumes within the segment from Dr. Phillips Boulevard to Turkey Lake Road exceed the daily maximum service volumes for level-of-service 'D'. The heaviest congestion occurs with traffic heading westbound at Dr. Phillips Boulevard where a third (1/3rd) of users attempting right turns to go north at this intersection. Additionally, the study evaluates crash data collected from 2012-2015 (four-year period) which found a total of 859 crashes within the corridor (averaging 215 crashes per year). The analysis revealed the highest crash location within the study area is the segment between Dr. Phillips Boulevard and the entrance at the Fountains with 203 crashes (23%). A large percentage of the crashes occurred at the Turkey Lake Road intersection; however, traffic and safety improvements at Turkey Lake Road will be evaluated and included as part of the roadway improvements associated with the Beyond the Ultimate I-4/Sand Lake Road interchange improvements.

ES.5 Alternatives

An evaluation matrix was developed to compare the pros and cons of the three alternatives. This matrix, shown in Table ES1, considers the operations, impacts, and costs of all the alternatives.

As demonstrated in Table ES1, three alternatives were formulated: Alternative 1 - No Build, Alternative 2 - Operational Improvements, and Alternative 3 - Full Reconstruction. The No Build alternative retains the current infrastructure and predictably demonstrates increased travel times associated with heavier congestion. The Operational Improvements alternative does include some infrastructure modification and costs but reduces travel times as well as provides moderate opportunities for Complete Streets and roadway character treatments. The Full Reconstruction alternative involves full corridor length reconstruction to a 6-lane divided facility, thus allowing for aesthetic roadway features and operational gains in reduced travel times, but it is significantly more costly and has greater impacts for stormwater/drainage.

Table ES1 | Alternative Evaluation Matrix

Evaluation Criteria	1 – No Build	2 – Operational Improvements	3 – Full Reconstruction
Lane Changes from Turkey Lake Rd. to	None	Dr. Phillips Blvd.	Apopka Vineland Rd.
PM Pk WB Corridor Travel Time – 2020 (min)	5.1	4.1	4.2
PM Pk WB Corridor Travel Time – 2040 (min)	9.9	6.6	6.1
Complete Streets Accommodation	Low	Medium	High
Roadway Design & Landscape Opportunities	Low	Medium	High
Stormwater Permitting Difficulty/Approach	None	Low Inline Treatment	High Pond Improvements
Additional Right-of-Way	No	No	Yes
Planning Cost (excludes ROW, Wetland Mitigation, Utility Relocation, and Lighting)	N/A	$8mil-$10mil	$24mil-$30mil

ES.6 Preferred Alternative

The Operational Improvements Alternative (Alternative 2) is being advanced as the Preferred Alternative for the Sand Lake Road Corridor. The decision is based on traffic operations analysis, roadway construction costs, drainage needs and costs, area character/Complete Streets accommodation and community feedback. The Preferred Alternative reflects a cost-effective strategy that alleviates much of the current and future facility capacity issues as well as improves the overall safety, mobility, and comfort of all users.

The most congested segment of the roadway, Dr. Phillips Boulevard to the Rialto signal, is addressed within the Preferred Alternative through lane enhancements, median enhancements and roadside improvements including a new shared use path.

To address the access management concern at the uncontrolled median opening at the entrances of The Fountains and Plaza Venezia, the Preferred Alternative offers either a directional median opening or a new signalized intersection which would require a future traffic signal warrant study. Each option is intended to alleviate conflicts which currently exist at this median opening, allowing users safer turning opportunities. Overall these combined elements ameliorate the existing traffic congestion as well as improve the safety of vehicle and pedestrian/bicycle movement.

Lastly, a 10-foot wide shared use path is being considered for the south side of the project corridor to provide a dedicated non-automotive facility improving the walking/bicycling experience on the corridor.

ES.7 Public Involvement

Critical to the success of this project is the feedback received from the local community and many of its leaders involved in the Study Advisory Group, which is comprised of area leaders, and property or business owners adjacent to the study corridor. There have been three Study Advisory Group meetings and two Community Meetings. The Study findings and recommendations are planned to be presented to the Orange County Local Planning Agency (LPA) and Orange County Board of County Commissioners for a formal public hearing process between April and June 2017.

Type	No	Date(s)	Purpose
Study Advisory Group	*4*	*7/27/2016, 9/26/2016,1/25/2017*	*Advisory Meeting*
Community Meeting	*2*	*10/26/2016,2/23/2017*	*Alternatives Discussion*
Orange County LPA	*2*	*4/20/2017; 5/18/2017*	*Work Session/Hearing**
Orange County BCC	*1*	*6/6/2017*	*Hearing**

1.0 Introduction

This section provides an overview of the study area as well as the purpose and need of the project.

1.1 Study Area

The Sand Lake Road corridor is the principal connection for many of the residential communities in the greater Dr. Phillips Community in southwest Orange County. It is the only east-west arterial connection to I-4 for a nearly 9-mile section of I-4. There are limited local east-west alternatives given the presence of two large lakes adjacent to the corridor as shown in the Study Area Map, Figure 1. The study corridor of Sand Lake Road is shown in Figure 2. The Sand Lake Road corridor on the western end is primarily developed with residential land uses; however, the eastern end serves as a principal commercial destination for many residents and visitors in the region with its multiple shopping centers, a number of high-end restaurant options, and a variety of office uses. The eastern part of the study corridor has the nickname "Restaurant Row" due to the many upscale destination restaurants in the area that serve locals, visitors from throughout the region, and conventioneers from the International Drive and Convention Center District. The existing roadway is predominantly four lanes, with minimal width sidewalks, no dedicated bicycle facilities and no transit service along the study segment of Sand Lake Road. The existing vehicle travel demand exceeds the capacity of a four lane roadway leading to significant congestion and long delays during the peak periods. Collectively, these transportation deficiencies have not stopped robust growth of land development and escalation of land values but rather threaten to gradually reduce the quality of life and economic viability of the area if left unaddressed.

1.2 Purpose & Need

The Sand Lake Road Study assesses current and future travel demand in the area and identifies context sensitive and cost feasible improvements to Sand Lake Road to advance the safety, mobility, and comfort of the traveling public. This report details how the improvement alternatives were developed and defined and explains how the recommended or preferred alternative was refined. The Preferred Alternative optimizes the travel needs of all roadway users including automobiles, pedestrians, bicyclists, and transit users.

Prior to 1947, Sand Lake Road became the improved roadway connection between the Turkey Lake Road corridor and the Apopka Vineland Road corridor. Uniquely positioned between Little Sand Lake and Spring Lake, it is the only roadway that directly connects I-4 to the Dr. Phillips area. Land development in this area has increased travel demand and dictates the need for roadway improvements to accommodate this demand. Currently, the roadway is at or nearing capacity in terms of Level-Of-Service (LOS) for vehicles, has limited accommodation for pedestrians and no accommodation for bicyclists or transit service. The corridor also provides a route for freight to reach the many retail and restaurant establishments in the area.

Project Purpose - Identify Context Sensitive & Cost Feasible Improvements

- Document Project Need
- Balance needs of all users
  - Safety
  - Mobility
  - Comfort

- Automobiles
- Pedestrians
- Cyclists
- Transit
- Freight

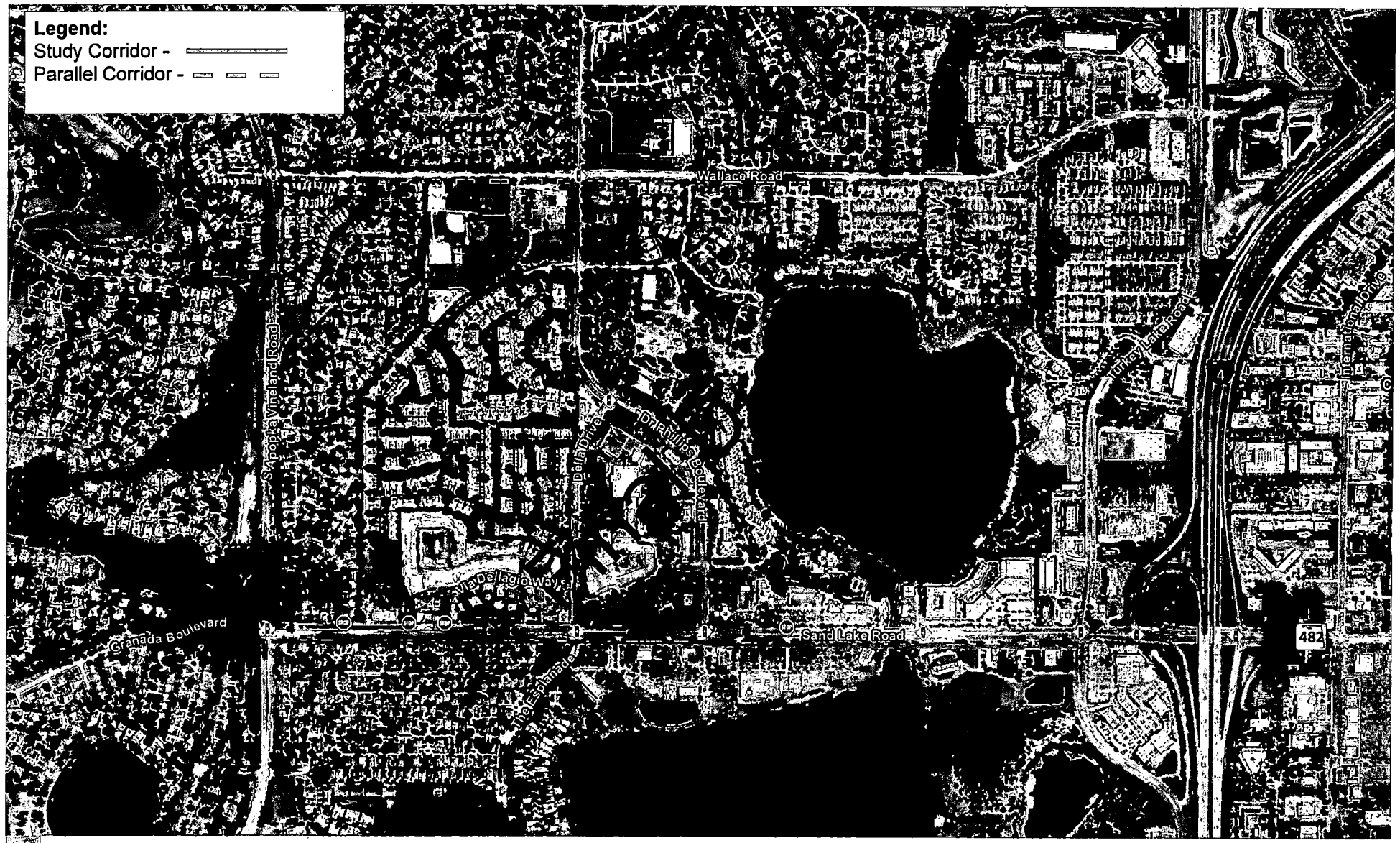


Figure 1 / Sand Lake Road RCA Study Area

Figure 2 / Sand Lake Road RCA
Study Corridor

2.0 Existing Conditions

The existing traffic and transportation information for the Sand Lake Road corridor are presented in this section.

2.1 Roadway Characteristics

The roadway characteristics define the physical and geometric qualities that allow for travel along the Sand Lake Road corridor.

2.1.1 Roadway Geometry

The Sand Lake Road corridor between Apopka Vineland Road and Turkey Lake Road is a straight roadway following the existing section break depicted in the 1849 General Land Office (GLO) map. There is moderate vertical curvature along the roadway which has limited effects on travel, but it does define the approach to drainage and future drainage improvement opportunities.

The roadway typical cross-section (street typical) of the approximately 120-feet of right-of-way for Sand Lake Road includes multiple travel lanes, dedicated left- and right-turn lanes, medians, swales and sidewalks. The divided median is approximately 20 feet wide, depressed and contains several distinctive oak trees. The majority of the roadway is configured with two twelve-feet wide travel lanes and right turn lanes at numerous cross streets and driveways. The posted speed limit throughout the corridor is 45 mph.

Drainage associated with the roadway encompasses a mixture of urban (curb and gutter, curb inlets, and storm sewer pipes), semi-urban (swales, ditch bottom inlets and storm sewer pipes), and semi-rural (swales and side-drains) stormwater conveyance systems. Refer to **Appendix I** which contains a Drainage Exhibit depicting the existing stormwater infrastructure systems within the study area.

At either end of the corridor, previously completed intermediate improvements have extended right turn lanes on either side of the roadway. On the western end, a continuous right turn lane in the westbound direction extends from Via Dellagio Way to Apopka Vineland Road. Improvements at the western end also include changes to the median for curbing, landscaping, hardscaping, and well defined left turn lanes. On the eastern end, from the Rialto development signal to Turkey Lake Road, continuous right-turn lanes in each direction create an effective six-lane section. Curb and gutter are present in this section, and a concrete separator delineates turn lanes. Lighting is present in regular intervals along the corridor.

There are five signalized intersections within the study corridor. Each has left-turn lanes built into the median. The four signals at the intersection of the public streets are Apopka Vineland Road, Della Drive, Dr. Phillips Boulevard, and Turkey Lake Road. Each of these streets are divided four-lane roadways with predominately north-south alignments. The fifth signal is for the Rialto development which is located between the Dr. Phillips Boulevard signal and the Turkey Lake Road signal and serves the north-south driveways on either side of Sand Lake Road. These cross-streets help define three roadway segments along Sand Lake Road with distinct volume and access characteristics. These

segments are Apopka Vineland to Dr. Phillips Boulevard, Dr. Phillips Boulevard to Turkey Lake Road, and Turkey Lake Road to International Drive. The Turkey Lake Road to International Drive segment is part of the much larger Interstate 4 (I-4) Beyond the Ultimate (BtU) project but is analyzed for its influence to the study area.

Generally parallel to and north of Sand Lake Road is Wallace Road which also provides east-west connection from Apopka Vineland Road to Turkey Lake Road. This facility is a two-lane, two-way roadway with frequent right- and left-turn lanes, has a posted speed limit of 45 mph and has signals at Apopka Vineland Road, Dr. Phillips Boulevard, and Turkey Lake Road. Analysis of this parallel facility is limited to operational recommendations based on traffic operations for conceptual improvements only.

2.1.2 Bicycle & Pedestrian Features

The roadway geometry along Sand Lake Road provides no exclusive space for bicyclists. Bicycles are allowed to travel in the general purpose lanes, but field observations show that a majority of bicycle activity occurs along the sidewalks.

Sidewalks are present along both sides for the entire length of the study corridor. In some locations these sidewalks are on the back of curb, and in others, they meander near the outside of the right-of-way. Generally, these sidewalks are at the minimum of five or six feet in width. Much of the roadway is abutted by commercial properties with intensive landscaping and overflow lighting, but no specific pedestrian lighting exists.

2.1.3 Transit Features

The study corridor does not have any direct fixed route transit service. The nearest transit service is available along Turkey Lake Road with far-side bus stops available in either direction. Despite the absence of transit, bus pads remain from service that was previously provided but is no longer available.

2.2 Existing (2015) Segment Traffic Conditions

Traffic along the Sand Lake Road corridor and the Wallace Road corridor is counted annually by Orange County to monitor vehicle demand. The existing levels of service (LOS) based on comparisons of daily volumes with generalized service volumes highlight existing roadway deficiencies. The three segments of Sand Lake Road and two segments of Wallace Road, discussed in Section 2.1.1, are shown in Table 1 along with their corresponding service volumes and 2015 LOS. This level of analysis considers only annual average daily traffic volumes (AADT or Daily). Based on Table 1, the segment of Sand Lake Road east of Dr. Phillips Boulevard operated at LOS 'F' (below acceptable standards) in 2015.

Table 1 | 2015 Daily Segment Level-of-Service Analysis

Segment	Service Volume Threshold (LOS C/D)	Segment Volume	Level of Service
Sand Lake Road			
Apopka Vineland Rd. to Dr. Phillips Blvd.	34,110 / 35,820	30,210	C
Dr. Phillips Blvd. to Turkey Lake Rd.	34,110 / 35,820	48,970	F
Turkey Lake Rd. to International Dr.	58,400 / 59,900	67,250	F
Wallace Road			
Apopka Vineland Rd. to Dr. Phillips Blvd.	15,120 / 15,930	10,510	C
Dr. Phillips Blvd. to Turkey Lake Rd.	15,120 / 15,930	14,745	C

Source: FDOT 2012 Generalized Service Volume Table and Orange County, FL 2015 Annual Count Report

2.3 Crash Analysis

Crash records were acquired using FDOT's Signal Four Analytics database for areas in and around the study corridor. Four years of crash records were compiled from January 1, 2012 through December 31, 2015. Based upon the crash information written by the responding officers, the nearest study intersections were used to aggregate the crash site locations to tabular analysis in Table 2. The graphical analysis providing the exact coded locations is shown in Figure 3 through Figure 6. During the analysis period, 1,102 crashes were reported, and there were no fatal crashes during the 4-year analysis period. The data from Signal Four Analytics can be found in Appendix A.

The majority (78%) of crashes were property damage only and the remaining 22% were injury crashes. Three intersections (the two intersections associated with the ramp terminals of I-4 are treated as one intersection for this analysis) account for 86.8% of all the crashes during the analysis period. The intersection with the highest number of crashes was Turkey Lake Road with 514 crashes (46.6% of the total), followed by 243 crashes (22.1%) at the I-4 intersection and 199 crashes (18.1%) at the Dr. Phillips Boulevard intersection. However, it is notable that over half of the crashes that occurred west of the Turkey Lake Road intersection occurred at the Dr. Phillips Boulevard intersection with the largest concentration of crashes being the westbound approach from the area near the Fountains shopping plaza to the Dr. Phillips Boulevard intersection.

Ranking the crashes by type, the majority of the crashes were rear end crashes (545 or 49.5%) followed by left turn crashes (194 or 17.6%) and sideswipes (161 or 14.6%). The remaining crashes were "other" (61 or 5.4%), angle (57 or 5.2%), right turn (44 or 4.0%), off road (17 or 1.5%), head on (6 or 0.5%), parked (2 or 0.2%) and rollover (1 or 0.1%). The number of the various crash types by intersection is identified in Table 2. Details for the fifteen (15) bicycle and pedestrian crashes are listed in Table 3.

Crash reduction strategies to help alleviate rear-end crashes, which represent the largest crash type, include the following:

- Improve intersection sight distance/clear sight triangle
- Add advance warning signs/flashers
- Install a roundabout
- Add exclusive left-turn lane/extend storage length
- Add exclusive right-turn lane/extend storage length
- Remove traffic signal no longer warranted
- Modify signal change interval
- Install signal coordination
- Relocate driveway entrance away from intersection
- Convert to all-way stop control

This list of strategies covers a wide variety of alternatives, not all of which are applicable on the Sand Lake Road corridor but were considered in the development of the alternatives analyzed.

Figure 3 / Sand Lake Road RCA
Crash Density with Apopka Vineland Road Inset

Figure 4 / Sand Lake Road RCA
Crash Density with Della Drive Inset

Figure 5 / Sand Lake Road RCA
Crash Density with Dr. Phillips Boulevard Inset

Figure 6 / Sand Lake Road RCA
Crash Density with Turkey Lake Road Inset

Table 2 | Crash Summary from 2012 to 2015

Intersection	Vehicle Crashes by Type															
	Total	Fatal	Injury	Injured	Bicycle	Pedestrian	Rear End	Left	Sideswipe	Other	Angle	Right	Off Road	Head On	Parked	Rollover
Apopka-Vineland Rd.	68	0	19	24	1	0	49	3	8	1	1	2	2	0	0	1
Clubhouse Estates Dr.	6	0	2	6	0	0	4	1	0	0	1	0	0	0	0	0
Sandpoint Blvd.	2	0	2	4	0	0	0	2	0	0	0	0	0	0	0	0
Via Dellagio Wy.	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Della Dr.	57	0	19	27	2	1	25	18	2	1	3	0	4	1	0	0
Dr. Phillips Blvd.	199	0	48	70	0	1	110	37	11	13	19	4	1	2	1	0
The Fountains	4	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
Rialto Shopping Plaza	8	0	2	3	1	0	0	2	0	0	1	2	0	2	0	0
West Sub-Total	**345**	**0**	**92**	**134**	**0**	**0**	**190**	**65**	**22**	**15**	**25**	**8**	**7**	**5**	**1**	**1**
Turkey Lake Rd.	514	0	104	152	3	4	258	60	101	28	26	26	7	1	0	0
I-4 Ramps	243	0	45	69	0	2	97	69	38	17	6	10	3	0	1	0
East Sub-Total	**757**	**0**	**149**	**221**	**0**	**0**	**355**	**129**	**139**	**45**	**32**	**36**	**10**	**1**	**1**	**0**
Total:	***1102***	***0***	***241***	***355***	***7***	***8***	***545***	***194***	***161***	***60***	***57***	***44***	***17***	***6***	***2***	***1***

Source: Signal Four Analytics

Table 3 | Pedestrian and Bicycle Crash Details

Crash Type	Date	Time	Intersection	Offset Distance	Offset Direction	Fatalities	Injuries	Alcohol Related	Distraction Related	Drug Related	Estimated Damages	Weather Condition	Light Condition
Bike	2/16/212	12:06PM	Turkey Lake Rd.	100	North	0	1	N	Y	N	$200	Clear	Daylight
Ped	5/23/12	9:40AM	Della Dr.	N/A	N/A	0	0	N	N	N	$18,000	Clear	Dusk
Bike	5/30/12	6:03PM	Apopka-Vineland Rd.	N/A	N/A	0	1	N	N	N	$200	Clear	Daylight
Ped	8/1/12	9:01AM	Turkey Lake Rd.	200	West	0	0	N	N	N	$1,100	Clear	Daylight
Bike	12/4/12	6:24PM	Della Dr.	N/A	N/A	0	1	N	N	N	$650	Clear	Dusk
Ped	1/15/13	6:50AM	I-4 Ramps	10	North	0	1	N	Y	N	$5	Clear	Dawn
Ped	4/10/13	11:20PM	I-4 Ramps	N/A	N/A	0	1	N	N	N	$400	Clear	Dark - Not Lighted
Bike	4/11/13	8:50AM	16 - Rialto Shopping Plaza	20	South	0	0	N	Y	N	$300	Clear	Daylight
Bike	7/10/13	7:23AM	Turkey Lake Rd.	N/A	N/A	0	1	N	Y	N	$1,100	Clear	Daylight
Bike	8/5/13	12:15AM	Della Dr.	50	West	0	1	N	N	N	$800	Clear	Dark - Lighted
Ped	4/23/14	5:45PM	Dr. Phillips Blvd.	25	West	0	2	N	N	N	$5,000	Clear	Daylight
Ped	9/11/14	7:50PM	Turkey Lake Rd.	50	East	0	1	N	N	N	$1,000	Clear	Dark - Lighted
Ped	12/31/14	7:14PM	Turkey Lake Rd.	100	North	0	0	N	N	N	$400	Cloudy	Dark - Lighted
Ped	1/3/15	2:48AM	Turkey Lake Rd.	600	South	0	1	Y	N	N	$600	Fog, Smog, Smoke	Dark - Lighted
Bike	5/14/15	5:46PM	Turkey Lake Rd.	N/A	N/A	0	0	N	N	N	$550	Clear	Daylight

Source: Signal Four Analytics

2.4 Utilities Assessment

The Sunshine 'One-Call' service identified each of the utility providers known to operate within the Sand Lake Road corridor. Contact information for each utility provider is listed in Table 4. Because many of these utilities traverse the corridor within the right-of-way, information regarding relocation or future plans for improvements to utility services should be coordinated during the design phase.

Table 4 | Sunshine One-Call Identified Utility Providers

Utility Provider	Contact Name	Phone Number	Mailing Address
American Traffic Solutions	Santiago Martinez	480-596-4595	***Not Provided***
AT&T	Dino Farruggio	561-997-0240	1120 S Rogers Circle, Boca Raton, FL 33487
Bright House Networks	Marvin Ursy Jr.	407-532-8509	3767 All American Boulevard, Orlando, FL 32810
CenturyLink	Ty Leslie	407-814-5293	***Not Provided***
City of Orlando - Traffic Engineering	Benton Bonney	407-246-2636	1214 S. Westmoreland Drive, Orlando, FL 32805
City of Orlando - Wastewater	David Breitrick	407-246-3525	5100 L B McLeod Road, Orlando, FL 32811
Comcast Cable Communications	Cesar Rivera	352-516-3824	8130 CR44 Leg-A, Leesburg, FL 34788
Duke Energy	Meisha Barnard	352-694-8521	***Not Provided***
FL Public Utilities	Dave Johnson	***Not Provided***	450 S. Charles Richard Beall Blvd., Debary, FL 32713
Hotwire Communications	Walter Sancho Davila	954-417-3606	***Not Provided***
Level 3 Communications	Network Relations	877-366-8344	1025 Eldorado Boulevard, Broomfield, CO 80021
Orange County Public Works	Roger Smith	407-836-7804	4200 S John Young Parkway, Orlando, FL 32839
Orange County Utilities	David Shorette	407-254-9764	201 S. Rosalind Avenue, Orlando, FL 32801
Orange County Utilities - Wastewater	David Shorette	407-254-9764	201 S. Rosalind Avenue, Orlando, FL 32801
Orlando Telephone Company, Inc.	Bill Lean	407-996-1149	4558 SW 35th Street, Orlando, FL 32811
Orlando Utilities Commission – Electric	Ron Hawkins	407-434-2569	6003 E. Pershing Avenue, Orlando, FL 32822
Orlando Utilities Commission – Lighting	Ron Hawkins	407-434-2569	6003 E. Pershing Avenue, Orlando, FL 32822
Orlando Utilities Commission - Transmission	USIC Dispatch	800-778-9140	1220 Winter Garden Vineland Road, Winter Garden, FL 34787
Orlando Utilities Commission – Water	Steven Lockington	407-434-2568	6003 E. Pershing Avenue, Orlando, FL 32822
TECO Peoples Gas	Deborah Frazier	407-420-6609	600 W. Robinson Street, Orlando, FL 32801
FDOT/TransCore	Tushar Patel	386-943-5315	***Not Provided***

Source: Sunshine One-Call

2.5 Transportation Planning Consistency

The Sand Lake Road Study is consistent with the policies outlined in Objective 1.1 of the Transportation Element Goal 1 of the County's *2030 Comprehensive Policy Plan* and consistent with the adopted *2030 Long Range Transportation Plan*, which shows this portion of Sand Lake Road as a Planned County Roadway Improvement. Sand Lake Road provides a critical east-west connection between I-4 to Apopka Vineland Road. Additionally, Sand Lake Road will be affected by several transportation improvements that are either planned or underway as further described below.

2.5.1 State Projects

FDOT has two projects in the area that will provide significant changes to the regional transportation network, specifically the widening of Sand Lake Road from west of I-Drive to east of the Florida Turnpike – which is currently under construction – and the Interstate 4 (I-4) Beyond the Ultimate (BtU) project. The I-4 BtU project includes two major interchange improvements that will likely affect the Sand Lake Road area:

- Interchange at Sand Lake Road and I-4 (Segment 2) – This interchange, once completed, will have a significant effect on the traffic patterns/flows at the Turkey Lake Road intersection.
- Interchange at Daryl Carter Parkway (Segment 1)

Information regarding the I-4 BtU projects can be found at http://www.i4express.com/.

2.5.2 County Projects

There are three (3) County projects that may have an effect on the Sand Lake Road corridor:

- Daryl Carter Parkway Extension over I-4 to Palm Parkway (construction complete)
- Daryl Carter Parkway Extension from Palm Parkway to Apopka Vineland Road – Design has been complete, and this project will extend the four-lane extension of Daryl Carter Parkway to Apopka-Vineland Road. This extension will provide an alternative east-west route between Apopka Vineland Road and I-Drive within approximately 4 miles of Sand Lake Road. Construction of this extension is anticipated to be underway in 2018.
- Intersection improvement at Wallace Road and Dr. Phillips Boulevard. Design plans for this project is complete, and construction is expected to start in October 2017.

2.6 Geotechnical Analysis

The Sand Lake Road pavement surface was investigated in November 2016 through pavement cores to obtain information about the thickness of the surface course and the type and thickness of the underling roadway base. The cores revealed that the pavement consisted of an asphalt-concrete surface course between three inches and four-and-a half inches thick on top of a limestone base that ranged between seven and twelve inches thick. The sandy soils that were anticipated to be present were confirmed in the process. Groundwater levels were not tested; however, there were no indications of damage. The findings are documented in Appendix B, Geotechnical Investigation Report. Each of

these findings indicate that the roadway surface is in acceptable condition, and continued monitoring is recommended as pavements may fail prematurely due to traffic exceeding original design characteristics and the impacts of groundwater, which may be present in the area.

2.7 Environmental Site Assessment

2.7.1 Methodology

A desk-top environmental site assessment for the Sand Lake Road corridor was performed for properties along the corridor between Apopka-Vineland Road and I-4. This 'desktop level' assessment included review of historical aerials (1995 to 2016) and a regulatory document review for properties within ¼-mile of the project corridor (1-mile for superfund sites and landfills). It should be noted that this contamination screening was not intended to and does not fully comply with the requirements listed in Part 2, Chapter 22 of the FDOT Project Development and Environment Manual and ASTM E 1527-13. This assessment was meant as a preliminary evaluation only. It is recommended that a detailed contamination screening, complying with requirements of Level 1 investigation (FDOT Part 2, Chapter 22) and/or Phase 1 Environmental Site Assessment (per ASTM E 1527-13), be completed during the Design phase of the project and before any construction activities begin.

2.7.2 Findings

The preliminary process described in the methodology identified potential contamination sites through reasonably ascertainable regulatory databases and historic aerial reviews. The identified facilities with potential contamination concerns are listed in Table 5. Besides these facilities, a few other petroleum storage tank and dry-cleaning facilities were identified through the regulatory database search (including Resource Conservation and Recovery Act, EPA's Enforcement and Compliance History, FDEP's Storage Tank Regulations and FDEP's Dry Cleaning Program). However, these additional facilities are not listed in Table 5 due to the absence of data indicating any contamination concerns.

This limited evaluation of the study area reveals no superfund and landfill sites within a 1-mile radius of the project corridor. Review of historical aerials (1995 to 2016) indicates no contamination concerns in the project corridor. Although residential areas existed in the western corridor area before 1995, most of the other developments occurred after 2000.

Table 5 | Facilities with Potential Contamination Concerns

Facility Name	Address	Distance from ROW	Contamination Concern	Link to Regulatory Documents
7346 W SAND LK RD - ROADSIDE DISCHARGE	7346 W Sand Lake Rd., Orlando, FL 32819	Adjacent	Oil Spill (Ongoing Remedial Activities)	• http://webapps.dep.state.fl.us/DepNexus/public/electronic-documents/9814692/gis-facility!search
7-ELEVEN FOOD STORE #29682	7329 Sand Lake Rd. Orlando, FL 32819	Adjacent	Oil Spill (Ongoing Remedial Activities)	• http://webapps.dep.state.fl.us/DepNexus/public/electronic-documents/8943462/facility!search
7-ELEVEN FOOD STORE #21315	7957 Turkey Lake Rd. Orlando, FL 32819	Adjacent	Past Oil Spill (Likely Ongoing Remedial Activities and No Further Actions (NFA) document is not found for this facility)	• http://webapps.dep.state.fl.us/DepNexus/public/electronic-documents/8512588/gis-facility!search
CIRCLE K #2709741	6941 Sand Lake Rd. Orlando, FL 32819	Within 100'	Past Oil Spill (Although NFA is issued, facility is still listed in FDEP database of ongoing remedial activities)	• http://webapps.dep.state.fl.us/DepNexus/public/electronic-documents/8513497/facility!search
CIRCLE K #2708960	6942 Sand Lake Rd. Orlando, FL 32819	Within 100'	Past Oil Spill (Although NFA is issued, facility is still listed in FDEP database of ongoing remedial activities)	• http://webapps.dep.state.fl.us/DepNexus/public/electronic-documents/8513378/facility!search
CHEVRON #42157	6908 Sand Lake Rd. Orlando, FL 32819	Adjacent	Past Oil Spill (Remedial activities are approaching to end and NFA might be issued by end of 2016)	• http://webapps.dep.state.fl.us/DepNexus/public/electronic-documents/8512747/facility!search

2.8 Land Use and Current Development Plans

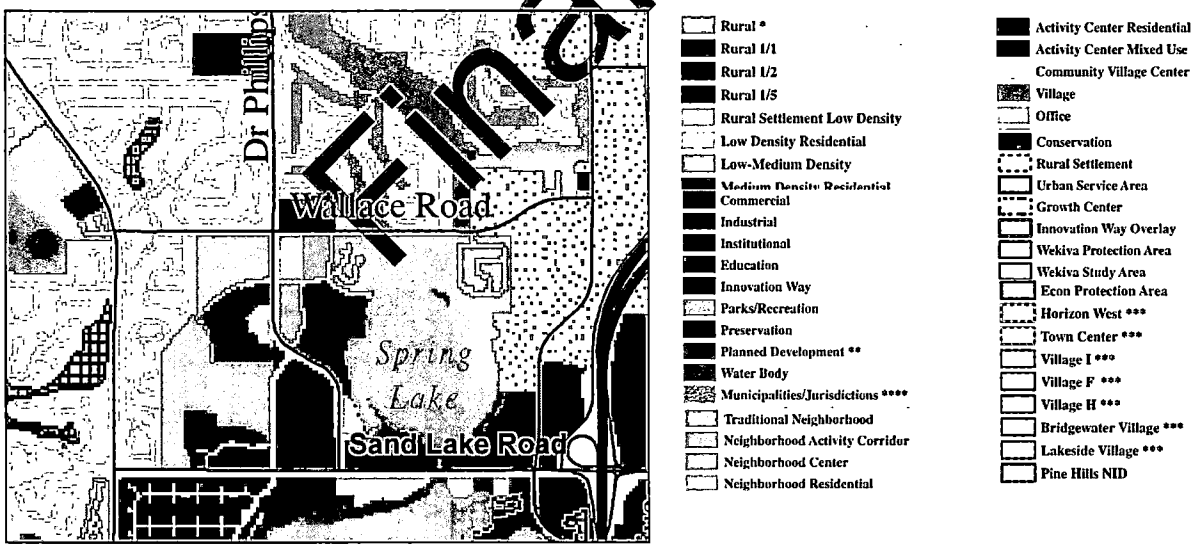
2.8.1 Existing Land Use

Similar to the traffic patterns, the existing land use patterns vary along Sand Lake Road. Within the area from Turkey Lake Road to Della Drive, the land use consists primarily of non-residential lands including commercial, office, religious, retail and restaurant uses and limited areas of undeveloped lands. Heading west beyond Della Drive, there is a mixture of commercial and residential on the north side but primarily residential on the south side of Sand Lake Road. Development along the corridor developed generally consistent with the adopted Future Land Use Map.

2.8.2 Future Land Use

Future land use information was obtained from the Orange County Future Land Use Maps and is illustrated in Figure 7. Generally, the corridor east of Dr. Phillips Boulevard consists of Commercial, Planned Development, and Office land use designations. Between Dr. Phillips Boulevard and Della Drive, the north side of Sand Lake Road is designated Commercial, but the south side is designated Medium Density Residential. The future land use becomes predominantly residential west of Della Drive, with a combination of Low Density, Low-Medium Density and Medium Density Residential to the north and Medium Density Residential to the south. At the western terminus of Sand Lake Road, the area is predominantly Low Density Residential.

Figure 7 | Orange County Future Land Use Map Excerpt



2.8.3 Planned Development

Travel demand and patterns in the corridor will be affected by developments anticipated to occur within the vicinity of the project. While development activity may change during the course of this study, current developments affecting the study corridor include:

- Residences at Dellagio – Platted with 83 lots but not yet fully constructed
- Majorca Planned Development – Development program includes 325 multi-family units
- Goddard School (a preschool to be located in the northeast corner of Apopka-Vineland Road and 1st Street)
- Dr. Phillips Relief High School (proposed to be located between Apopka-Vineland Road and Palm Parkway immediately south of the Dr. Phillips Community Park)
- Granada Planned Development – Property is located in the southwest corner of the Turkey Lake Road and Sand Lake Road intersection, and the development program includes 175 single-family units and 586 multi-family units

2.9 Cultural Features

Various cultural features within the Sand Lake Road corridor help to identify the uniqueness of the Sand Lake Road area.

2.9.1 Schools

Although there are no schools immediately adjacent to Sand Lake Road corridor, travel demand and patterns may be affected by schools serving the neighborhoods within the study corridor. Table 6 shows the public school attendance zones for residents in the Sand Lake Road study limits.

Table 6 | Public School Attendance Zones

School Type	School Name	Location/Service Area
Elementary	Dr. Phillips ES	6909 Dr. Phillips Boulevard; Serves neighborhoods north of Sand Lake Road
	Bay Meadow ES	9150 S Apopka-Vineland Road; Serves neighborhoods south of Sand Lake Road
Middle	Southwest MS	6450 Dr. Phillips Boulevard; Entire study limits in school zone
High	Dr. Phillips HS	6500 Turkey Lake Road; Entire study limits in school zone

2.9.2 Parks and Community Centers

There are no public parks or community centers within the study limits; however, the Dr. Phillips Community Park, located on 80.66 acres approximately 3 miles south of Sand Lake Road, serves as a major recreational destination for residents within the study limits as well as surrounding communities. Additionally, the Dr. P. Phillips YMCA, located in the southwest corner of Wallace Road and Dr. Phillips Boulevard, offers school programs, school camps, and sports and recreation programs and is another major destination point within the study limits.

2.9.3 Hospitals

The Dr. P. Phillips Hospital, formerly Orlando Regional Sand Lake Hospital, is located along Turkey Lake Road approximately 1 mile south of the Turkey Lake Road at Sand Lake Road intersection. It is a full-service medical/surgical facility serving residents of southwest Orange County and Orlando's growing tourist population. In addition, there are several medical offices located within the Sand Lake Road corridor, including women's health, dentistry, pediatrics and general medicine. Additionally, based on field review, there is a sign located near the Dr. Phillips Boulevard at Della Drive intersection announcing the coming of an Orlando Health facility.

2.9.4 Religious Institutions

There are several churches located adjacent to Sand Lake Road, including Salem Lutheran Church, Good Samaritan Chapel, and a future Center for Jewish Life.

2.9.5 Fire/Police Protection

The study limits are located within Fire Battalion 1 and is served by Orange County Fire Station No. 1, which is located within a mile north of Sand Lake Road near the intersection of Wallace Road and Apopka Vineland Road. In terms of police protection, the area is served by the Orange County Sheriff's Office, Sector III, located in Ocoee, Florida.

2.9.6 Other Cultural Institutions

This stretch of Sand Lake Road, dubbed "Restaurant Row," is well known for its more than two dozen upscale and casual restaurants. Located about 10 minutes from the Orange County Convention Center, it is a major traffic generator for employees and patrons of the Convention Center and other destination points along International Drive and Universal Boulevard. Additionally, there are two limestone arches located along Dr. Phillips Boulevard that some locals have indicated add character to the area. The area is also home to the Southwest Branch of the Orange County Public Library.

2.10 Archaeological and Historic Features

A review of historic maps and aerials indicates that two structures were present as of 1947, but there is a lack of evidence to indicate these structures still exist. Archaeologically, the site's natural setting posed favorable conditions for human habitation. However, review of the current aerials indicates that the severely altered landscape within the existing right-of-way and disturbance associated with underground utilities and storm drains indicate a low potential for significant historical findings.

Due to extensive ground disturbance and a lack of evidence pointing to the presence of any extant buildings or other structures predating 1972, the improvements to Sand Lake Road present little to no potential to affect historic resources.

2.11 Hydrologic and Natural Features

The analysis of study area hydrology and natural features occurs within Sections 26, 27, 34, and 35, Township 23 South, Range 28 East, Orange County, Florida. This segment of Sand Lake Road occurs within the boundaries of the South Florida Water Management District (SFWMD) in the Kissimmee River drainage basin.

This environmental review and assessment describes the following: identification of wetlands, surface waters, potential habitats for protected species and the results of the evaluations conducted in August 2016. The findings discussed in this section demonstrate the on-site conditions at the time of the site evaluations and do not preclude the possibility that conditions may change.

Scientific data obtained and utilized during the data collection phase included:

- USGS Topographic Survey Quadrangle
- USFWS National Wetlands Inventory Map
- Aerial photography (2015 and 2016)
- *Endangered and Threatened Plants and Wildlife List, 50 CFR 17*, U.S. Fish and Wildlife Service, Department of the Interior
- *Rules of the Preservation of Native Flora of Florida, Chapter 5B-40*, Florida Department of Agriculture and Consumer Services, Division of Plant Industry
- *Rules Relating to Endangered or Threatened Wildlife Species, Chapter 68A-27*, Florida Fish and Wildlife Conservation Commission
- *Florida's Endangered Species, Threatened Species, and Species of Special Concern*, Florida Fish and Wildlife Conservation Commission, January 2016
- *Florida Land Use and Cover Classification System*, Florida Department of Transportation, 1999
- Florida Natural Areas Inventory, http://www.fnai.org
- *Field Guide to the Rare Plants of Florida*, Florida Natural Areas Inventory, Tallahassee, Florida, 2000
- *Field Guide to the Rare Animals of Florida*, Florida Natural Areas Inventory, Tallahassee, Florida, 2001
- *Guide to the Vascular Plants of Florida*, Richard P. Wunderlin, University Presses of Florida, Second Edition, 2003

A site review and an evaluation was conducted on August 19, 2016 to determine onsite land use/vegetation types and the potential for protected species occurrences in the area. Vegetative communities within the study area were characterized and evaluated with emphasis on natural communities known to support federal or state listed species. Groundtruthing of the vegetative communities was conducted using four wheel drive vehicles and pedestrian transects. Any observations or evidence of protected species were recorded during the site inspection and documented with Threatened and Endangered Species.

2.11.1 Land Use Descriptions and FLUCCS Codes

Land uses within the project study area were classified using the Florida Land Use and Cover Classification System (FLUCCS) developed by the Florida Department of Transportation (FDOT, 1999). Land use cover types were determined using 2015 and 2016 aerial photographs and groundtruthing.

Table 7 lists land use cover types and their classifications.

Table 7| FLUCCS Descriptions within the Sand Lake Road Project Area

Classification	Description
120	Residential, Medium Density (2 to 5 dwelling units per acre)
140	Commercial and Services
510	Ditches and Canals
522	Lakes larger than 100 acres but less than 500 acres
534	Reservoirs less than 10 acres
619	Exotic Wetland Hardwoods
814	Roads and Highways
836	Dry Retention Ponds

Source: FLUCCS Classifications based on Florida Land Use and Cover Classification System, January 1999

The following information provides descriptions of the uplands, wetlands, and surface water land uses that occur within the project study area.

Medium Density Residential, 2 to 5 dwelling units per acre (FLUCCS 120)
This category includes single-family residential units with two to five dwelling units per acre, the majority of which is found on the western side of the Sand Lake Road project site, to the north and south. Vegetation includes maintained lawns consisting of Bahia grass (*Paspalum notatum*), Bermuda grass (*Cynodon dactylon*), and St. Augustine grass (*Stenotaphrum secundatum*) with various ornamental shrub and tree species with associated landscaping.

Commercial and Services (FLUCCS 140)
The dominant land use type within the project area consists of a variety of professional, retail, commercial and service facilities, which are located throughout the study area north and south of Sand Lake Road. Vegetation observed on the various parcels includes typical lawn grasses and ornamental plantings.

Ditches and Canals (FLUCCS 510)
This category is used to describe the man-made drainage features, such as roadside ditches and canals. One large drainage ditch is located between the Little Sand Lake and Spring Lake, connecting them through a culvert under Sand Lake Road. The banks associated with the ditch are well maintained lawn grasses. Species observed within the ditch include torpedo grass (*Panicum repens*), guinea grass (*P. maximum*), alligatorweed (*Alternanthera philoxeroides*), and Peruvian primrose willow (*Ludwigia peruviana*). Brazilian pepper was also observed at the ends of the ditch close to the two lakes.

Lakes larger than 100 acres but less than 500 acres (FLUCCS 522)
Two lakes, Spring Lake and Little Sand Lake, occur north and south of Sand Lake Road, respectively. Emergent vegetation within the fringe of the lakes includes maidencane (*Panicum hemitomon*), white waterlily (*Nymphaea odorata*), bulltongue arrowhead (*Sagittaria lancifolia*), torpedo grass, spatterdock (*Nuphar luteum*), knotted spikerush (*Eleocharis interstincta*), and cattail (*Typha* spp.).

Reservoirs (FLUCCS 534)
Areas classified as wet retention/detention ponds include those areas utilized for the storage and treatment of stormwater and are not vegetated.

Exotic Wetland Hardwoods (FLUCCS 619)
Approximately ¼ -mile west of the Sand Lake Road and Turkey Lake Road intersection, Sand Lake Road crosses a culvert and ditch system connecting Spring Lake and Little Sand Lake. Little Sand Lake begins approximately 100 feet south of the roadway, with a small forested wetland located between the lake and the road. The disturbed hardwood wetland is dominated by Brazilian pepper (*Schinus terebinthifolia*), and also includes pond cypress (*Taxodium ascendens*), elderberry (*Sambucus nigra*), and Carolina willow (*Salix caroliniana*).

A second exotic forested wetland is located along the northwest edge of Little Sand Lake, adjacent to NanoBiotech Pharma, Inc. This system is also highly disturbed and dominated by Brazilian pepper. Other species observed include wax myrtle (*Myrica cerifera*), pond cypress, red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), and Chinese tallow (*Triadica sebifera*). This wetland is located over 400 feet from the project right-of-way.

Roads and Highways (FLUCCS 814)
In addition to Sand Lake Road, roads and highways within the project area include the following (from west to east): Apopka Vineland Road, Della Drive, The Esplanade, Dr. Phillips Boulevard and Turkey Lake Road. Also included in this category are the adjacent sidewalks and maintained areas.

Dry Retention Ponds (FLUCCS 836)
This category includes two dry retention ponds located south of Sand Lake Road at The Esplanade. These areas are heavily maintained and dominated by bahiagrass with some wetland vegetation within including Cuban bulrush (*Oxycaryum cubense*), Carolina fimbry (*Fimbristylis* spp), and tropical flatsedge (*Cyperus surinamensis*). One additional dry retention pond is located adjacent to NanoBiotech Pharma, Inc. and the north shore of Little Sand Lake. The vegetation in this area is not maintained and is composed of cogongrass (*Imperata cylindrica*), common ragweed (*Ambrosia artemisiifolia*), dogfennel (*Eupatorium capillifolium*), vasey grass (*Paspalum urvillei*), beggarticks (*Bidens alba*), and creeping oxeye (*Sphagneticola trilobata*).

2.11.2 Wetlands and Surface Waters

Federal, state, and local regulatory agencies have jurisdictional authority over the wetlands/surface waters within the study area. These agencies include the U.S. Army Corps of Engineers, South Florida Water Management District (SFWMD), and Orange County Environmental Protection Division. As a

result, impacts associated with the proposed Sand Lake Road improvements may require regulatory permits and compensatory mitigation for agencies that claim jurisdiction over these systems.

There are no jurisdictional wetlands within the existing Sand Lake Road right-of-way. However, there are wetlands and surface waters immediately adjacent to the right-of-way which includes the ditch connecting Spring Lake and Little Sand Lake, the emergent wetland vegetation along the edges of Spring Lake and Little Sand Lake in the vicinity of the ditch, and several stormwater ponds (reservoirs). All other wetland and surface water systems outside of the right-of-way will likely not be impacted by the roadway improvements.

2.11.3 Conservation Areas

Tibet-Butler Preserve and the Shingle Creek Conservation Areas are approximately 2 miles west and 3.5 miles east, respectively, from the project area. There are no known conservation areas within the study corridor.

2.11.4 Mitigation Sites

The project is within the service areas of eight mitigation banks which should be eligible to be used if environmental impacts occur. They are Shingle Creek, Reedy Creek, Southport Ranch, Collany, Hatchineha Ranch, Bullfrog Bay, Florida, and Quickdraw mitigation banks. There are no mitigation banks within or adjacent to the project right-of-way.

2.12 Threatened and Endangered Species

The project corridor and surrounding area consist of residential and commercial developments with minimal, if any, occurrences of undisturbed habitat. Past impacts to the remnant vegetative communities and fragmentation have resulted in minimal wildlife utilization and diversity.

Based on the results of the field evaluation and the accessibility of the on-site land use communities, the following summarizes the results of this evaluation and provides a discussion of the compilation of protected species that were observed or may potentially occur within the study area. The presence of protected species and the potential for occurrence within the area were evaluated through the review of state and federal databases, available literature and a field review. Table 8 lists protected wildlife and plant species in Orange County that, due to the historic availability of suitable habitat, have a potential for occurrence within the project area.

As part of this study, the Florida Natural Areas Inventory (FNAI) provided occurrence records of any protected species that may occur within, or in the proximity of, the project study area. The FNAI records revealed the presence of several "elemental occurrences" of protected species near the FNAI defined study area; however, there were no "elemental occurrences" of protected species recorded within the FNAI defined study area. An "elemental occurrence" listed by FNAI generally indicates a viable population of a protected species. According to FNAI records, the wood stork (*Mycteria americana*) is the only listed species likely to occur on or near the site. The FNAI letter detailing the occurrence records is provided in Appendix C.

Table 8 | Protected Species, Habitat Descriptions, and Potential for Occurrence

Species	Protection Status	Habitat	Potential for Occurrence
Birds			
Aramus guarauna Limpkin	SSC	Floodplain swamp, floodplain marsh, rivers, streams, sloughs, lakes	Moderate
Egretta caerulea Little blue heron	SSC	Estuarine, lacustrine, riverine, tidal marsh, tidal swamp	Present
Egretta thula Snowy egret	SSC	Estuarine, lacustrine, riverine, tidal marsh, tidal swamp	Moderate
Egretta tricolor Tricolored heron	SSC	Estuarine, lacustrine, riverine, tidal marsh, tidal swamp	Moderate
Eudocimus albus White ibis	SSC	Estuarine, lacustrine, riverine, tidal marsh, tidal swamp	Present
Grus canadensis pratensis Florida sandhill crane	ST	Basin marsh, depressional marsh, dry prairie, marl prairie, pastures	Moderate
Haliaeetus leucocephalus Bald eagle	P	Estuarine, lacustrine, riverine, tidal marsh, tidal swamp	Low
Mycteria americana Wood stork	FT	Estuarine swamps/marshes, lacustrine, ditches, ruderal	Present
Picoides borealis Red-cockaded woodpecker	FE	Mesic flatwoods, sandhill, mature open pine stands, scrubby flatwoods	Low
Amphibians			
Rana capito Gopher frog	SSC	Dry sandy places; associated with gopher tortoise burrows	Low
Reptiles			
Alligator mississippiensis American alligator	FT(S/A)	Tidal marsh, swamp, lacustrine, palustrine, riverine	High
Drymarchon corais couperi Eastern indigo snake	FT	Wide range utilizing seasonal habitats; frequently in gopher tortoise burrows	Low
Gopherus polyphemus Gopher tortoise	ST/C	Old field, sandhill, scrub, xeric hammock, ruderal, pine flatwoods	Low
Pituophis melanoleucus magitus Florida pine snake	SSC	Sandhill, xeric hammock, pine flatwoods, ruderal	Low
Mammals			
Podomys floridanus Florida mouse	SSC	Sandhill, scrub, scrubby flatwoods, upland hammock	Low
Plants			
Coelorachis tuberculosa Piedmont joint grass	ST	Sandhills, upland lake margins	Low
Encyclia tampensis Butterfly orchid	CE	Mangrove, cypress and hardwood swamps, live oak hammocks	Low
Harrisella porrecta Threadroot orchid	ST	Old orange groves, cypress domes, strand swamps, hardwood swamps	Low
Lobelia cardinalis Cardinal flower	ST	Banks of streams, rivers, ditches, cypress swamps, hammocks	Low

Species	Protection Status	Habitat	Potential for Occurrence
Lycopodiella cernuum Staghorn clubmoss	CE	Wet depressions, wet prairies, ditches, moist areas	Low
Lythrum flagellare Florida loosestrife	SE	Swamps, dome swamps, hydric hammocks, ditch banks, sloughs	Low
Nemastylis floridana Fall-flowering pleat-leaf	SE	Clearings in swamps, marshes, and wet pine flatwoods	Low
Osmunda cinnamomea Cinnamon fern	CE	Swamps and wetlands	Moderate
Osmunda regalis var. spectabilis Royal fern	CE	Swamps and wetlands	Moderate
Sacoila lanceolata var. lanceolata Leafless beaked orchid	ST	Open pastures, roadsides, wet pine flatwoods, sandhills	Low
Salix floridana Florida willow	SE	Hydric hammocks, swamps, bottomland forests and floodplains	Low
Tillandsia balbisiana Inflated wild pine	ST	Hammocks, cypress swamps, pineland scrub	Low
Tillandsia fasciculata Cardinal airplant	SE	Hammocks, cypress swamps, pinelands	Low
Tillandsia utriculata Giant wild pine	SE	Hammocks, cypress swamps, pinelands, scrub	Low

ST = State population listed as Threatened by the FFWCC/FDA; FT = Listed as Threatened at the Federal level by the USFWS and at the State level by the FFWCC/FDA; FT(S/A) = Listed as Threatened by Similarity of Appearance at the Federal level by the USFWS and at the State level by the FFWCC; SE = State population listed as Endangered by the FFWCC/FDA; FE = Listed as Endangered at the Federal level by the USFWS and at the State level by the FFWCC/FDA; SSC = Species of Special Concern listed by the FFWCC; CE = Listed as Commercially Exploited by the FDA; P =-protected under Bald Eagle Act, Migratory Bird Act, and Lacy Act; C = Candidate species for Federal listing

2.12.1 Protected Wildlife Species

As a result of the field review, three protected wildlife species were observed within the project road corridor. The little blue heron, white ibis, and wood stork were observed foraging within the retention pond south of the intersection of Sand Lake Road and Turkey Lake Road. No other evidence of protected species or nest sites was identified, through either record searches or field reviews within the project area. The project is within the U.S. Fish and Wildlife Services' (USFWS) Consultation Areas of the Scrub-Jay, Snail Kite, and Red-Cockaded Woodpecker which could require consultation if there were suitable habitats within the project area that may be impacted by the project.

Suitable habitat or occurrence records for four state and federally listed wildlife species occur within or adjacent to the study corridor. These species are the wood stork, red-cockaded woodpecker, American alligator, and eastern indigo snake.

Wood Stork

The wood stork is listed by the USFWS and Florida Fish and Wildlife Conservation Commission (FFWCC) as a threatened species. According to USFWS data, the project study area is not within a wood stork core foraging area. In addition, the closest wood stork rookery is located approximately 16.8 miles from the project area. Wood storks were observed foraging within a retention pond adjacent to the Sand Lake Road corridor. Foraging habitat exists in the study area in the form of forested

wetlands, retention ponds, and ditches. There are no known nesting sites or active wood stork colonies within the immediate study area.

As a result of the evaluation, it appears that the proposed improvements to Sand Lake Road should not adversely affect this species as there are no nearby rookeries. Suitable foraging habitat will remain within the area subsequent to the improvements.

Red-Cockaded Woodpecker
The red-cockaded woodpecker is listed as endangered by the USFWS and the FFWCC. FNAI lists this species as likely to occur near the project area; however, no suitable habitat for this species occurs within the project corridor. The red- cockaded woodpecker is not expected to be adversely affected by improvements within the corridor.

American Alligator
The American alligator is listed as threatened due to the similarity of appearance to the endangered American crocodile (*Crocodylus acutus*) by the FFWCC and the USFWS. The American alligator was not observed in the study area, although this species is known to frequent stormwater ponds and large water bodies. This species is not expected to be directly impacted by improvements to the corridor due to the abundant un-impacted habitat offered by Spring Lake and Little Sand Lake and the fact that alligators are highly mobile animals that relocate naturally due to limiting conditions such as water levels and adequacy of food supplies.

Eastern Indigo Snake
The eastern indigo snake, designated as threatened by both federal and state agencies, is found in habitats ranging from mangrove swamps and wet prairies to xeric pinelands and scrub. This species is strongly associated with high, dry, well-drained soils. However, during warmer months, indigo snakes also frequent streams and swamps. In drier communities, where habitat use coincides, these snakes occasionally utilize gopher tortoise burrows for shelter. Since this species is known to inhabit virtually all native Florida communities and to range over large areas, there is a low likelihood that this species occur within the area.

FNAI does not indicate any elemental occurrences of the eastern indigo snake near the project area; however, it does list the species as having a 'potential' for occurrence within the project corridor. Due to the potential presence of this species, the project may need to comply with the USFWS "Standard Protection Measures for the Eastern Indigo Snake," dated August 12, 2013, during construction activities.

In addition to the four state and federally listed wildlife species discussed above, 11 state listed wildlife species occur or have a potential to occur within the study area and are listed below.

Florida Sandhill Crane
The Florida Sandhill crane is listed as a species of special concern in Florida. Cranes typically require marsh habitat with standing water and emergent vegetation for nest building and protection of their young. Foraging occurs in open pastureland, ruderal areas, dry prairies, freshwater marshes, and roadsides. There were no Florida Sandhill cranes observed within or near the Sand Lake Road study

area. In addition, no suitable nesting habitat was identified within the study area. This project is not expected to impact any regional populations of the Florida Sandhill Crane.

Gopher Tortoise and Associated Commensal Species

The gopher tortoise is listed as a threatened species by the state. The tortoise is typically found in old fields, sandhill, scrub, xeric hammock, pine flatwoods, and ruderal sites. Several commensal species associated with gopher tortoise burrows are also listed as species of special concern in Florida. These include the gopher frog, Florida mouse, and Florida pine snake. No potentially occupied gopher tortoise burrows were identified within the Sand Lake Road corridor and roadway improvements are not likely to adversely affect any of these species.

Wading Bird Species

The wetlands and surface waters in the study area offer foraging habitat for five listed species of wading birds, including limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. All five species are listed as species of special concern in Florida and have a potential for occurrence within the project corridor. The little blue heron and white ibis were observed foraging in a retention pond adjacent to Sand Lake Road. However, no nesting habitat was identified within the study area. This project is not expected to impact any regional wading bird populations since suitable foraging habitat will remain in the area subsequent to any roadway improvements.

Bald Eagle

The bald eagle is protected under the Endangered Species Act, Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act. A query of the FFWCC eagle nest location database provided four known nests within a 5-mile radius of the project area. The closest eagle nest (ID OR006), is located approximately 2.5 miles from the project site. This project is not expected to disrupt the bald eagles feeding or breeding activities; therefore, roadway improvements are not likely to adversely affect this species. However, the project area should be re-evaluated for the occurrences of bald eagles during the design phase of the project.

2.12.2 Protected Plant Species

A total of 14 plant species listed as protected by the Florida Department of Agriculture and Consumer Services (FDACS) have the potential to occur in the study area, including five endangered species, five threatened species, and four commercially exploited species listed in Table 8. "Commercially exploited" is a classification that is used by the state more as an indicator of potential species decline if harvesting of wild plants continues to be aggressive. All plant species have a low potential for occurrence in the project area due to heavy disturbance within the available habitats. No listed species were found in the study corridor. No federally protected plant species have the potential for occurrence in the project area. This project is not expected to impact any regional endangered, threatened, or commercially exploited plant species populations. The project is within the USFWS's Lake Wales Ridge Plant Consultation Area which could require consultation with if there were suitable habitats within the project area that may be impacted by the project.

2.13 Drainage Criteria

The Sand Lake Road corridor, between Apopka-Vineland Road and Turkey Lake Road, is located within the Big Sand Lake watershed. More specifically, the existing stormwater systems associated with the corridor convey the stormwater runoff to either Little Sand Lake or Lake Serene, both of which are classified as land-locked lakes (i.e., closed drainage basins without positive outfall systems). It is worth noting that the Orange County Stormwater Management Division has retained Geosyntec Consultants to complete the ***Big Sand Lake Watershed Management Plan - Watershed Existing Conditions Assessment*** Technical Memorandum (draft dated December 2015). The purpose of the study is to develop a comprehensive drainage and flood level of services evaluation of the Big Sand Lake watershed area including floodplain delineations.

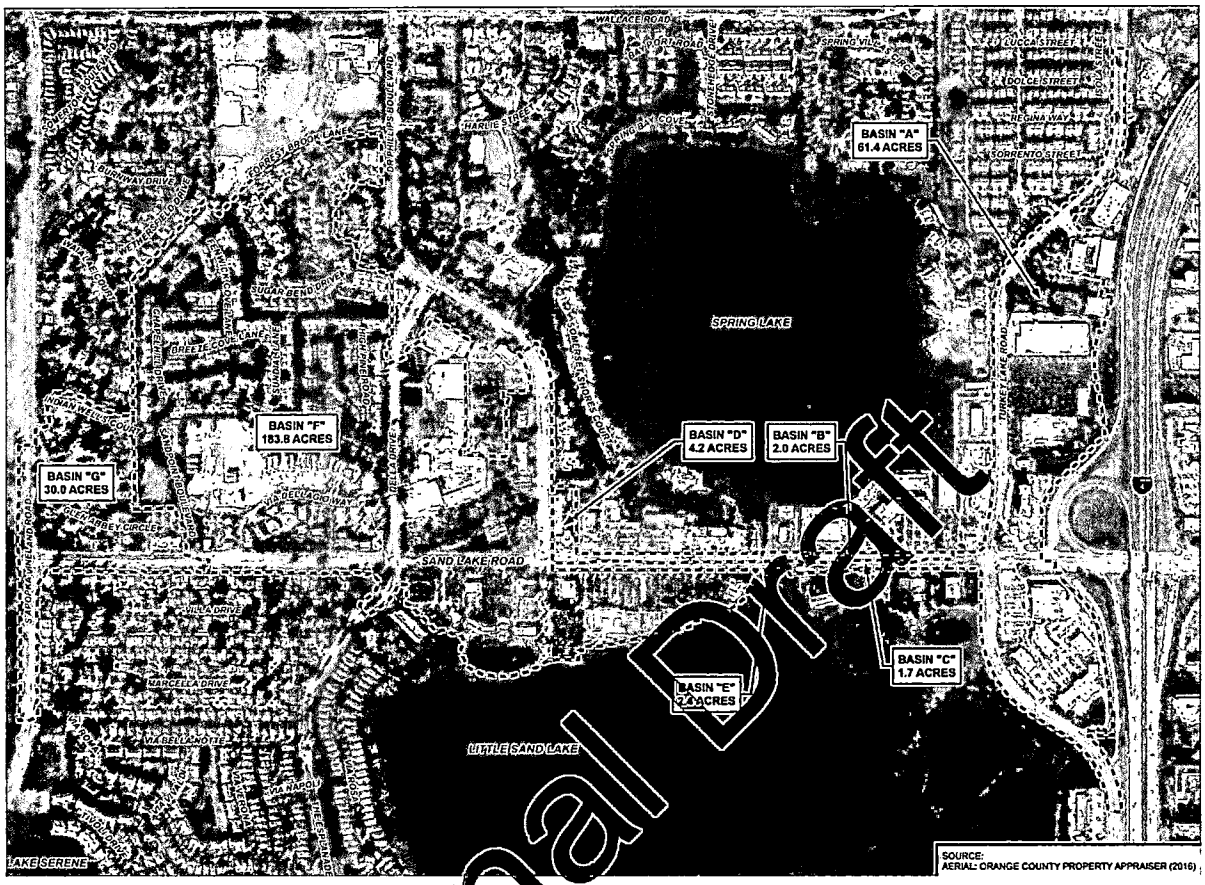
In regards to the existing drainage conditions, the Sand Lake Road corridor encompasses seven (7) drainage basins shown in Figure 8 and in Appendix I. Basin A, associated with the Sand Lake Road and Turkey Lake Road rights-of-way, discharges stormwater runoff to an existing Orange County stormwater pond via existing storm sewer systems. The existing pond eventually discharges to Little Sand Lake via a control structure and outfall pipe. Basins B, C, D, and E discharge directly to the canal that connects Spring Lake and Little Sand Lake via a series of culverts and swales within the Sand Lake Road right-of-way. Basin F is a large basin that encompasses Sand Lake Road, Dr. Phillips Boulevard, and Della Drive, as well as a significant amount of off-site development, and discharges to Little Sand Lake via an existing 54-inch outfall system. Lastly, Basin G is associated with the Sand Lake Road and Apopka Vineland Road rights-of-way and eventually discharges into an existing Orange County stormwater pond via pipes and swales. The existing Orange County stormwater pond eventually outfalls into Lake Serene.

The County Stormwater Management Division is primarily tasked with providing maintenance services and improvement to the County's primary drainage systems while the County's Roads & Drainage Division is primarily tasked with providing maintenance services and improvement to the County's secondary conveyance systems within public rights-of-way. In order to document existing drainage problems within the study area, complaint logs for the following streets were obtained from the Orange County Roads & Drainage Division staff for the time period from January 2000 through October 2016:

- West Sand Lake Road
- Turkey Lake Road
- South Apopka-Vineland Road
- Dr. Phillips Boulevard
- Della Drive
- Clubhouse Estates Drive (within the Clubhouse Estates Subdivision)
- Indian Wells Court (within the Clubhouse Estates Subdivision)
- Glen Abbey Circle (within the Clubhouse Estates Subdivision)

Regarding West Sand Lake Road, which is the only major corridor to be impacted by the study, most of the complaint log entries were unrelated to drainage issues. The few drainage-related complaints were scattered throughout the study area and pertained only to maintenance issues (e.g., missing manhole covers, clogged inlets, etc.).

Figure 8 | Existing Conditions Drainage Basins Diagram



3.0 Existing and Future Traffic Analysis

The existing and future traffic analysis for the Sand Lake Road corridor is documented in this section including traffic data collection for the project, travel demand modeling and growth assumptions, as well as detailed traffic simulation analysis covering three design years for the AM and PM peak hours for five geometric and access controls alternatives.

3.1 Traffic Data Collection

The consultant team acquired existing traffic information from a variety of sources to establish an existing traffic demand at each intersection along the Sand Lake Road corridor. Two primary sources of traffic information anchored this process: turning movement counts conducted by FDOT and Orange County through this and other projects on Sand Lake Road during the 2015-2016 school year and Orange County Roadway Segment Counts for 2015. The turning movement counts were conducted in 15-minute intervals and lasted either four or eight hours depending on location. The count locations, including all the signalized intersections and several stop controlled locations along the corridor, are listed in Table 9 and shown in Figure 9.

All counts include pedestrian and bicycle movement separately. The peak periods identified for those counts were 8 AM to 9 AM and 5 PM to 6 PM. Additionally, videos collected at some intersections and along the corridor were reviewed to identify anomalies in the traffic counts and other FDOT sources were consulted for consistency. The full count information is included in Appendix D.

Table 9 | Turning Movement Counts Location and Source

Intersection	Source	Date of Count
Sand Lake Road		
Apopka Vineland Rd.	FDOT	October 22nd, 2015
Clubhouse Estates Dr.	LTEC	May 5th, 2016
Sandpoint Blvd.	LTEC	May 5th, 2016
Via Dellagio Wy	LTEC	May 5th, 2016
Della Dr./The Esplanade	FDOT	September 29th, 2016
Dr. Philips Blvd.	FDOT	September 23rd, 2016
The Fountains/Plaza Venezia	LTEC	May 5th, 2016
Rialto Shopping Plaza /Sand Lake IV	LTEC	May 5th, 2016
Turkey Lake Rd.	LTEC	May 5th, 2016
I-4 WB to Turkey Lake Rd. SB	LTEC	May 5th, 2016
I-4 Eastbound Ramp	LTEC	March 29th, 2016
I-4 Westbound Ramp	LTEC	March 29th, 2016
Wallace Road		
Apopka Vineland Rd.	FDOT	October 22nd, 2016
Dr. Philips Blvd.	FDOT	September 22nd, 2016
Turkey Lake Rd.	FDOT	January 13th, 2016

Source: FDOT, Orange County, FL, and LTEC

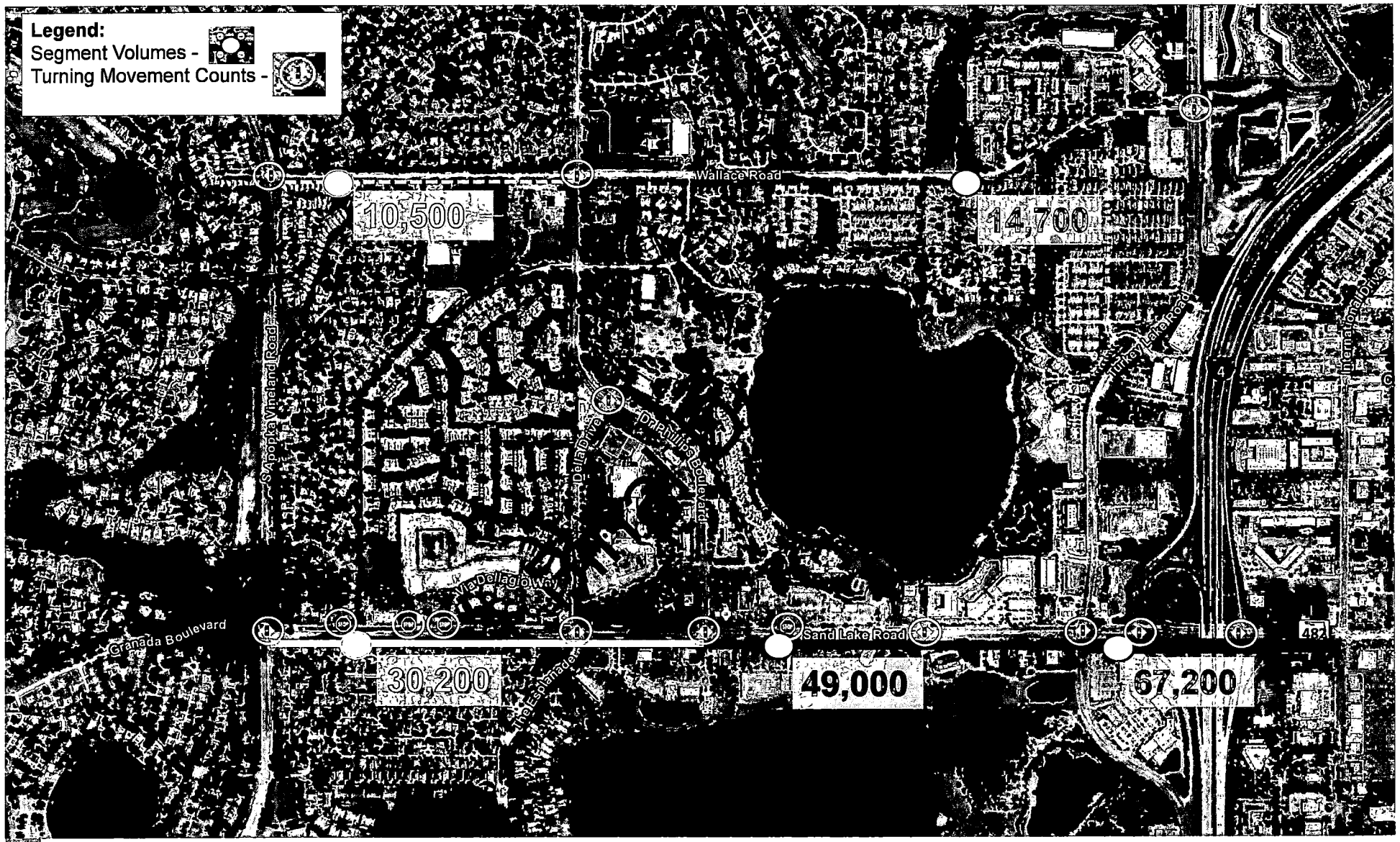


Figure 9 / Sand Lake Road RCA
Traffic Data Collection Locations

3.2 Existing Traffic Analysis

The design traffic process requires a detailed understanding of the current demand for vehicle movement through analysis of the existing demand being served based on the data collected.

3.2.1 Aggregation of the Traffic Data

Turning movement counts were reviewed against one another to understand time of day and date of count variations in the data. This included counts at the five signalized intersections in the corridor, five additional signalized intersections adjacent to the corridor, and four un-signalized intersections of significance along the corridor. This assembled data provided a corridor-wide look at each individual movement. Adjustments to each movement were then carefully considered to account for FDOT documented seasonal factors to compare consistently against AADT values. The corridor-wide set of turning movement values provided a basis of movement demand for peak hour demand and operations.

3.2.2 Traffic Factors

Vehicle traffic factors were determined to understand the relationship of one time period or direction to another in the context of daily traffic and vehicle class. For Sand Lake Road, the relationships observed and understood for these factors was considerably different in each section of the study corridor due to differing land uses and proximity to I-4, the region's most traveled roadway facility. The observed Peak to Daily Ratio (K) Factor, Directional Distribution Factor (D), and Truck Factor (T) were each considered in the analysis of Sand Lake Road. The application of K, D, and T factors was carefully conducted to reflect the variation in these factors from intersection to intersection. This intersection by intersection approach also considered that the unconstrained demand was expected to produce a higher K value for the afternoon peak on the western edge of the corridor and a lower value on the eastern edge consistent with the entertainment and tourist uses found in this area. The FDOT Standard K of 9% for an urban arterial was found to be inconsistent with the land uses on Sand Lake Road and was therefore not used in this analysis. To represent latent demand for peak hour travel as intended by the Standard K, each intersection between Apopka Vineland Road and Turkey Lake Road was held to a K value of 7% or higher in the AM and PM peak hours. If the observed intersection specific values were higher than 7%, higher values were used. The procedures described in FDOT's *Project Traffic Forecasting Handbook (2014)* were referenced throughout the process. Table 10 summarizes the percentages of the existing segment traffic information for each of the three unique sections of Sand Lake Road being studied.

Table 10| Peak Hour Traffic Factors

Segment	Annual Average Daily Volume (AADT)	Average Peak to Daily (K)	Average Directional (D)	Average Truck (T)
	Sand Lake Rd			
Apopka Vineland Rd. to Dr. Phillips Rd.	30,213	7.6%	54.4%	2.4%
Dr. Phillips Rd. to Turkey Lake Rd.	48,966	7.0%	58.0%	5.1%
Turkey Lake Rd. to International Dr.	67,249	6.7%	50.8%	N/A
	Wallace Rd			
Apopka Vineland Rd to Dr. Phillips Rd.	10,506	10.3%	67.7%	7.2%
Dr. Phillips Rd. to Turkey Lake Rd.	14,745	10.3%	66.6%	4.4%

Source: Orange County Traffic Engineering Department 2015 Annual Count Report and Florida Traffic Information 2015

3.2.3 Existing AM and PM Peak Hour Traffic

The existing AM and PM peak hour traffic were the product of the steps described in data collection, data aggregation and traffic factors. These volumes represent the demand for vehicle traffic on each movement at each intersection in 2015. The highest peak hour directional traffic volumes were observed in the westbound direction during the PM peak hour with the volumes generally decreasing as vehicles travel west on the corridor. During the AM peak hour, the peak direction was in the eastbound direction with traffic increasing approaching I-4. A full series of all design volumes can be found in Appendix E.

3.2.4 Existing AM and PM Peak Hour Traffic Operations

The existing AM and PM peak hour traffic volumes were modeled in the context of the existing roadway geometry and signal timing using a micro-simulation software called VISSIM. This software allows for the analysis of traffic based on simulating each vehicle on the roadway. Calibration of the simulation was achieved using the existing traffic volume and characteristics to match existing field-observed conditions including saturation flow rates, queue lengths, corridor travel times, and estimated sink and source locations. The results of this effort were merged with the updated information for FDOT's I-4 Beyond the Ultimate project which will modify the Sand Lake Road at I-4 interchange. The VISSIM support information can be found in Appendix F.

In the AM peak hour, over 10,000 vehicles were simulated using the Sand Lake Road corridor with an average delay of 122 seconds. Much of the delay is eastbound with a travel time of 4.6 minutes compared to 3.8 minutes for the westbound direction. In the PM peak hour, more than 12,000 vehicles were simulated using the Sand Lake Road corridor with average delay of 123 seconds and a westbound travel time of 5.3 minutes and an eastbound travel time of only 3.9 minutes. At the intersection level, the queuing eastbound in the AM peak hour and westbound in the PM peak hour highlights the congestion experienced by drivers. In each peak hour, the queue spillback from Dr. Phillips Boulevard through adjacent intersections limits flexibility and requires drivers to maneuver more aggressively to reach their destinations.

A summary of the network, corridor, and intersection metrics are provided in the following tables.

Table 11 | Existing Network and Corridor Traffic Operations

Evaluation Measure	Existing Conditions	
	AM	PM
Network Traffic Operations		
Vehicle Demand	10,378	12,487
Vehicles Served	10,047	12,118
% Vehicles Served	96.8%	97.0%
Number of Stops	22,794	36,262
Delay (hr)	352.7	427.2
Average Delay per Vehicle (sec)	122.4	123.2
Corridor – Apopka Vineland Rd. to I-4		
Westbound Travel Time (min)	3.8	5.3
Westbound Speed (mph)	23.1	16.6
Eastbound Travel Time (min)	4.6	3.9
Eastbound Speed (mph)	19.5	22.8
East Corridor – Dr. Phillips Blvd. to I-4		
Westbound Travel Time (min)	2.8	3.9
Westbound Speed (mph)	18.3	13.4
Eastbound Travel Time (min)	3.0	2.5
Eastbound Speed (mph)	17.6	20.8
West Corridor – Apopka Vineland Rd. to Dr. Phillips Blvd		
Westbound Travel Time (min)	0.9	1.3
Westbound Speed (mph)	37.7	27.6
Eastbound Travel Time (min)	1.5	1.2
Eastbound Speed (mph)	24.2	31.5

Table 12 | Existing Segment and Intersection Traffic Operations

Segment	2015 Segment Level Operations							
	Eastbound				Westbound			
	AM		PM		AM		PM	
	Speed (mph)	LOS	Speed (mph)	LOS	Speed (mph)	LOS	Speed (mph)	LOS
Apopka Vineland Rd. to Della Dr.	27.2	C	29.7	C	28.3	C	26.4	C
Della Dr. to Dr. Phillips Blvd.	26.3	C	24.0	C	27.6	C	16.8	E
Dr. Philips Blvd. to Fountain/Venezia	39.0	B	38.6	B	29.7	C	14.3	E
Fountains/Venezia to Rialto	34.7	B	35.3	B	38.7	B	19.1	D
Rialto to Turkey Lake Rd.	16.9	E	24.4	C	35.0	B	22.5	D

Segment	2015 Intersection Level Operations							
	AM				PM			
	LOS	Delay (sec)	EB Queue (ft)	WB Queue (ft)	LOS	Delay (sec)	EB Queue (ft)	WB Queue (ft)
Apopka Vineland Rd.	C	33.08	287	312	D	37.84	180	670
Della Dr.	C	29.11	823	354	D	36.45	4967	584
Dr. Philips Blvd.	C	25.05	726	433	D	45.03	671	754
Fountains/Venezia	C	22.74	153	119	F	55.36	223	1083
Rialto	B	11.49	578	408	B	19.72	246	843
Turkey Lake Rd.	E	68.75	1189	468	D	45.96	745	480

Queue Lengths shown cannot exceed distance between intersections. Interaction between queues observed at corridor and network level.

3.3 Future Traffic Analysis

The proposed and the recommended alternatives are developed in consideration of future demand traffic. For the Sand Lake Road RCA, the years 2020 and 2040 are established as near term and long term forecasting periods.

3.3.1 Growth Rates

The study of Sand Lake Road and the RCA process is a product in part of demand for travel growing in this area. Establishing reasonable expectations for growth is an essential part of planning for a facility that meets the needs of the residents without being excessive in design.

Two methods were used to develop the growth in demand for Sand Lake Road. These were historic trends emphasizing the continuation of past growth and regional travel demand modeling focused on the planned changes in land use. Historic trends were considered for the years from 2010 to 2015 to account in part for the significant drop in demand seen during the economic recession in 2009. The historic trends indicate that growth may continue at greater than 1% per year.

The Central Florida Regional Planning Model was used to understand the longer term demand with a more mature roadway network, mature land uses and variations between Sand Lake Road as a four-lane facility and a six-lane facility. This model has incorporated improvements associated with the I-4 Beyond the Ultimate (BtU) project with completion prior to the 2040 horizon year. The model growth rates were generally less than 1% per year. In light of regional growth history and the dynamic nature of nearby International Drive, a more conservative historical approach is preferred by Orange County. Table 13 summarizes the resulting annual growth rates.

For Wallace Road, much of the surrounding land use growth has already occurred. However, to account for generalized background growth, a 1.2% per year rate has been applied for the period for both the interim and horizon years consistent with the Sand Lake Road.

Table 13 | Annualized Growth Rates

Years	Growth Rate
No Build – Four Lanes of Through Traffic	
2015 to 2020	1.2%
2020 to 2040	1.2%
Build – Six Lanes of Through Traffic	
2015 to 2020	1.6%
2020 to 2040	1.6%

Source: Based on Historic Trends and the Central Florida Regional Planning Model as Modified for the I-4 BtU Project.

3.3.2 Future AM and PM Design Volumes

The design volumes for Sand Lake Road were developed to identify two different year scenarios, each with a different roadway configuration for both the AM and PM peak hours. The future scenarios are listed below and cover both a four-through lane and six-through lane section for Sand Lake Road. For the horizon year 2020, it is assumed that the I-4 Beyond the Ultimate improvements will not be complete. For the horizon year 2040, it is assumed the I-4 Beyond the Ultimate improvements are complete. For both existing and future horizon years, a number of the intersections have demand volumes beyond what can be served by the existing geometry and signal timing during the peak hour. A full series of all design volumes can be found in Appendix E.

3.3.3 Future AM and PM Peak Hour Traffic Operations

The year 2020 and 2040 AM and PM peak hour traffic volumes are modeled in the context of the proposed roadway geometry and signal timing using VISSIM – building from the existing conditions analysis and incorporating changes to the roadway geometry proposed with each alternative. The geometric and signalization alternatives are presented in Table 14. The VISSIM support information can be found in Appendix F.

The analysis of each future year, time period, roadway configuration and access management shown in Table 14 are summarized in
Table 15 through Table 26. All of the improvement scenarios provide significant travel time saving of more than 20% over the No Build Alternative by 2040. Due to the increased volume forecast with a full six-lane improvement, the travel time, delay, stops and other metrics do not improve considerably between the four lane with a continuous right turn lane from Dr. Phillips Boulevard to Rialto when compared with a traditional six lane widening project for the length of the corridor. The primary difference between the signalized and non-signalized option is in management of the turning movements at the Fountains/Venezia shopping centers. Without a signal, the vehicle queue for the westbound turn lanes effects westbound through traffic. With the signal, the westbound left turn queue can be managed, but delay is incurred by the eastbound movement to allow for that turn lane management. Direct access to Sand Lake Road for each shopping center would be a benefit to each center and would limit the number of U-turns at the Dr. Phillips Boulevard traffic signal. Collectively, the signalized option for the continuous right turn provides the lowest travel time for westbound traffic in the PM peak period which is the most congested time of day.

The traffic operations analysis results are based upon additional continuous lanes connecting Dr. Phillips Boulevard and Turkey Lake Road in both directions. The continuous right turn lanes are modeled as through-right lanes for this analysis to maximize land use and capacity while minimizing the operational impact of the weaving and queue spillback observed in the existing condition. The specific signage and striping of the outside lane will need to be considered carefully in order to minimize right turn crashes that can be associated with continuous right turn lanes. It is acknowledged that breaking the continuous right turn lanes between Dr. Phillips Boulevard and Turkey Lake Road will result in both a reduction in capacity and an increase in weaving on the roadway. Further refinement of signage and striping for the outside lanes should occur in both this study and the following design phase.

The system impact of a new signal at the Plaza Venezia and Fountains main entrance is also considered in the future analysis. One of the intended ramifications of a new signal is new pedestrian connections between the two shopping centers. These pedestrian crossings may have the unintended consequence of reducing the amount of green time available for through vehicles along Sand Lake Road. A sensitivity analysis is included in Table 21 or Table 23 comparing the vehicle metric presented in the base signal condition and the maximum pedestrian crossing scenario. This is provided to support the decision process for moving into a Signal Warrant analysis in a later phase of the project beyond the RCA.

Table 14 | All Traffic Operations Scenarios Evaluated

Analysis Year	Time of Day	Volume Scenario (# Lanes)	Roadway Geometry	Access Control	Alternative Number
2020	AM Peak Hour	4	• No Build	No Change	1
			• Continuous Right Turn from Dr. Phillips Blvd. to Rialto	• Directional Left-In at Fountains/Venezia	2a
				• Signal at Fountains/Venezia	2b
		6	• Six Lane Widening from Apopka Vineland Road to Rialto	• Directional Left-In at Fountains/Venezia	3a
				• Signal at Fountains/Venezia	3b
	PM Peak Hour	4	• No Build	No Change	1
			• Continuous Right Turn from Dr. Phillips Blvd. to Rialto	• Directional Left-In at Fountains/Venezia	2a
				• Signal at Fountains/Venezia	2b
		6	• Six Lane Widening from Apopka Vineland Road to Rialto	• Directional Left-In at Fountains/Venezia	3a
				• Signal at Fountains/Venezia	3b
2040	AM Peak Hour	4	• No Build	No Change	1
			• Continuous Right Turn from Dr. Phillips Blvd. to Rialto	• Directional Left-In at Fountains/Venezia	2a
				• Signal at Fountains/Venezia	2b
		6	• Six Lane Widening from Apopka Vineland Road to Rialto	• Directional Left-In at Fountains/Venezia	3a
				• Signal at Fountains/Venezia	3b
	PM Peak Hour	4	• No Build	No Change	1
			• Continuous Right Turn from Dr. Phillips Blvd. to Rialto	• Directional Left-In at Fountains/Venezia	2a
				• Signal at Fountains/Venezia	2b
		6	• Six Lane Widening from Apopka Vineland Road to Rialto	• Directional Left-In at Fountains/Venezia	3a
				• Signal at Fountains/Venezia	3b

Table 15 | 2020 AM Peak Hour Network and Corridor Traffic Operations Summary

Evaluation Measure	Alternative #1 – No Build	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd and Rialto		Alternative #3 – Six Lane Widening between Apopka Vineland Rd. and Rialto	
		Fountains/Venezia Median Treatment			
	Full Opening	Directional Opening	Signalized Opening	Directional Opening	Signalized Opening
Network Traffic Operations - Apopka Vineland Rd. to I-4					
Vehicle Demand	11,006	11,006	11,006	11,209	11,209
Vehicles Served	11,001	10,993	10,995	11,200	11,202
% Vehicles Served	100.0%	99.9%	99.9%	99.9%	99.9%
Number of Stops	26,469	26,292	26,037	25,064	24,613
Delay (hr)	405.9	408.5	406.6	397.2	390.2
Average Delay per Vehicle (sec)	132.8	133.8	133.1	127.7	125.4
Corridor – Apopka Vineland Rd. to I-4					
Westbound Travel Time (min)	3.7	3.6	3.6	3.6	3.6
Westbound Speed (mph)	23.9	24.6	24.4	24.6	24.6
Eastbound Travel Time (min)	5.2	5.1	5.1	5.0	5.0
Eastbound Speed (mph)	17.2	17.4	17.5	17.7	18.0
East Corridor – Dr. Phillips Blvd. to I-4					
Westbound Travel Time (min)	2.7	2.6	2.7	2.6	2.6
Westbound Speed (mph)	19.4	19.8	19.6	20.0	19.8
Eastbound Travel Time (min)	3.5	3.5	3.5	3.6	3.5
Eastbound Speed (mph)	14.9	15.0	15.1	14.6	15.1
West Corridor – Apopka Vineland Rd. to Dr. Phillips Blvd.					
Westbound Travel Time (min)	0.9	0.9	0.9	0.9	0.9
Westbound Speed (mph)	38.2	38.3	38.7	37.8	38.5
Eastbound Travel Time (min)	1.6	1.6	1.6	1.4	1.4
Eastbound Speed (mph)	23.2	23.5	23.5	26.7	26.4

Table 16 | 2020 PM Peak Hour Network and Corridor Traffic Operations Summary

Evaluation Measure	Alternative #1 – No Build	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd. and Rialto		Alternative #3 – Six Lane Widening between Apopka Vineland Rd. and Rialto	
		Fountains/Venezia Median Treatment			
	Full Opening	Directional Opening	Signalized Opening	Directional Opening	Signalized Opening
Network Traffic Operations - Apopka Vineland Rd. to I-4					
Vehicle Demand	13,237	13,237	13,237	13,487	13,487
Vehicles Served	13,227	13,223	13,235	13,486	13,486
% Vehicles Served	99.9%	99.9%	100.0%	100.0%	100.0%
Number of Stops	34,297	29,793	30,242	30,419	30,725
Delay (hr)	464.8	447.9	454.5	459.8	461.4
Average Delay per Vehicle (sec)	126.5	122.0	123.6	122.7	123.2
Corridor – Apopka Vineland Rd. to I-4					
Westbound Travel Time (min)	5.1	4.1	4.3	4.2	4.2
Westbound Speed (mph)	17.0	21.1	20.4	20.9	21.0
Eastbound Travel Time (min)	4.1	4.1	4.1	4.2	4.2
Eastbound Speed (mph)	21.8	21.9	21.7	21.2	21.1
East Corridor – Dr. Phillips Blvd. to I-4					
Westbound Travel Time (min)	3.8	2.5	2.7	2.6	2.5
Westbound Speed (mph)	13.8	20.5	19.5	20.3	20.6
Eastbound Travel Time (min)	2.6	2.6	2.7	2.7	2.7
Eastbound Speed (mph)	20.4	20.4	19.9	20.0	19.6
West Corridor – Apopka Vineland Rd to Dr. Phillips Blvd.					
Westbound Travel Time (min)	1.3	1.5	1.5	1.5	1.5
Westbound Speed (mph)	26.7	23.4	23.0	23.1	22.7
Eastbound Travel Time (min)	1.5	1.5	1.4	1.5	1.5
Eastbound Speed (mph)	24.5	24.5	25.5	24.0	24.3

Table 17 | 2040 AM Peak Hour Network and Corridor Traffic Operations Summary

Evaluation Measure	Alternative #1 – No Build	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd. and Rialto		Alternative #3 – Six Lane Widening between Apopka Vineland Rd. and Rialto	
		Fountains/Venezia Median Treatment			
	Full Opening	Directional Opening	Signalized Opening	Directional Opening	Signalized Opening
Network Traffic Operations - Apopka Vineland Rd. to I-4					
Vehicle Demand	13,492	13,492	13,492	14,531	14,531
Vehicles Served	11,867	12,769	12,795	13,515	13,486
% Vehicles Served	88.0%	94.6%	94.8%	93.0%	92.8%
Number of Stops	62,339	52,088	50,750	60,930	63,394
Delay (hr)	749.7	541.8	543.0	616.2	626.1
Average Delay per Vehicle (sec)	207.5	147.5	147.6	156.8	159.4
Corridor – Apopka Vineland Rd. to I-4					
Westbound Travel Time (min)	5.0	3.3	3.3	3.3	3.3
Westbound Speed (mph)	17.8	27.2	27.1	27.2	27.3
Eastbound Travel Time (min)	5.5	4.3	4.3	4.6	4.7
Eastbound Speed (mph)	16.6	21.2	21.2	19.8	19.2
East Corridor – Dr. Phillips Blvd. to I-4					
Westbound Travel Time (min)	2.4	2.3	2.3	2.3	2.3
Westbound Speed (mph)	22.3	24.2	24.2	24.3	24.1
Eastbound Travel Time (min)	2.4	2.7	2.7	3.3	3.5
Eastbound Speed (mph)	22.5	20.6	20.1	16.3	15.8
West Corridor – Apopka Vineland Rd. to Dr. Phillips Blvd.					
Westbound Travel Time (min)	2.2	1.0	1.0	0.9	0.9
Westbound Speed (mph)	15.7	36.5	36.0	37.3	37.8
Eastbound Travel Time (min)	3.4	2.0	1.9	1.6	1.6
Eastbound Speed (mph)	10.6	18.6	19.3	23.1	23.1

Table 18 | 2040 PM Peak Hour Network and Corridor Traffic Operations Summary

Evaluation Measure	Alternative #1 – No Build	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd. and Rialto		Alternative #3 – Six Lane Widening between Apopka Vineland Rd. and Rialto	
		Fountains/Venezia Median Treatment			
	Full Opening	Directional Opening	Signalized Opening	Directional Opening	Signalized Opening
Network Traffic Operations - Apopka Vineland Rd. to I-4					
Vehicle Demand	16,234	16,234	16,234	17,480	17,480
Vehicles Served	13,865	15,239	15,327	15,949	16,238
% Vehicles Served	85.4%	93.9%	94.4%	91.2%	92.9%
Number of Stops	92,613	54,421	53,007	69,619	61,987
Delay (hr)	1,058.9	769.9	738.4	939.4	869.2
Average Delay per Vehicle (sec)	257.3	173.5	165.9	200.3	183.7
Corridor – Apopka Vineland Rd. to I-4					
Westbound Travel Time (min)	9.9	6.6	5.9	7.2	6.1
Westbound Speed (mph)	9.1	13.7	15.2	12.5	14.7
Eastbound Travel Time (min)	4.5	4.9	4.9	5.1	5.2
Eastbound Speed (mph)	20.2	18.6	18.8	17.9	17.4
Eastern Half Corridor – Dr. Phillips Blvd. to I-4					
Westbound Travel Time (min)	8.6	5.3	4.5	6.2	4.9
Westbound Speed (mph)	6.3	10.3	12.2	8.9	11.1
Eastbound Travel Time (min)	2.7	2.6	2.8	2.9	3.1
Eastbound Speed (mph)	20.2	20.7	19.7	18.8	17.4
Western Half Corridor – Apopka Vineland Rd. to Dr. Phillips Blvd.					
Westbound Travel Time (min)	1.7	1.5	1.6	1.3	1.4
Westbound Speed (mph)	20.2	24.1	21.4	28.2	24.8
Eastbound Travel Time (min)	1.7	2.0	1.9	2.0	1.9
Eastbound Speed (mph)	22.1	17.9	19.4	18.8	19.8

Table 19 | 2020 AM Peak Hour Segment Traffic Operations Summary

Evaluation Measure	Alternative #1 – No Build	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd and Rialto		Alternative #3 – Six Lane Widening between Apopka Vineland Rd. and Rialto	
		Fountains/Venezia Median Treatment			
	Full Opening	Directional Opening	Signalized Opening	Directional Opening	Signalized Opening
Eastbound/Peak Direction Ave Speed / LOS					
Apopka Vineland Rd. to Della Dr.	26.4 / C	26.4 / C	26.5 / C	29.1 / C	28.9 / C
Della Dr. to Dr. Phillips Blvd.	24.4 / C	24.1 / C	24.3 / C	30.1 / C	29.7 / C
Dr. Philips Blvd. to Fountains/Venezia	36.4 / B	39.1 / A	37.2 / B	37.8 / B	35.1 / B
Fountains/Venezia to Rialto	32.2 / B	34.1 / B	32.8 / B	29.1 / C	31.2 / B
Rialto to Turkey Lake Rd.	11.6 / F	12.2 / F	11.2 / F	11.3 / F	12.3 / F
Westbound/Off-Peak Direction Ave Speed / LOS					
Apopka Vineland Rd. to Della Dr.	28 / C	28.1 / C	27.8 / C	28.1 / C	28.2 / C
Della Dr. to Dr. Phillips Blvd.	28.2 / C	28.1 / C	28.8 / C	26.9 / C	27.6 / C
Dr. Philips Blvd. to Fountains/Venezia	28.0 / C	29.2 / C	28.2 / C	31.2 / B	31.6 / B
Fountains/Venezia to Rialto	37.7 / B	40.4 / A	37.3 / B	42.3 / A	38.8 / A
Rialto to Turkey Lake Rd.	34.4 / B	35.2 / B	35.7 / B	35.6 / B	35.5 / B

Table 20| 2020 PM Peak Hour Segment Traffic Operations Summary

Evaluation Measure	Alternative #1 – No Build	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd. and Rialto		Alternative #3 – Six Lane Widening between Apopka Vineland Rd. and Rialto	
		Fountains/Venezia Median Treatment			
	Full Opening	Directional Opening	Signalized Opening	Directional Opening	Signalized Opening
Eastbound/Off-Peak Direction Ave Speed / LOS					
Apopka Vineland Rd. to Della Dr.	28.9 / C	29 / C	29 / C	30.5 / B	30.2 / B
Della Dr. to Dr. Phillips Blvd.	22.7 / C	22.8 / C	22.7 / C	27.3 / C	27.5 / C
Dr. Philips Blvd. to Fountains/Venezia	38.3 / A	41 / A	32.5 / B	37.0 / B	24.3 / C
Fountains/Venezia to Rialto	34.8 / B	36.8 / B	29.7 / C	35.0 / B	35.8 / B
Rialto to Turkey Lake Rd.	22.5 / C	22.8 / C	22.4 / D	20.9 / D	21.1 / D
Westbound/Peak Direction Ave Speed / LOS					
Apopka Vineland Rd. to Della Dr.	22.5 / C	22.8 / C	22.4 / D	20.9 / D	21.1 / D
Della Dr. to Dr. Phillips Blvd.	15.9 / E	15.4 / E	15.1 / E	17.3 / E	17.3 / E
Dr. Philips Blvd. to Fountains/Venezia	13.9 / E	19.4 / D	22.0 / D	16.2 / E	19.4 / D
Fountains/Venezia to Rialto	14.8 / E	29.7 / C	36.1 / B	37.1 / B	32.6 / B
Rialto to Turkey Lake Rd.	15.7 / E	28.3 / C	23.7 / C	29.6 / C	30.6 / B

Table 21 | 2040 AM Peak Hour Segment Traffic Operations Summary

Evaluation Measure	Alternative #1 – No Build	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd. and Rialto		Alternative #3 – Six Lane Widening between Apopka Vineland Rd. and Rialto	
		Fountains/Venezia Median Treatment			
	Full Opening	Directional Opening	Signalized Opening	Directional Opening	Signalized Opening
Eastbound/ Peak Direction Ave Speed / LOS					
Apopka Vineland Rd. to Della Dr.	8.9 / F	18.3 / D	18.6 / D	27.9 / C	28.2 / C
Della Dr. to Dr. Phillips Blvd.	11.2 / F	23.0 / C	23.4 / C	29.5 / C	29.5 / C
Dr. Philips Blvd. to Fountains/Venezia	37.5 / B	40.9 / A	29.0 / C	32.0 / B	28.1 / C
Fountains/Venezia to Rialto	34.1 / B	36.9 / B	27.8 / C	24.9 / C	26.7 / C
Rialto to Turkey Lake Rd.	29.2 / C	21.4 / D	21 / D	10.8 / F	11.2 / F
Westbound/Off-Peak Direction Ave Speed / LOS					
Apopka Vineland Rd. to Della Dr.	8.4 / F	25.8 / C	25.9 / C	25.8 / C	25.8 / C
Della Dr. to Dr. Phillips Blvd.	11.9 / F	28.3 / C	27.9 / C	27.5 / C	27.9 / C
Dr. Philips Blvd. to Fountains/Venezia	19.0 / D	33.1 / B	31.2 / B	27.5 / C	28.4 / C
Fountains/Venezia to Rialto	20.5 / D	36.9 / B	34.5 / B	41.7 / A	38.6 / A
Rialto to Turkey Lake Rd.	21.4 / D	29.4 / C	29.4 / C	30.3 / B	30.6 / B

Table 22 | 2040 PM Peak Hour Segment Traffic Operations Summary

Evaluation Measure	Alternative #1 – No Build	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd. and Rialto		Alternative #3 – Six Lane Widening between Apopka Vineland Rd. and Rialto	
		Fountains/Venezia Median Treatment			
	Full Opening	Directional Opening	Signalized Opening	Directional Opening	Signalized Opening
Eastbound/Off-Peak Direction Ave Speed / LOS					
Apopka Vineland Rd. to Della Dr.	27.4 / C	19.6 / D	19.8 / D	21.6 / D	22.1 / D
Della Dr. to Dr. Phillips Blvd.	17.4 / E	18.4 / D	18.8 / D	21.8 / D	21.6 / D
Dr. Philips Blvd. to Fountains/Venezia	36.7 / B	39.9 / A	22.5 / C	32.5 / B	19.2 / D
Fountains/Venezia to Rialto	33.7 / B	37.6 / B	24.2 / C	34.8 / B	31.3 / B
Rialto to Turkey Lake Rd.	29.5 / C	29.8 / C	28.9 / C	24.8 / C	23.4 / C
Westbound/Peak Direction Ave Speed / LOS					
Apopka Vineland Rd. to Della Dr.	21.9 / D	23.1 / C	21.7 / D	24.4 / C	22.1 / D
Della Dr. to Dr. Phillips Blvd.	14.9 / E	19.4 / D	18.2 / D	18.1 / D	17.4 / E
Dr. Philips Blvd. to Fountains/Venezia	10.5 / F	9.5 / F	16.1 / E	5.7 / F	6.4 / F
Fountains/Venezia to Rialto	11.1 / F	10.1 / F	17.7 / E	9.5 / F	13.4 / F
Rialto to Turkey Lake Rd.	5 / F	15.2 / E	19.2 / D	10.1 / F	16.7 / E

Table 23 | 2020 AM Peak Hour Intersection Traffic Operations Summary

Evaluation Measure	Alternative #1 – No Build	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd. and Rialto		Alternative #3 – Six Lane Widening between Apopka Vineland Rd. and Rialto	
		Fountains/Venezia Median Treatment			
	Full Opening	Directional Opening	Signalized Opening	Directional Opening	Signalized Opening
Level-of-Service (LOS)					
Apopka Vineland Rd.	D	D	D	C	C
Della Dr.	C	C	C	C	C
Dr. Philips Blvd.	C	C	C	C	C
Fountains/Venezia	C	A	A	A	A
Rialto	B	B	B	B	B
Turkey Lake Rd.	F	F	F	F	F
Delay in Seconds					
Apopka Vineland Rd.	36.0	35.9	35.9	30.5	30.9
Della Dr.	30.0	30.2	30.2	26.8	27.0
Dr. Philips Blvd.	27.1	25.9	25.9	22.7	22.6
Fountains/Venezia	21.8	7.6	7.6	8.8	3.0
Rialto	14.7	14.9	14.9	15.9	13.6
Turkey Lake Rd.	82.0	83.9	83.9	83.6	81.2
Eastbound Queue in Feet					
Apopka Vineland Rd.	310	307	307	286	295
Della Dr.	860	931	931	486	483
Dr. Philips Blvd.	788	818	818	395	411
Fountains/Venezia	232	70	70	144	247
Rialto	795	606	606	659	600
Turkey Lake Rd.	1362	1332	1332	1358	1351
Westbound Queue in Feet					
Apopka Vineland Rd.	359	341	341	347	369
Della Dr.	357	348	348	266	253
Dr. Philips Blvd.	478	353	353	278	287
Fountains/Venezia	163	97	97	85	195
Rialto	447	295	295	289	285
Turkey Lake Rd.	476	474	474	474	474

Queue Lengths shown cannot exceed distance between intersections. Interaction between queues observed at corridor and network level.

Table 24 | 2020 PM Peak Hour Intersection Traffic Operations Summary

Evaluation Measure	Alternative #1 – No Build	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd. and Rialto		Alternative #3 – Six Lane Widening between Apopka Vineland Rd. and Rialto	
		Fountains/Venezia Median Treatment			
	Full Opening	Directional Opening	Signalized Opening	Directional Opening	Signalized Opening
Level-of-Service (LOS)					
Apopka Vineland Rd.	D	E	E	E	E
Della Dr.	D	D	D	D	D
Dr. Philips Blvd.	D	D	D	D	D
Fountains/Venezia	F	B	B	B	A
Rialto	C	B	B	B	B
Turkey Lake Rd.	D	D	D	D	D
Delay in Seconds					
Apopka Vineland Rd.	41.2	70.7	70.7	68.9	68.9
Della Dr.	38.8	39.5	39.5	35.8	35.9
Dr. Philips Blvd.	52.2	42.4	42.4	39.5	37.0
Fountains/Venezia	122.5	10.9	10.9	14.4	9.3
Rialto	32.0	15.6	15.6	14.1	13.0
Turkey Lake Rd.	49.2	48.4	48.4	49.6	49.5
Eastbound Queue in Feet					
Apopka Vineland Rd.	200	309	309	343	328
Della Dr.	588	642	642	335	380
Dr. Philips Blvd.	714	700	700	469	441
Fountains/Venezia	228	79	79	200	313
Rialto	261	279	279	309	269
Turkey Lake Rd.	833	781	781	878	856
Westbound Queue in Feet					
Apopka Vineland Rd.	676	677	677	676	680
Della Dr.	614	723	723	480	496
Dr. Philips Blvd.	744	731	731	702	675
Fountains/Venezia	1210	272	272	309	541
Rialto	1196	815	815	830	766
Turkey Lake Rd.	484	479	479	482	479

Queue Lengths shown cannot exceed distance between intersections. Interaction between queues observed at corridor and network level.

Table 25 | 2040 AM Peak Hour Intersection Traffic Operations Summary

Evaluation Measure	Alternative #1 – No Build	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd. and Rialto		Alternative #3 – Six Lane Widening between Apopka Vineland Rd. and Rialto	
		Fountains/Venezia Median Treatment			
	Full Opening	Directional Opening	Signalized Opening	Directional Opening	Signalized Opening
Level-of-Service (LOS)					
Apopka Vineland Rd.	E	F	F	E	E
Della Dr.	D	D	D	C	C
Dr. Philips Blvd.	F	C	C	C	C
Fountains/Venezia	F	A	A	C	A
Rialto	F	B	B	C	B
Turkey Lake Rd.	E	E	E	E	E
Delay in Seconds					
Apopka Vineland Rd.	79.4	99.1	99.1	66.5	66.3
Della Dr.	43.2	50.0	50.0	32.1	31.6
Dr. Philips Blvd.	95.1	31.5	31.5	26.5	25.7
Fountains/Venezia	300.1	8.1	8.1	18.2	5.5
Rialto	86.7	13.2	13.2	22.3	20.0
Turkey Lake Rd.	58.1	58.5	58.5	79.1	78.1
Eastbound Queue in Feet					
Apopka Vineland Rd.	240	615	615	614	614
Della Dr.	713	1168	1168	955	972
Dr. Philips Blvd.	867	1125	1125	771	803
Fountains/Venezia	366	68	68	350	365
Rialto	310	509	509	892	884
Turkey Lake Rd.	691	1111	1111	1358	1355
Westbound Queue in Feet					
Apopka Vineland Rd.	682	565	565	513	507
Della Dr.	696	372	372	306	293
Dr. Philips Blvd.	709	484	484	411	383
Fountains/Venezia	1269	123	123	121	201
Rialto	1378	376	376	430	442
Turkey Lake Rd.	484	509	509	303	303

Queue Lengths shown cannot exceed distance between intersections. Interaction between queues observed at corridor and network level.

Table 26 | 2040 PM Peak Hour Intersection Traffic Operations Summary

Evaluation Measure	Alternative #1 – No Build	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd. and Rialto		Alternative #3 – Six Lane Widening between Apopka Vineland Rd. and Rialto	
		Fountains/Venezia Median Treatment			
	Full Opening	Directional Opening	Signalized Opening	Directional Opening	Signalized Opening
Level-of-Service (LOS)					
Apopka Vineland Rd.	E	F	F	F	F
Della Dr.	D	D	D	D	D
Dr. Philips Blvd.	F	E	E	E	E
Fountains/Venezia	F	F	C	F	C
Rialto	F	D	C	D	C
Turkey Lake Rd.	E	D	D	D	D
Delay in Seconds					
Apopka Vineland Rd.	78.0	94.6	94.7	93.6	96.2
Della Dr.	43.3	50.1	50.4	45.2	44.7
Dr. Philips Blvd.	94.8	61.9	57.5	71.8	68.7
Fountains/Venezia	222.4	58.4	25.4	376.5	32.4
Rialto	86.7	36.1	25.2	44.8	28.3
Turkey Lake Rd.	57.8	42.6	41.9	49.0	45.3
Eastbound Queue in Feet					
Apopka Vineland Rd.	242	587	586	607	607
Della Dr.	727	1131	1146	807	779
Dr. Philips Blvd.	876	968	975	692	703
Fountains/Venezia	350	126	323	323	616
Rialto	335	326	186	507	763
Turkey Lake Rd.	727	704	753	930	984
Westbound Queue in Feet					
Apopka Vineland Rd.	679	683	679	676	678
Della Dr.	712	1130	1154	704	801
Dr. Philips Blvd.	690	695	708	769	787
Fountains/Venezia	1272	1251	1073	1234	1229
Rialto	1375	1258	1101	1372	1229
Turkey Lake Rd.	484	473	472	478	466

Queue Lengths shown cannot exceed distance between intersections. Interaction between queues observed at corridor and network level.

Table 27 | 2040 PM Peak Hour Network and Corridor Pedestrian Impact Comparison

Evaluation Measure	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd and Rialto		
	Fountains/Venezia Median Treatment		
	Directional Opening	Signalized - Existing Ped Calls	Signalized – Ped Call Every Cycle
Network Traffic Operations - Apopka Vineland Rd. to I-4			
Vehicle Demand	16,234	16,234	16,234
Vehicles Served	15,239	15,327	15,026
% Vehicles Served	93.9%	94.4%	92.6%
Number of Stops	54,421	53,007	54,360
Delay (hr)	769.9	738.4	788.6
Average Delay per Vehicle (sec)	173.5	165.9	180.8
Corridor – Apopka Vineland Rd to I-4			
Westbound Travel Time (min)	6.6	5.9	6.2
Westbound Speed (mph)	13.7	15.2	14.6
Eastbound Travel Time (min)	4.9	4.9	5.1
Eastbound Speed (mph)	18.6	18.8	18.0
Eastern Half Corridor – Dr. Phillips Blvd to I-4			
Westbound Travel Time (min)	5.3	4.5	4.5
Westbound Speed (mph)	10.3	12.2	12.2
Eastbound Travel Time (min)	2.6	2.8	3.0
Eastbound Speed (mph)	20.7	19.7	18.0
Western Half Corridor – Apopka Vineland Rd to Dr. Phillips Blvd			
Westbound Travel Time (min)	1.5	1.6	1.9
Westbound Speed (mph)	24.1	21.4	18.4
Eastbound Travel Time (min)	2.0	1.9	1.8
Eastbound Speed (mph)	17.9	19.4	20.8

Table 28 | 2040 PM Peak Hour Segment Pedestrian Impact Comparison

Evaluation Measure	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd and Rialto		
	Fountains/Venezia Median Treatment		
	Directional Opening	Signalized - Existing Ped Calls	Signalized – Ped Call Every Cycle
Eastbound/Off-Peak Direction Ave Speed / LOS			
Apopka Vineland Rd. to Della Dr.	19.6 / D	19.8 / D	21.4 / D
Della Dr. to Dr. Phillips Blvd.	18.4 / D	18.8 / D	17.2 / E
Dr. Philips Blvd. to Fountains/Venezia	39.9 / A	22.5 / C	16.3 / E
Fountains/Venezia to Rialto	37.6 / B	24.2 / C	18.5 / D
Rialto to Turkey Lake Rd.	29.8 / C	28.9 / C	26.9 / C
Westbound/Peak Direction Ave Speed / LOS			
Apopka Vineland Rd. to Della Dr.	23.1 / C	21.7 / D	17.4 / E
Della Dr. to Dr. Phillips Blvd.	19.4 / D	18.2 / D	18.8 / D
Dr. Philips Blvd. to Fountains/Venezia	9.5 / F	16.1 / E	13.9 / E
Fountains/Venezia to Rialto	10.1 / F	17.7 / E	15.1 / E
Rialto to Turkey Lake Rd.	15.2 / E	19.2 / D	18.1 / D

Table 29 | 2040 PM Peak Hour Intersection Pedestrian Impact Comparison

Evaluation Measure	Alternative #2 – Continuous Right Turn Lanes between Dr. Phillips Blvd and Rialto		
	Fountains/Venezia Median Treatment		
	Directional Opening	Signalized - Existing Ped Calls	Signalized – Ped Call Every Cycle
Level-of-Service (LOS)			
Apopka Vineland Rd.	F	F	F
Della Dr.	D	D	D
Dr. Philips Blvd.	E	E	E
Fountains/Venezia	F	C	C
Rialto	D	C	C
Turkey Lake Rd.	D	D	D
Delay in Seconds			
Apopka Vineland Rd.	94.6	94.7	125.2
Della Dr.	50.1	50.4	48.9
Dr. Philips Blvd.	61.9	57.5	57.1
Fountains/Venezia	58.4	25.4	30.0
Rialto	36.1	25.2	25.2
Turkey Lake Rd.	42.6	41.9	42.4
Eastbound Queue in Feet			
Apopka Vineland Rd.	587	586	415
Della Dr.	1131	1146	1023
Dr. Philips Blvd.	968	975	959
Fountains/Venezia	126	323	420
Rialto	326	186	258
Turkey Lake Rd.	704	753	787
Westbound Queue in Feet			
Apopka Vineland Rd.	683	679	683
Della Dr.	1130	1154	1143
Dr. Philips Blvd.	695	708	711
Fountains/Venezia	1251	1073	1245
Rialto	1258	1101	1071
Turkey Lake Rd.	473	472	470

Queue Lengths shown cannot exceed distance between intersections. Interaction between queues observed at corridor and network level.

3.3.4 Wallace Road Traffic Operations

Wallace Road was reviewed in conjunction with Sand Lake Road for opportunities to construct minor enhancements to improve vehicle operations. In the existing condition, Wallace Road is near capacity on a daily basis and over capacity on several movements along the corridor in the peak period. To ameliorate traffic conditions along Wallace Road, a review of the turn lane availability and operation at the signals was conducted. The existing conditions revealed that Wallace Road has left and right turn lanes to facilitate movement into many of the adjacent residential sub-divisions and commercial properties. However, in the section between Apopka Vineland Road and Dr. Phillips Boulevard, two subdivision connections do not have left turn lanes. Crashes have occurred in the past five years at both the intersections of Wallace Road at Valerian Boulevard and Wallace Road at Teasel Drive.

A Synchro based traffic operations analysis tested roadway modifications to the signalized intersections that may ease traffic congestion. The operations summary results of this analysis and planned concept sheets for Wallace Road derived from this analysis can be found in Appendix G. Since the north-south corridors of Apopka Vineland Road, Dr. Phillips Boulevard, and Turkey Lake Road are the major through routes, the opportunities on Wallace Road are through queue management. At the Wallace Road and Dr. Phillips Boulevard intersection, an improvement is fully designed for construction in 2017 to simplify roadway geometry near the YMCA facility on the east leg of the intersection and add a right turn lane for the eastbound approach. On the east, the intersection of Wallace Road at Turkey Lake Road has three existing approach lanes and would require modification beyond the scale of this project such as four lane widening to improve conditions.

The western most intersection of Wallace Road at Apopka Vineland Road shows opportunities within context improvements to store and serve queued vehicles more effectively. The PM queues for the westbound through and left turn lane extends well beyond the length of the right turn lane. The long queue 'starves' the right turn lane which contributes to further queuing at the intersection. The 95th percentile queue today is estimated at 450 feet in length. This length is also the approximate length the existing right turn lane could be extended without interfering with the intersection at Valerian Boulevard. An improvement extending the turn lane to 450 feet is recommended by this analysis as a near term improvement. Additionally, the 2040 analysis which grew traffic volumes consistent with Sand Lake Road indicates that the 450 feet of right turn lane will support the 50th percentile queue in 2040. In the development of the preferred alternative, opportunities to maximize queue lengths at this intersection will be considered in conjunction with un-signalized turn lane improvements between Apopka Vineland Road and Dr. Phillips Boulevard.

3.4 Traffic Analysis Summary

The traffic analysis highlights that in the next 25 years the growth in vehicular travel demand on the Sand Lake Road corridor will cause significant deterioration in travel time and overall mobility. The build alternatives presented each provide some degree of improvement from the no build alternative. Alternative 2 is shown to provide overall improvement to traffic operations for two primary reasons. One, it allows for continuity in traffic flow from Dr. Phillips Boulevard to Turkey Lake Road for which there are very limited alternative routes. Two, it limits induced vehicular travel demand from Apopka

Vineland Road. Alternative 3 is shown to provide the maximum capacity for the roadway, but is predicted to induce additional vehicular travel demand. Both of these alternatives only ameliorate the future traffic conditions and are not shown to improve travel delay in 2040 design year from the delay observed in the 2015 traffic conditions.

4.0 Design Controls and Standards

This chapter of the report will highlight the limitations and guidelines of designing improvements in the Sand Lake Road area.

4.1 Roadway Design Criteria

Sources used determining the design criteria for the Sand Lake Road RCA include the 2016 Florida Department of Transportation (FDOT) Plans Preparation Manual (PPM), the FDOT Design Standards, the Florida Green Book, the Manual of Uniform Traffic Control Devices (MUTCD), and the American Association of State Highway Transportation Officials (AASHTO) Green Book (2011). Specific design criteria used to develop the proposed concepts and alternatives are identified below:

- Functional Classification: Urban Minor Arterial
- Travel Lane Width: varies; minimum 11' (10' for exclusive turn lane)
- Design Speed: 45 mph (Posted Speed: 40-45 mph)
- Bicycle lanes not included within roadway; incorporated into shared use path
- Minimum Sidewalk Width: 5'
- Curb and Gutter:
  - Median Type E
  - Outside Type F
- Clear Zone (outside lane): 4' from face of curb
- Clear Zone (inside lane): 6' from edge of median traffic lane

Pavement design and landscaping are yet to be determined.

4.2 Drainage Criteria

Drainage improvements within the Sand Lake Road corridor must comply with all Federal (U.S. Army Corps of Engineers), State (Florida Department of Environmental Protection), and regional (South Florida Water Management District) and local (Orange County) regulations for surface water management. Design of the primary and secondary stormwater systems must address criteria and regulations enforced by Orange County and the SFWMD as summarized below:

- Chapter 34 of the Orange County Code of Ordinances related to Land Development: Subdivision Regulations; and
- The SFWMD Environmental Resource Permit Applicant's Handbook (Volumes I and II, effective October 1, 2013 and August 10, 2014, respectively).

Design criteria specific to the study area are summarized below:

Roadway Drainage Design (Secondary Stormwater System)

- Storm Sewer Systems: 10-year design storm (Hydraulic Grade Line 6 inches below the gutter)
- Roadside Ditches/Swales: 10-year design storm
- Cross-Drains: 10-year design storm
- Spread of Water: 10-year design storm (half the outside traveled lane width)
-

Note: The Rational Method shall be utilized to establish the peak runoff rates associated with the 10-year frequency design storm event.

Stormwater Management Design (Primary Stormwater System)

- Water Quality (SFWMD criteria):
  Retention, detention, or both retention and detention in the overall system, including swales, lakes, canals, greenways, etc., shall be provided for one of the following three criteria or equivalent combinations thereof:
  1. Wet detention volume shall be provided for the first inch of runoff from the developed project, or the total runoff of 2.5 inches times the percentage of imperviousness, whichever is greater.
  2. Dry detention volume shall be provided equal to 75 percent of the above amounts computed for wet detention.
  3. Retention volume shall be provided equal to 50 percent of the above amounts computed for wet detention. Retention volume included in flood protection calculations requires a guarantee of long term operation and maintenance of system bleed-down ability (e.g., evidence of excellent soil percolation rates).

- Water Quantity (Orange County):
  For projects located in closed (land-locked) drainage basins, the pond design shall retain the entire runoff volume for 100-year frequency/24-hour duration storm event. The pond shall be designed to completely evacuate the retained volume for the 100-year frequency/24-hour duration storm by natural seepage or positive bleed-down within fourteen (14) days following the design storm event. Final design seepage rates must be determined by a geotechnical engineer.

It is worth noting that the primary stormwater system criteria applies to the Full Reconstruction alternative (Alternative #3). In regards to the Operational Improvements (Alternative #2), the criteria is more subjective and focused on no-net-impact to the receiving water body. In other words, if existing swales give way to storm sewer pipes to accommodate an additional travel lane, water quality retrofit options must be investigated to demonstrate no-net-impact conditions to Little Sand Lake or Lake Serene (e.g., sedimentation baffle box, underground exfiltration system, inlet baskets, etc.).

4.3 Roadway Opportunities and Constraints

The current design of Sand Lake Road within the project area leaves opportunity for numerous improvements. Various locations along Sand Lake Road currently include a third travel lane for right turn/through movements. As these lanes are within the existing right-of-way, extending or connecting them to create a six-lane typical section throughout the corridor is a key opportunity. However, this project is also constrained by current right-of-way limits, drainage patterns, and land development. As a result, typical section widths need to be kept to a minimum wherever possible.

5.0 Development of Improvement Alternatives

This section offers details and analysis on two proposed build alternatives, and a no build alternative. The build alternatives were formulated for improving conditions in the study area. These three alternatives were analyzed in detail based on the following components: geometric roadway design, complete streets analysis, traffic forecast and analysis, crashes, access management, drainage, and environmental considerations. Additionally, analysis was given to a variety of drainage conditions existing in this area that will require accommodation for each build alternative considered. While formulating the proposed alternatives, balancing the elements of safety, mobility, and comfort was given full consideration in order to meet the needs of the community and users of the roadway.

5.1 Alternative Improvement Concepts

An assessment of each of the alternatives will be provided in this section including the description of the alternative through corridor segments and anticipated outcomes. The segmentation of each Alternative is shown in Figure 10.

5.1.1 Alternative 1 – No Build

An option for addressing current and future facility conditions of the Sand Lake Road corridor is to maintain the existing infrastructure by way of a no build approach.

Description

In the No Build Alternative, Sand Lake Road between Turkey Lake Road and Dr. Phillips Boulevard would be maintained as is for the planning horizon. The existing physical conditions described in this report are expected to continue in this alternative. This includes the 4-lane segments from Apopka Vineland Road to the Rialto signal and the transition segment from the Rialto signal to Turkey Lake Road. The No Build Alternative analysis includes the I-4 Interchange modifications associated with FDOT project I-4 Beyond the Ultimate in the 2040 horizon year.

Implications

A No Build Alternative does not address the growing and changing travel demand and offers no new opportunities for improving the health of this transportation system. Leaving this segment as it is today does not have the disruption through construction, capital costs or changes to driving patterns. However, the long-term sustainability of the corridor is not addressed and could lead to future infrastructure disrepair, weaker neighborhood connectivity, and diminished economic development. There are limited benefits to present when considering the current roadway deficiencies and future deterioration of mobility due to growing traffic demand. Declining level-of-service on the roadway has the potential to gradually reduce the quality of life and future viability of the area if left unaddressed.

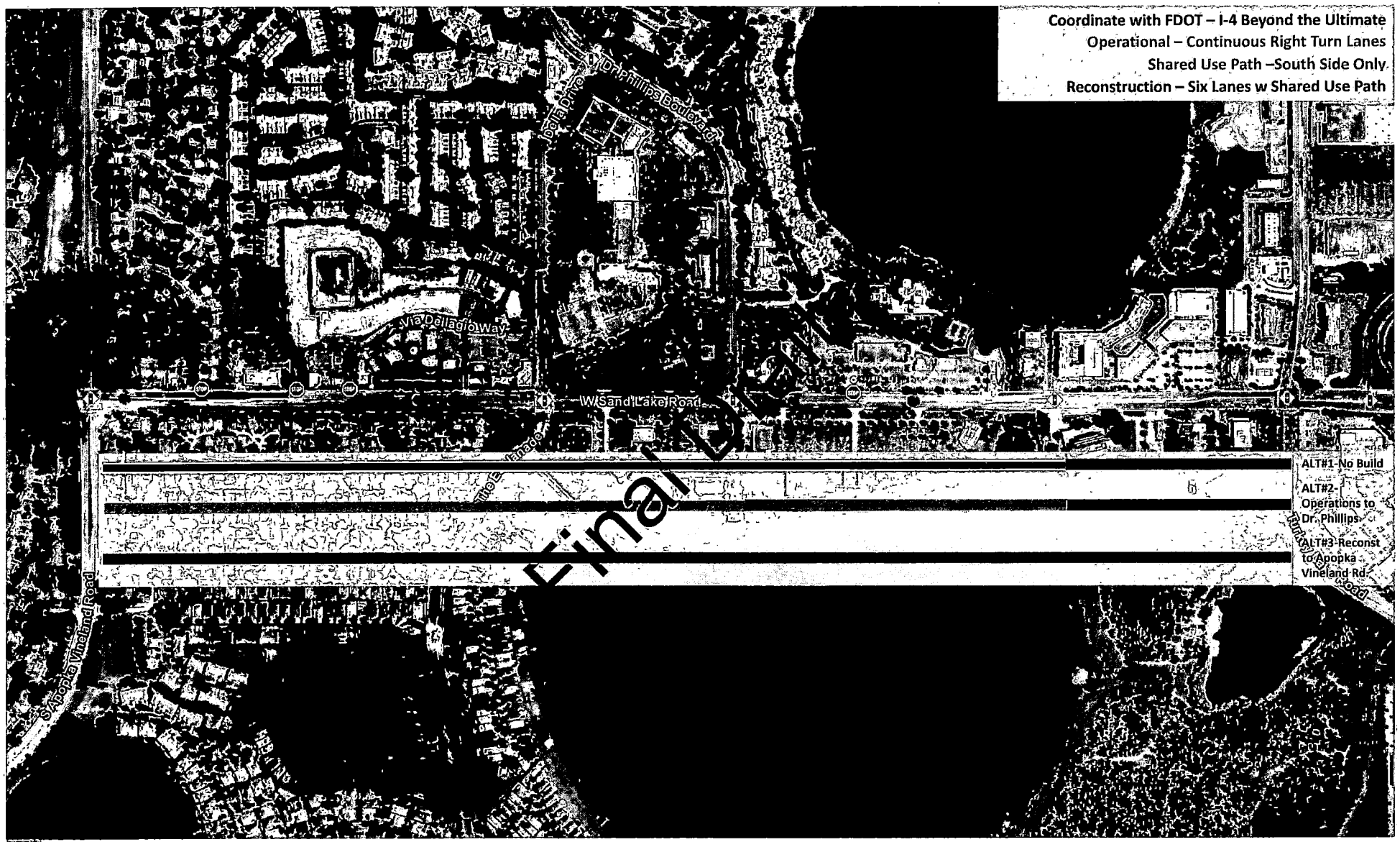


Figure 10 / Sand Lake Road RCA
Alternative Segmentation Map

5.1.2 Alternative 2 – Operational Improvements

Alternative 2 proposes limited construction through the installation of relatively minor improvements along the corridor to reconfigure and connect turning lanes along with other accommodations for bicycles and pedestrians.

Description

The Operational Improvements Alternative addresses existing and projected deficiencies by addressing each segment of Sand Lake Road with unique improvements. Through a refinement process which considered evaluated traffic operations and other benefits. Three segments of Sand Lake Road were ultimately determined to have unique needs as part of Alternative 2. These included west of Dr. Phillips Boulevard, Dr. Phillips Boulevard to Rialto, and east of Rialto. Within these segments, proposed operational improvements to Sand Lake Road allow for a relief in congestion and an increase in capacity by improving intersection efficiency. New pavement is proposed to connect existing right turn lanes between Dr. Phillips Boulevard and Rialto. This addition will allow for continuous movement in the area by way of directing westbound traffic through the corridor and limiting the current weaving and observed inconsistent driver behavior approaching the Dr. Phillips Boulevard traffic signal. Additionally, a westbound left turn lane is proposed at the east Venezia Plaza entrance along with a shared-use path on the south side only to allow for a more robust access configuration for the adjacent shopping center and multimodal accessibility along the corridor.

Implications

The Operational Improvements Alternative focuses attention on the critical needs including traffic safety and operational efficiency for the corridor so to address those needs with the fewest impacts possible. Some of the benefits of this alternative include reduced corridor travel times when compared to the no-build alternative and maximized use of the existing right-of way between Dr. Phillips Boulevard and Rialto. The shared-use path which connects the length of the corridor from Apopka Vineland Road to Rialto allows for bicycle and pedestrian-friendly activity which can enhance access to public transportation.

5.1.3 Alternative 3 – Full Reconstruction

Alternative 3 for the Sand Lake Road corridor proposes reconstruction of the existing roadway allowing for a 6-lane roadway with a shared-use path.

Description

The Full Reconstruction Alternative to the Sand Lake Road corridor allows for the reconfiguration of the existing right-of-way to accommodate three lanes in both directions with turn lanes and landscaping throughout. In this alternative, all segments between Apopka Vineland Road and Rialto would be reconstructed to maximize the existing right-of-way and limit additional right-of-way needs to minor intersection improvements and pond site locations. A shared use path on the south side of the roadway is included in this alternative as an off-street bicycle facility.

Implications

A Full Reconstruction of the corridor is anticipated to have the greatest impact to the community. The additional lanes would allow for greater capacity therefore having a benefit of reduced congestion when compared to the No Build Alternative. The reconstruction presents opportunities for additional landscaping and streetscaping which could further define the corridor positively impacting the business and residents in the surround areas. With additional pavement it is likely that a new stormwater detention pond would be needed and would be located near the corridor. Finally, the shared use path allows for bicycle and pedestrian-friendly activity which will enhance prospective use public transportation options. The additional right-of-way costs and construction activities also substantially increase the cost and complexity of the improvement and make it more difficult to implement.

5.2 Typical Sections by Alternative

The typical section by alternative described the process and segments affected by enhancing or reconstructing segments of Sand Lake Road to more effectively use the public right-of-way.

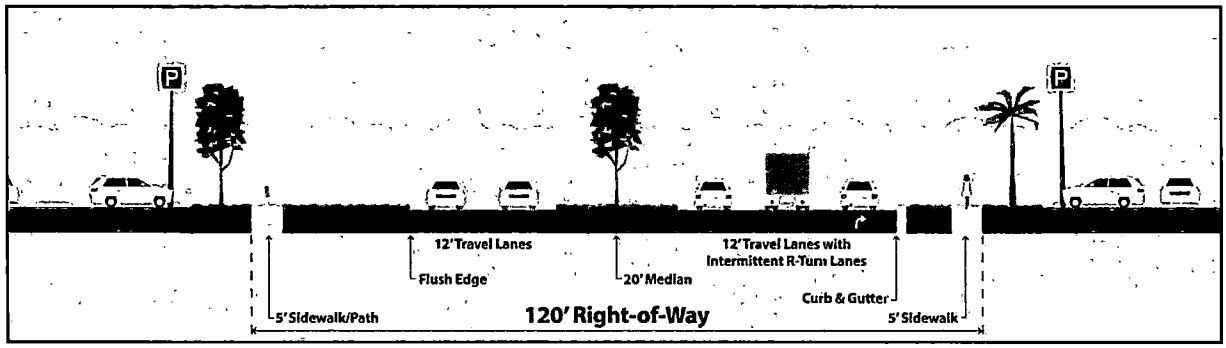
5.2.1 Alternative 1 – No Build

The No Build Alternative uses the existing typical section which maintains the infrastructure in its current condition. This keeps the existing roadway geometry as a straight, four-lane, and 1.3-mile corridor, divided with frequent right turn lanes. West of Rialto and east of Rialto contain slightly different typical section configurations, as described below. The Typical Section for the No Build Alternative is shown in Figure 11.

West of Rialto Signal

Sand Lake Road from Apopka Vineland Road to Rialto is nominally a four-lane divided arterial with frequent right turn lanes on the north side of the roadway. The proposed no build alternative would not change the existing geometrical layout of this section and would not improve the current capacity issues and operations of the roadway segments along this corridor. Currently, the westbound travel lanes contain two 12' lanes with intermittent right turn lanes, curb and gutter, and 5' wide sidewalk. The eastbound travel lanes contain two 12' travel lanes with a flush edge and 5' sidewalk. This roadway segment contains a 20' median and does not offer any dedicated bicycle facilities.

Figure 11 | Alternative 1 Typical Section



East of Rialto Signal

Facility conditions for this segment of Sand Lake Road have been previously modified from the typical section west of the Rialto signal. Specifically, Sand Lake Road from Rialto to Turkey Lake Road has been widened to six-lanes, featuring four through lanes and continuous right turn lanes ending at Rialto on the west and International Drive on the east. The median in this section has been limited to an 8-foot concrete separator to facilitate access control and provide left-turn opportunities. For the segment East of Rialto, the County is coordinating with the FDOT project, I-4 Beyond the Ultimate (BtU), to determine a final typical section as Sand Lake Road transitions from the interchange area to the Dr. Phillips community. The FDOT project includes redesigning the I-4 interchange with Sand Lake Road and widening of Sand Lake Road from west of Turkey Lake to Universal Boulevard. All the proposed alternatives and typical sections are consistent with FDOT's proposed changes and require coordination with FDOT to ensure continuity of elements such as sidewalk, paths, bicycle lanes and drainage.

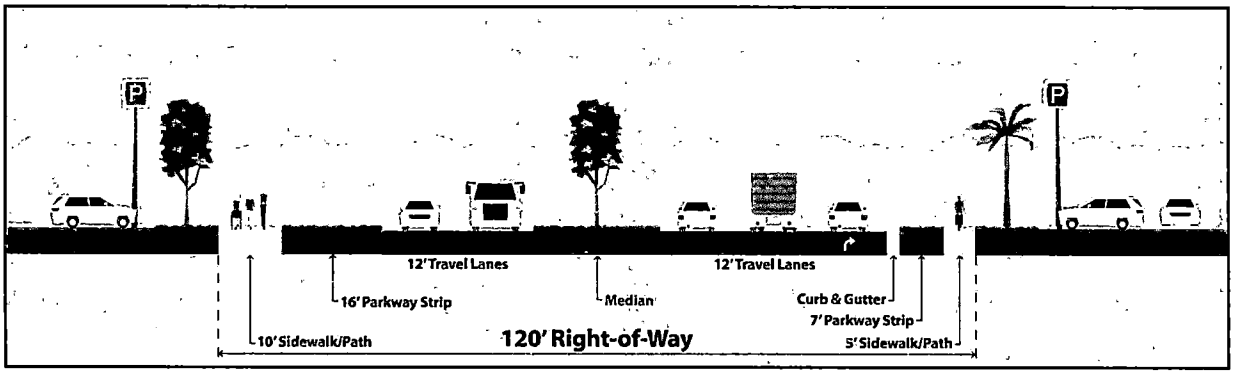
5.2.2 Alternative 2 – Operational Improvements

Alternative 2 includes three typical sections consistent with the alternatives segmentation of the roadway: Apopka Vineland Road to Dr. Phillips Boulevard, Dr. Phillips Boulevard to Rialto, and east of Rialto. These changes will include operational improvements to the roadway segments with a new westbound left turn lane at the eastern most Venezia Plaza entrance on Sand Lake Road. Additionally, new pavement is proposed to connect the right turning lanes between Dr. Phillips Boulevard and Rialto.

5.1.2.1 Apopka Vineland Road to Dr. Phillips Boulevard

The second alternative proposes maintaining the existing roadway lane configuration in this segment. The 120' right-of-way is shown in Figure 12 representing the existing condition with the exception of the new shared use path on the south side of the roadway. The westbound travel lanes are shown to remain as two 12' lanes portions with curb and gutter, a 7' parkway strip, and a 5' sidewalk. The eastbound travel lanes contain two 12' lanes with flush edge, a 16' parkway strip, and a 10' sidewalk. The upgraded 10' sidewalk/shared use path supports existing and future pedestrian and bicycle use and is located on the south side of the roadway.

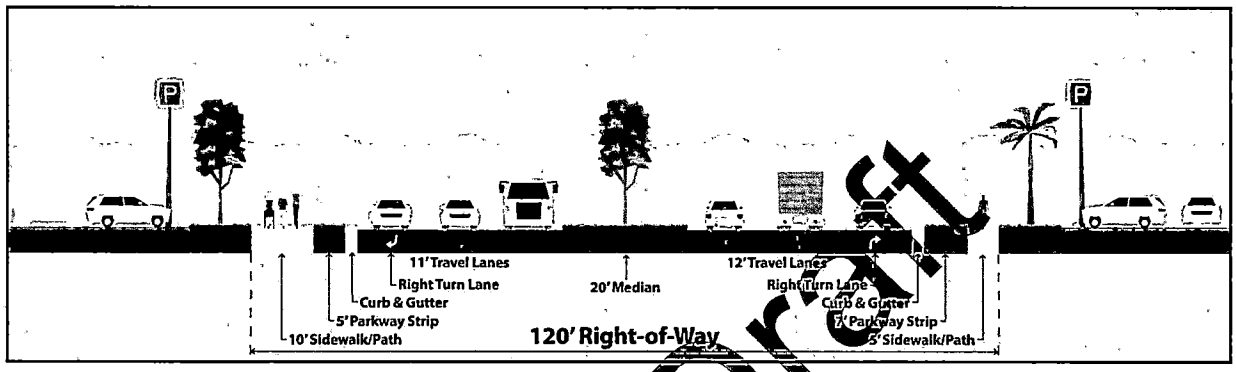
Figure 12 | Alternative 2 Typical Section Apopka Vineland Rd. to Dr. Phillips Blvd.



5.1.2.2 Dr. Phillips Boulevard to Rialto Signal

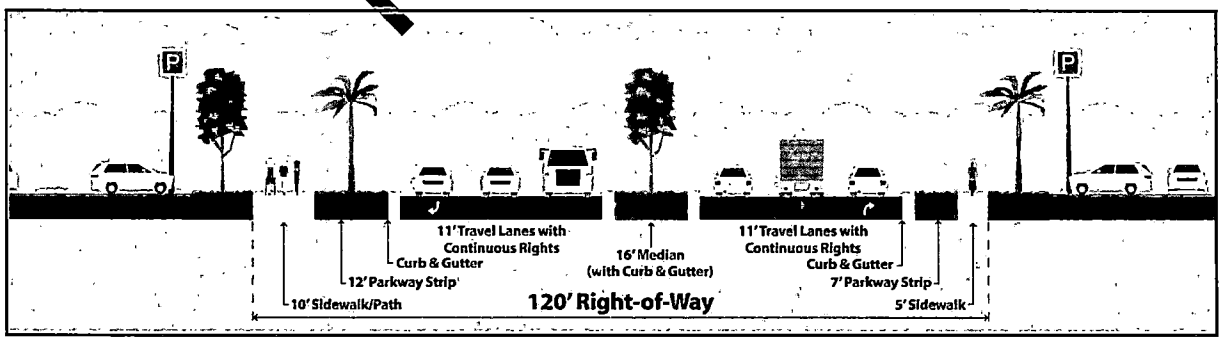
Two typical sections are considered to support Alternative 2 in the segment from Dr. Phillips Blvd. to Rialto. The first typical section, as shown in Figure 13, contains two 12' westbound travel lanes with a continuous right turn lane, a 7' parkway strip, a 5' sidewalk, and curb and gutter. The eastbound direction contains two 11' travel lanes with a continuous right turn lane, a 5' parkway strip, a 10' sidewalk/shared use path, and curb and gutter. This typical section maintains the existing 20' median.

Figure 13 | Alternative 2 Typical Section from Dr. Phillips Blvd. to Rialto Existing Median



The second typical section, as shown in Figure 14, includes two 11' westbound travel lanes with a continuous right turn lane, a 7' parkway strip, and a 5' sidewalk along with curb and gutter. The eastbound travel lanes contain two 11' lanes with a continuous right turn lane, curb and gutter, a 12' parkway strip and a 10' sidewalk/shared use path. These proposed shifts are possible by reducing the roadway median to 16' from the existing 20' median. The 10' sidewalk/shared use path is intended to support growth in pedestrian and bicycle use, and is recommended on the south side of the roadway only where the median shift has been used to allow for a larger buffering area.

Figure 14 | Alternative 2 Typical Section from Dr. Phillips Blvd. to Rialto with Median Shift



5.1.2.3 East of Rialto Signal

From Rialto east to Turkey Lake Road, there are no proposed changes to the number of travel lanes. Each direction has three travel lanes with median openings to access businesses along the roadway. East of Rialto, the County is coordinating with FDOT's I-4 Beyond the Ultimate project. FDOT is

redesigning the I-4 interchange with Sand Lake Road, and this will include improvements to Sand Lake Road from west of Turkey Lake Road to Universal Boulevard. All the proposed alternatives and typical sections are consistent with FDOT's proposed changes and require coordination with FDOT to ensure continuity of elements such as sidewalk, paths, bicycle lanes and drainage.

5.2.3 Alternative 3 - Full Reconstruction

Alternative 3 considers full reconstruction of Sand Lake Road to a 6-lane urban roadway west of the Rialto signal. Coordination with FDOT will occur for future improvements east of Rialto. Figure 15 and Figure 16 represent the typical sections for the proposed alternative.

West of Rialto Signal

Full reconstruction of this roadway segment includes three travel lanes in each direction and a 10 foot shared use path on the south side of the roadway. The westbound direction contains three 11' lanes and has the opportunity to include an 11' right turn lane for large intersections such as Dr. Phillips Boulevard. The right turn lane addition is shown in Figure 16. Outside the travelway, curb and gutter are shown throughout the segment dividing out the 11' parkway strip and 6' sidewalk. The eastbound direction contains two 11' lanes and an 11' shared through/right turn lane. Outside the travelway, curb and gutter are shown throughout the segment dividing out the 7' parkway strip and the 10' sidewalk/shared use path. From Apopka Vineland Road to Rialto, a 16' median is shown to maximize the space outside the travelway.

Figure 15 | Alternative 3 Typical Section

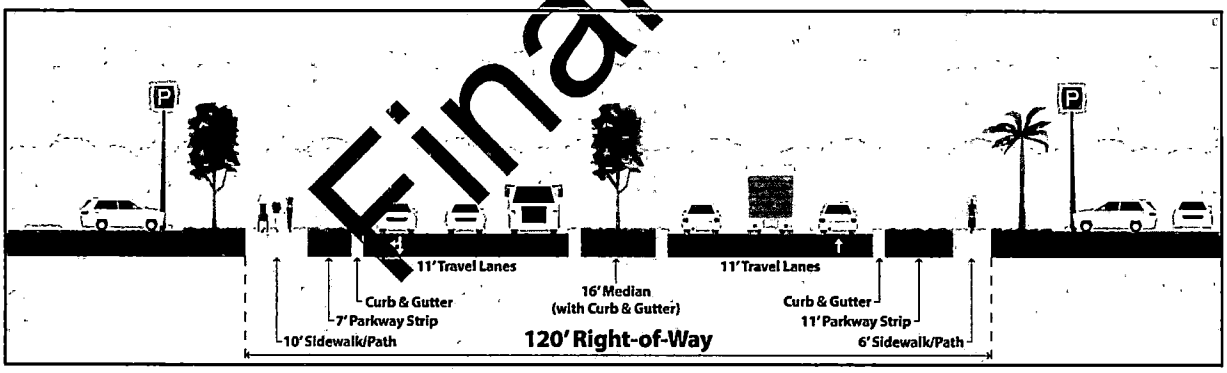
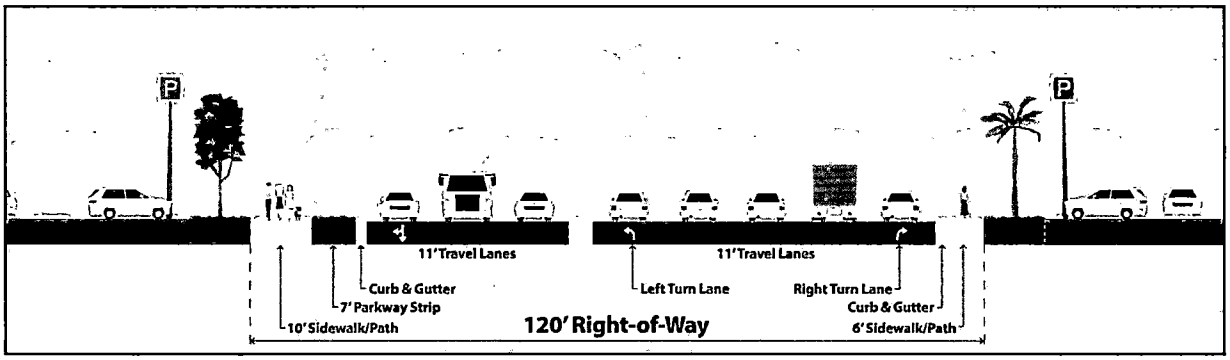


Figure 16 | Alternative 3 Typical Section with Westbound Right Turn at Dr. Phillips Blvd.



East of Rialto Signal

From Rialto east to Turkey Lake Road, there are no proposed changes to the number of travel lanes. Each direction currently has three travel lanes with median openings to access businesses along the roadway. East of Rialto, the County is coordinating with FDOT's I-4 Beyond the Ultimate project. FDOT is redesigning the I-4 interchange with Sand Lake Road and this will include improvements to Sand Lake Road from west of Turkey Lake Road to Universal Boulevard. All the proposed alternatives and typical sections are consistent with FDOT's proposed changes and require coordination with FDOT to ensure continuity of elements such as sidewalk, paths, bicycle lanes and drainage.

5.3 Access Management

Sand Lake Road is an existing, urbanized, and thriving corridor with a mix of uses fronting the roadway and reliant on the access that exists today. The access management review of this corridor carefully considered the existing interaction of the surrounding land uses with the roadway. For Alternatives 2 and 3, modifications to access are proposed in support of the County goals of safety and mobility.

5.3.3 Access Management Approach

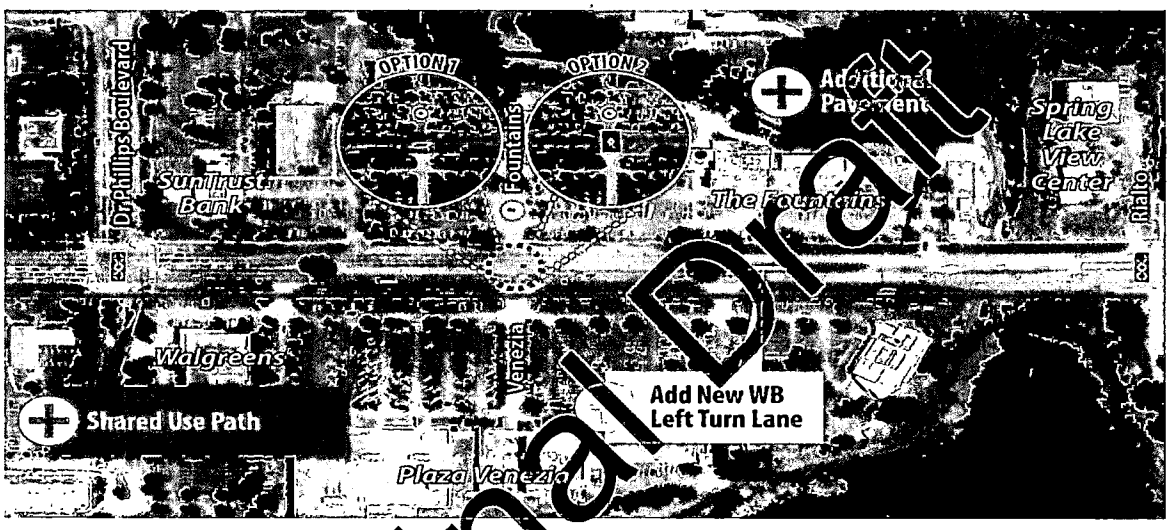
Sand Lake Road in the study area is a divided roadway with medians throughout. Access to Sand Lake Road consists of multiple signalized and full access unsignalized median openings, directional median openings, and right-in right out driveway connections. Access management for this study addressed the unsignalized locations with a focus on need for closure or modification to support the enhancements on the roadway. The FDOT Median Handbook guidance on access management and modification options provides direction for when access changes are reasonable. This guidance includes review of median width, turning movement volume, primary roadway AADT, and crash history. Each of the proposed access options takes into account the effects of existing spacing between access points and attempts to address the overall traffic safety, efficiency, and system integrity of the corridor.

5.3.4 Proposed Changes

Only one access location in the review is identified for modification. The unsignalized full median opening between the Plaza Venezia and The Fountains Shopping Center requires modification to be consistent with either Alternative 2 or Alternative 3. This access point is observed to challenge drivers under the existing traffic volumes and roadway geometric. To minimize driver confusion, crashes, and

traffic delay, this report recommends modification of the access to either limit left-turns out of the shopping centers through the use of a directional median opening or to signalize the location. These are identified as Options 1 – Directional Median or Option 2 – Signalization. As a note, the signalization option would require a Traffic Signal Warrant Study be completed and recommend a signal. This Traffic Signal Warrant Study is not part of the access management analysis performed for the Sand Lake Road RCA. In addition to Option 1 and Option 2, a new directional westbound left turn opening allowing new access into Plaza Venezia is recommended for either alternative to increase accessibility into this commercial site at the eastern most location available west of the channel between Spring Lake and Little Sand Lake. All of the proposed access changes are shown in Figure 17.

Figure 17 | Operational Improvement Changes for Alternative 2



Option 1 - Directional Median

The directional median opening option creates channeled access for drivers turning left from Sand Lake Road into either The Fountains or Plaza Venezia shopping centers through the use of a raised island. Side street left turn and plaza to plaza through movements are prohibited and would be rerouted primarily through the signalized intersection at Sand Lake Road and Dr. Phillips Boulevard. A visualization of this option can be seen in Figure 18. This approach discourages conflicting turns, reduces opportunities for vehicle crashes improving safety for users. *It is important to note that due to median modification and narrowing of the median that the tree shown in the median may not be able to be preserved. This will need investigated further during the design phase. Even if the tree is not preserved, another tree could be placed in this location. One possibility for this location is to not shift the median until east of this tree. This would allow for more space in the median for this tree.*

Figure 18 | Directional Median Opening

Signalized Intersection

A signalized intersection placed at Sand Lake Road and The Fountains and Plaza Venezia access involves the installation of traffic signals and pedestrian crosswalks. The signalization option, which requires a traffic signal being warranted through a separate study, allows for the existing access location to be used, but with the protection and consistent guidance of signalized traffic control. This reduces driver confusion for entering and exiting the shopping centers. It also allows a dedicated period for pedestrians to cross the roadway. The signalization option allows for all the same movement, but requires careful coordination with the signal at Sand Lake Road and Dr. Phillips Boulevard to minimize impact to the through vehicular traffic operations. A preliminary review suggests that left turning vehicle traffic from Sand Lake Road westbound into Plaza Venezia may meet the requirements of a traffic signal warrant. However, prior to final design, a traffic signal warrant study should be conducted with the most recent traffic volumes available at that time. A visualization of this option is shown in Figure 19. *It is important to note that due to median modification and narrowing of the median that the tree shown in the median may not be able to be preserved. This will need investigated further during the design phase. Even if the tree is not preserved, another tree could be placed in this location. One possibility for this location is to not shift the median until east of this tree. This would allow for more space in the median for this tree.*

Figure 19 | Signalized Intersection

Left Turn Opening

A new direction left turn opening is recommended for the westbound direction of Sand Lake Road at the eastern most driveway of the Plaza Venezia shopping center. This modification allows drivers traveling westbound to access the Plaza Venezia before reaching the existing median opening across from The Fountains shopping center. This modification distributes demand by providing an additional and earlier option. A visualization of this modification is shown in Figure 20. *It is important to note that due to median modification and narrowing of the median that the tree shown in the median may not be able to be preserved. This will need investigated further during the design phase. Even if the tree is not preserved, another tree could be placed in this location. The shifting of the median also allows for additional landscaping on the south side of the roadway that would serve as a buffer to the shared use path.*

Figure 20 | Left Turn Opening

5.3.5 The Fountains / Plaza Venezia Shopping Plazas

The shared median opening access point for The Fountains and Plaza Venezia is recommend for modification independent of the Alternative ultimately advanced into construction. The Sand Lake Road segment fronting these two shopping centers has an existing AADT 80% higher than the recommended point in the FDOT Median Handbook. Crash history for Sand Lake Road shows a majority of all crashes west of the Turkey Lake Road intersection occur between this access point and the adjacent Dr. Phillips Boulevard intersection. Improvements that address the rear-end crashes observed in this section may exacerbate the challenges associated with an unsignalized full median opening. Both Option 1 – Directional Median and Option 2 – Signalization are presented as recommendations consideration when advancing Sand Lake Road into the design phase.

5.4 Alternatives Evaluation

Alternatives Evaluation provides a detailed comparison of the qualitative and quantitative characteristics for the three Alternatives.

5.4.1 Qualitative Comparison

The qualitative analysis includes a review of the evaluation criteria used and the results measured.

Alternative 1 – No Build

The No Build Alternative proposes no lane or roadway modifications. The current transportation system provides low opportunities for Complete Streets accommodation, roadway design enhancements, and landscaping. Additionally, this alternative presents no modifications to the current stormwater system and therefore would not require additional drainage infrastructure. It also does not require any right-of-way acquisition. However, a No Build Alternative does not address the safety or mobility goals of this project. As quantified in westbound peak hour travel times, it is projected that the existing simulated travel time of 5.3 minutes may remain stable through the year 2020 at 5.1 minutes due to improved traffic signal operation but could balloon by the year 2040 to 9.9 minutes as volume increases. The uninterrupted travel time at the speed limit of 45 mph along the corridor without delays at signals is approximately 2 minutes. Therefore Alternative 1 would result in approximately 8 minutes the delay in congestion during the 2040 peak hour.

Alternative 2 – Operational Improvements

The Operational Improvements Alternative includes lane modifications for the Rialto traffic signal to Dr. Phillips Boulevard segment. No acquisition of right-of-way is anticipated in order to implement this alternative. There is a "medium" opportunity for improving conditions for Complete Streets accommodation. Modifications to the median and to the parkway strip are intended to address landscaping and streetscape elements. Additionally, minimal modifications are needed to address the impacts to the stormwater system but County coordination with the Water Management District is expected. As quantified in westbound peak hour travel times, it is projected that the existing simulated travel time of 5.3 minutes could improve in the year 2020 to 4.1 minutes due to both improved traffic

signal operation and the operational geometric enhancements, but is still expected to grow to 6.6 minutes in the 2040 horizon year.

Alternative 3 – Full Reconstruction

The Full Construction Alternative includes lane modifications for entire corridor west of Rialto. There would be a need to acquire additional right-of-way in order to accommodate this design primarily for stormwater related improvements. Relative to addressing additional landscaping, this alternative provides the greatest opportunity because the introduction of curbing would allow for additional planting areas. This alternative allows for addition capacity through additional lanes, enhancing curb and gutter, and improving landscaping on the parkway strip. It is likely this alternative would require new pond sites to address stormwater. As quantified in westbound peak hour travel times, it is projected that the existing simulated travel time of 5.3 minutes could improve in the year 2020 to 4.2 minutes due to both improved traffic signal operation and through additional capacity, but is still expected to grow to 6.1 minutes in the 2040 horizon year.

5.4.2 Alternative Evaluation Matrix of Operations, Impacts and Costs

Table 30 provides a side-by-side comparison of the three Alternatives in terms of each evaluation criteria. For the qualitative elements of the design, a high, medium, and low opportunity scale has been applied to provide context to the quality of the element.

Table 30 | Alternative Evaluation Matrix

Evaluation Criteria	1 – No Build	2 – Operational Improvements	3 – Full Reconstruction
Lane Changes from Turkey Lake Rd. to	None	Dr. Phillips Blvd.	Apopka Vineland Rd.
PM Pk WB Corridor Travel Time – 2020 (min)	5.1	4.1	4.2
PM Pk WB Corridor Travel Time – 2040 (min)	9.9	6.6	6.1
Complete Streets Accommodation	Low	Medium	High
Roadway Design & Landscape Opportunities	Low	Medium	High
Stormwater Permitting Difficulty/Approach	None	Low Inline Treatment	High Pond Improvements
Additional Right-of-Way	No	No	Yes
Planning Cost (excludes ROW, Wetland Mitigation, Utility Relocation, and Lighting)	N/A	$8mil-$10mil	$24mil-$30mil

6.0 Preferred Alternative

The Preferred Alternative is presented through the synthesis of professional planning, engineering and public input to leading to a set of roadway improvements designed to enhance the experience and safety of those traveling on, residing near and doing business on Sand Lake Road.

6.1 Preferred Alternative Summary

The Preferred Alternative enhances the safety, mobility, and comfort for users of the Sand Lake Road corridor. The Sand Lake Road corridor is congested, particularly during peak hours, and the existing design is limited in it's accommodation for pedestrian and bicycle users. Population and economic growth along this part of the corridor is expected. However, proportionate infrastructure is required to support and sustain anticipated travel demand. This section details the Preferred Alternative derived from Alternative 2.

6.1.1 Recommended Corridor Enhancements

The Preferred Alternative includes operational improvements to the existing infrastructure of the Sand Lake Road corridor. Each improvement presented is shown within the right-of-way and provides accommodations for the needs of Sand Lake Road users. These improvements include:

- Continuous eastbound/westbound outside lanes for right turning vehicles between Rialto and Dr. Phillips Boulevard
- Access management options for the median opening between The Fountains and Plaza Venezia shopping centers
- New westbound directional left into Venezia Plaza for eastern most access to the shopping plaza
- Multi-use shared path on south side of Sand Lake Road for bicycle and pedestrian movement
- Enhanced pedestrian crossing features including decorative pavement and right turn channelizing island at Dr. Phillips Boulevard Intersection
- Extended median left turning lanes for the eastbound direction onto Della Drive and Dr. Phillips Boulevard, and westbound to The Esplande.
- Median Curb and gutter consistently from Clubhouse Estate Drive to Rialto
- Left turning lane added to southbound Della Drive approaching Sand Lake Road to allow for a dedicated southbound right turn lane.
- Curb treatments added to the Sand Lake Road intersections with Della Drive and Dr. Phillips Boulevard

6.1.2 Design Traffic Volumes

The Design Traffic Volumes analyzed in the Preferred Alternative are the same as in Alternative 2. The volumes and subsequent traffic operations were developed using vehicular travel demand modeled for the 2020 and 2040 horizon years then translated into peak hour turning movement volumes as presented in Section 3 of the RCA – Existing and Future Traffic Analysis. The Operational

Improvements associated with the Preferred Alternative were not considered a 'Build' in terms of the modeling effort as triggered by a 6-lane widening between Apopka Vineland Road and I-4. This analysis considered the changes in I-4; both under construction with the I-4 Ultimate project and the planned improvements associated with the I-4 Beyond the Ultimate (BtU) including the associated interchange modifications.

6.1.3 Traffic Operations Analysis

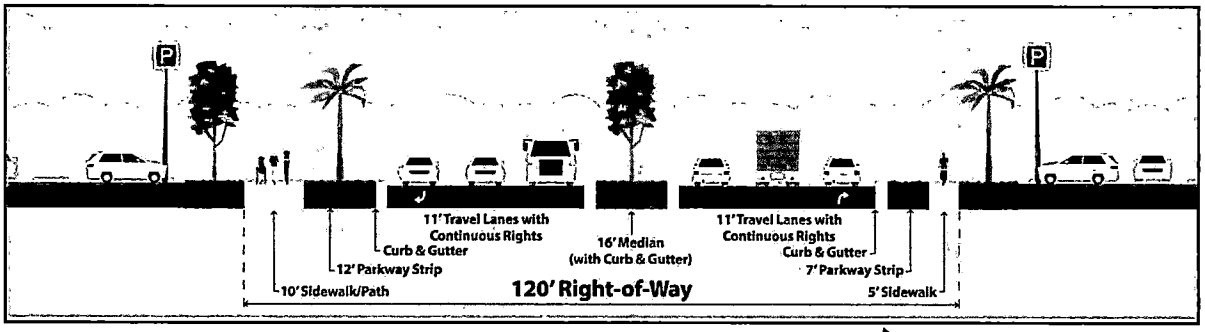
The traffic operational analysis details are presented in Section 3 of the RCA – Existing and Future Traffic Analysis. The VISSIM based traffic operations analysis for the Preferred Alternative support the mobility expectations for vehicle travel on Sand Lake Road. The results of the analysis demonstrate the improvement associated with Alternative 2 provides a westbound travel time savings of more than 20% in the year 2040 when compared to Alternative 1 - No Build. This is similar to the operation improvement of a full reconstruction, but requires less impervious space and therefore lessor impacts and cost. The most significant design feature contributing to these results is the continuous right turn lanes between Dr. Phillips Boulevard and Turkey Lake Road maximize the right-of-way to develop capacity while minimizing the negative operational impact of the weaving and queue spillback observed on the short and disconnected right turn lanes existing today.

6.1.4 Typical Sections and Alignment

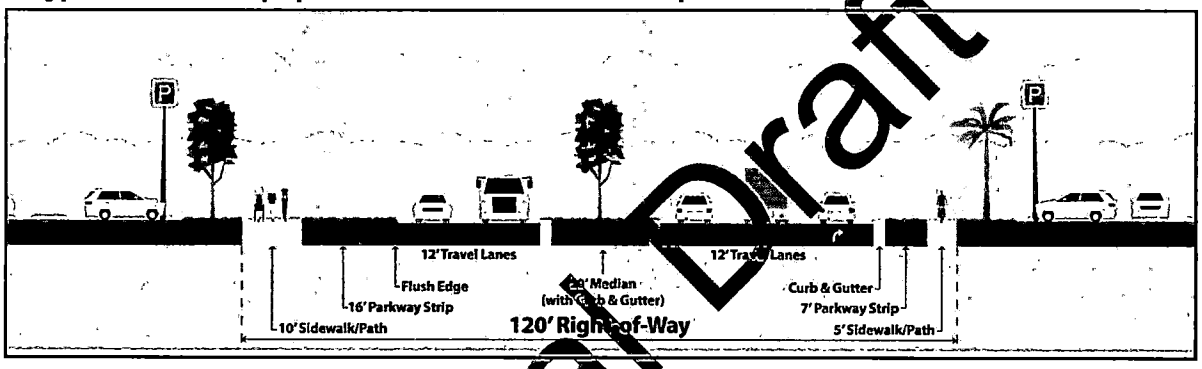
The Typical Section and Alignment are consistent with Alternative 2 using the median shift version. This version maximizes the available space outside of the travel way to provide a wide buffer between the shared use path and the travelway where a continuous right turn lane is present. In addition to Alternative 2, median curb has been added not only in the segment between Dr. Phillips Boulevard and Rialto, but in all locations along the Sand Lake Road study area. As illustrated in Figure 21, the improvements associated with the Preferred Alternative are anticipated to be contained within the existing 120 feet of right-of-way. Final design survey may show the need for right-of-entry or temporary construction easements in order to better tie into existing properties and driveways and avoid the need for short retaining walls with handrails and to provide driveways with more gentle slopes.

Figure 21 | Typical Sections - Preferred Alternative

Typical Section Dr. Phillips Blvd. to Rialto



Typical Section Apopka Vineland Rd. to Dr. Phillips Blvd.



6.1.5 Concept Plans

For this project, the Preferred Alternative conceptual plan sheets describe the roadway corridor from west to east indicating areas of additional pavement for operational improvements, landscaping opportunity areas, and other corridor characteristics.

REVISIONS			
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ORANGE COUNTY GOVERNMENT FLORIDA

SAND LAKE ROAD STUDY

SAND LAKE RD RCA PREFERRED ALTERNATIVE CONCEPT PLANS

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ORANGE COUNTY GOVERNMENT FLORIDA

SAND LAKE ROAD STUDY

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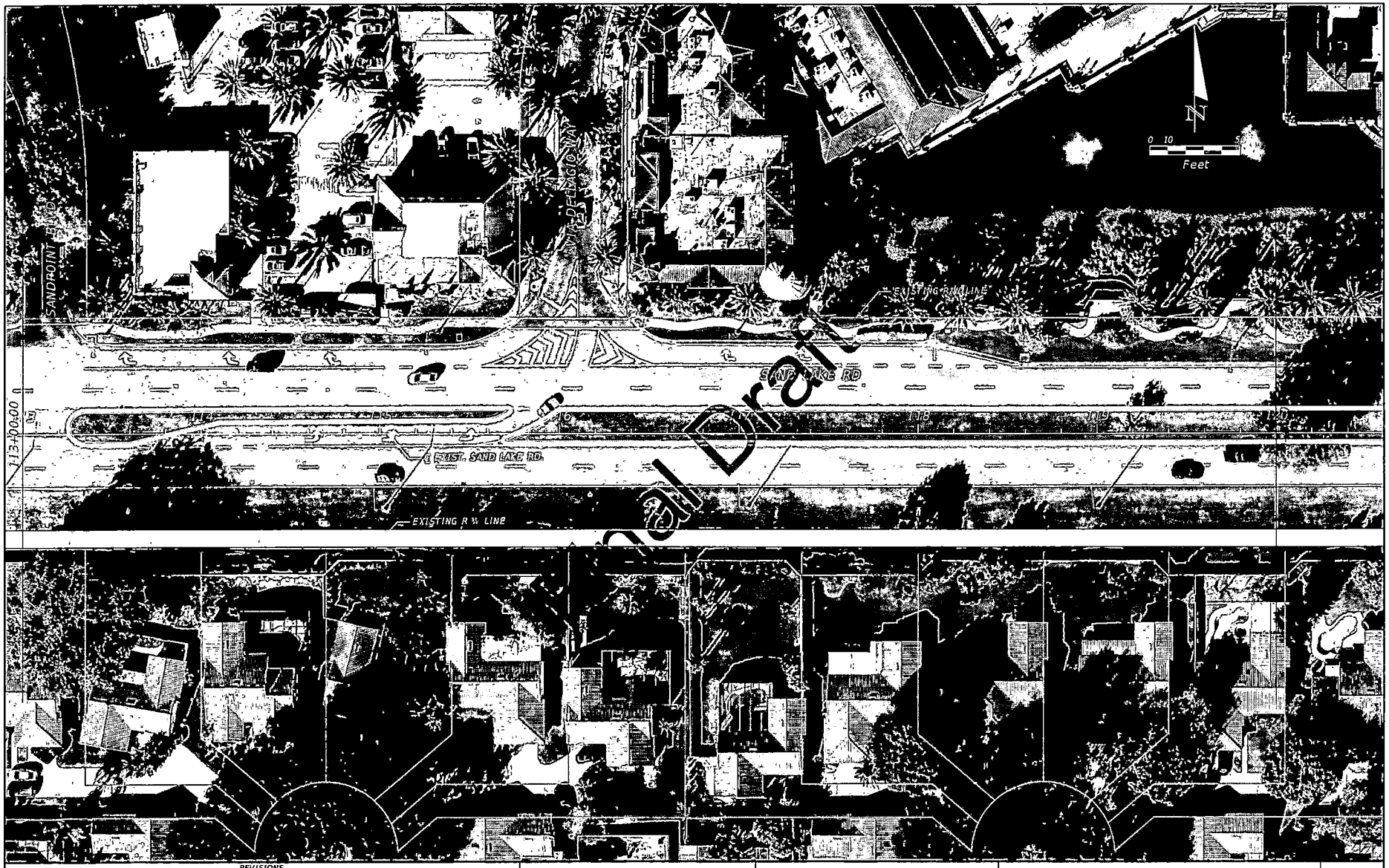

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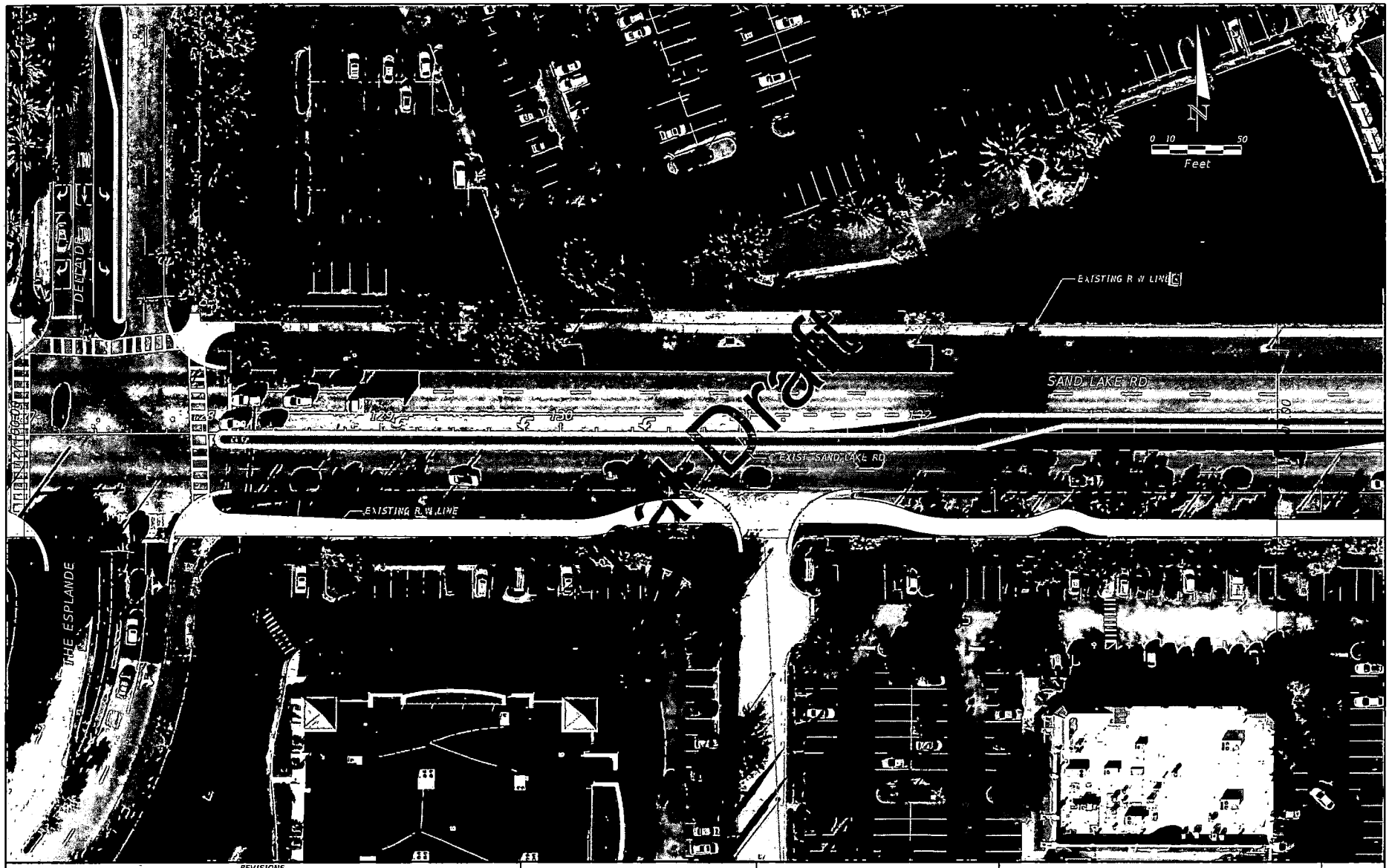

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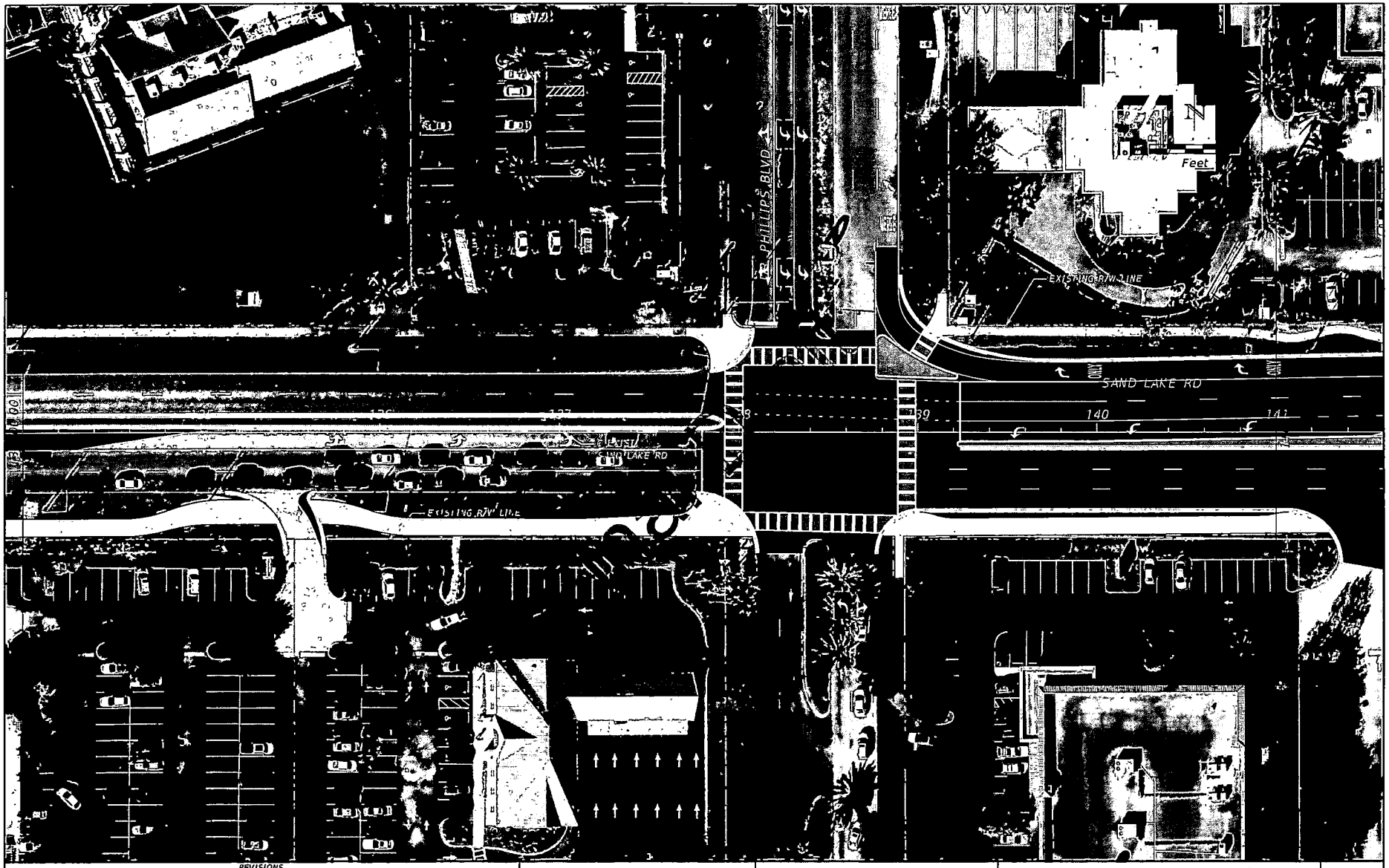

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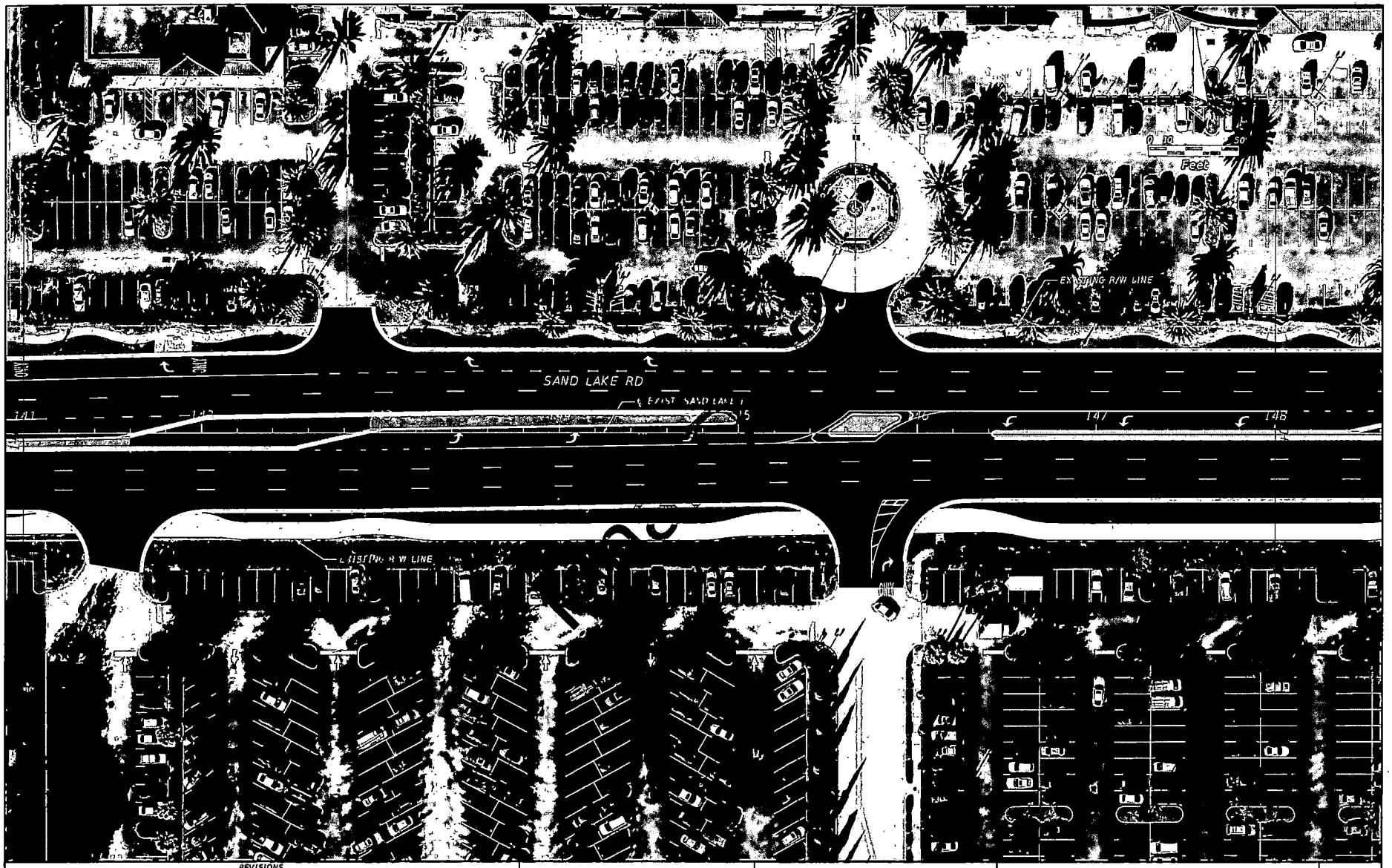

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ORANGE COUNTY GOVERNMENT FLORIDA

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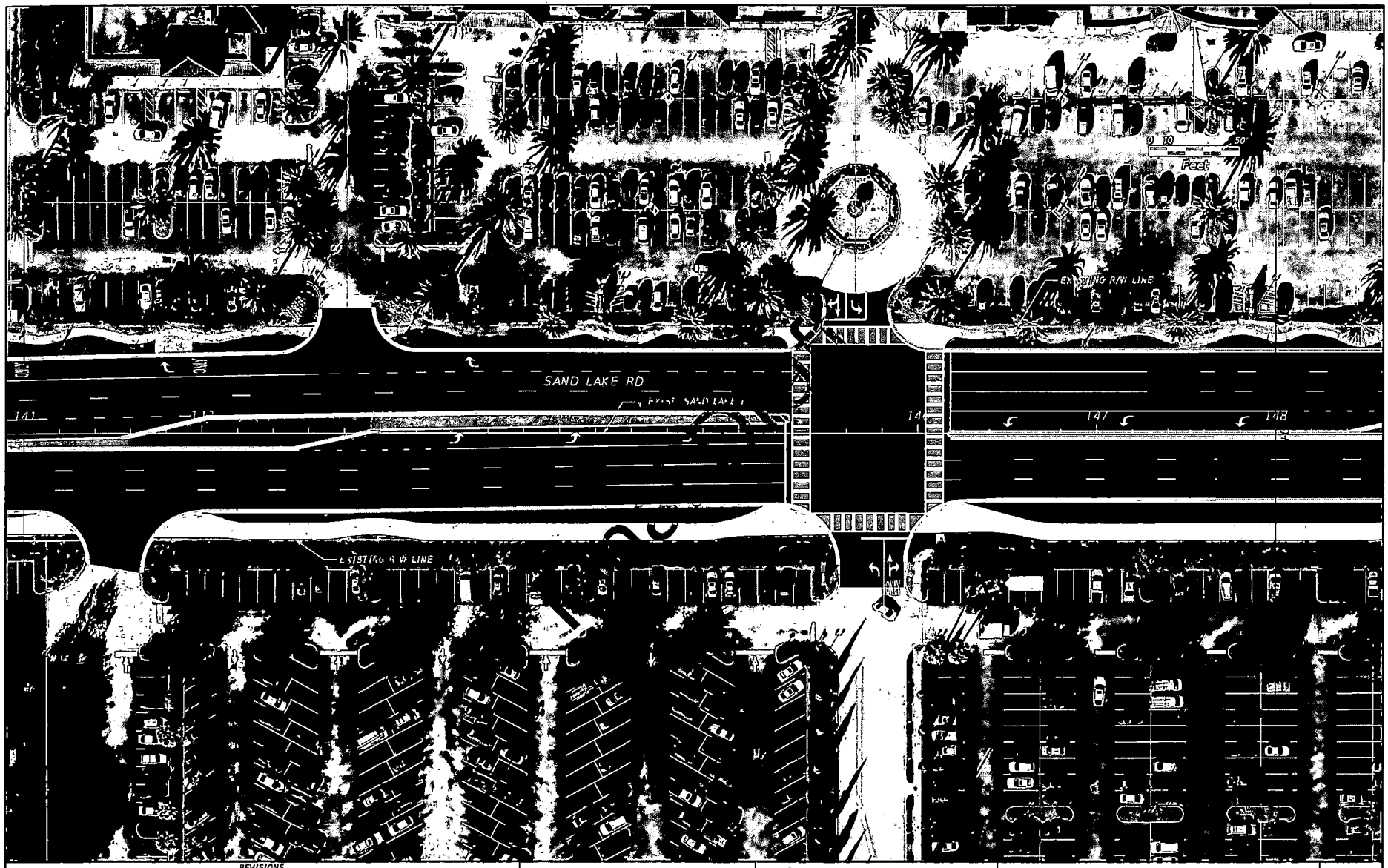

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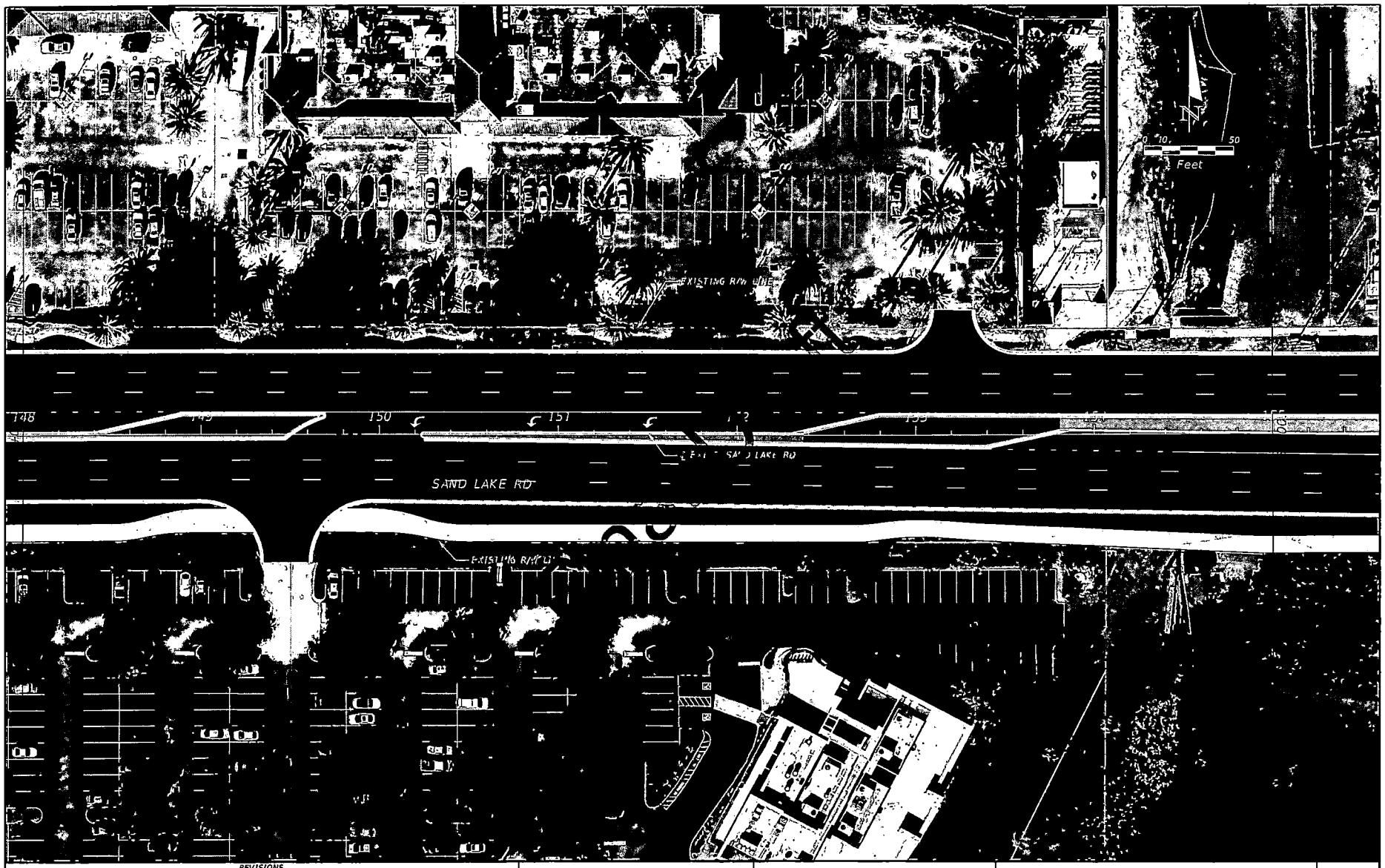

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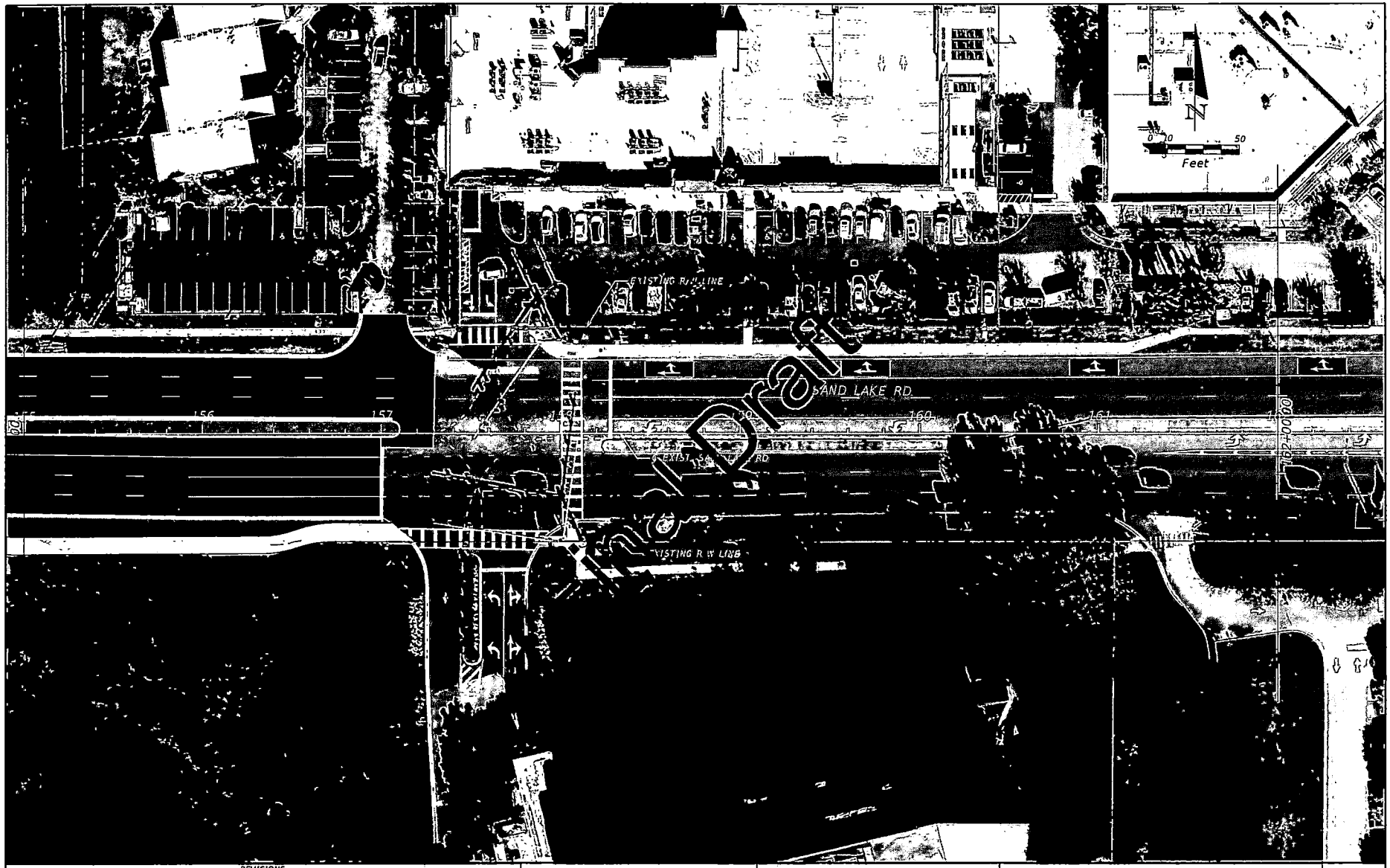

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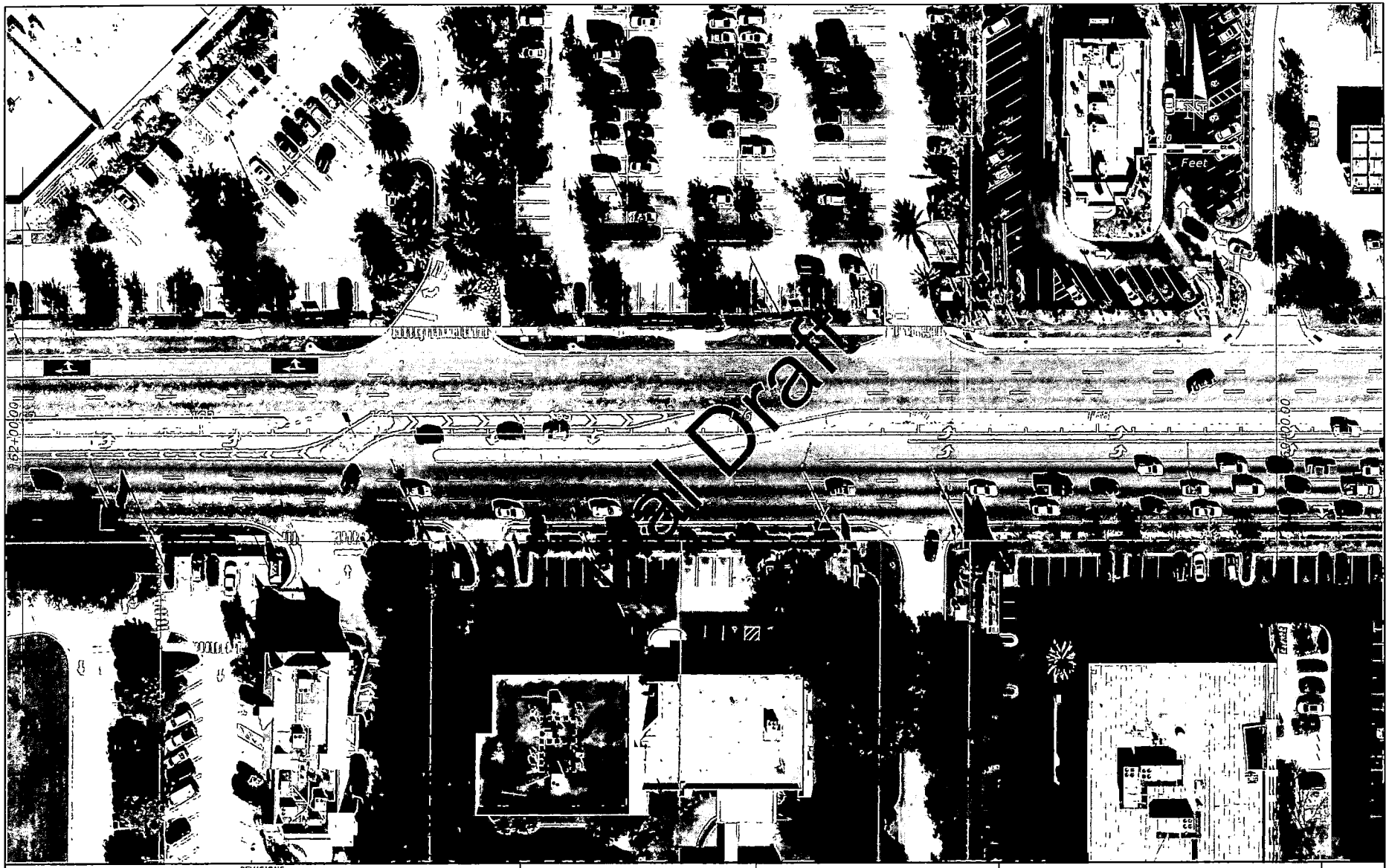

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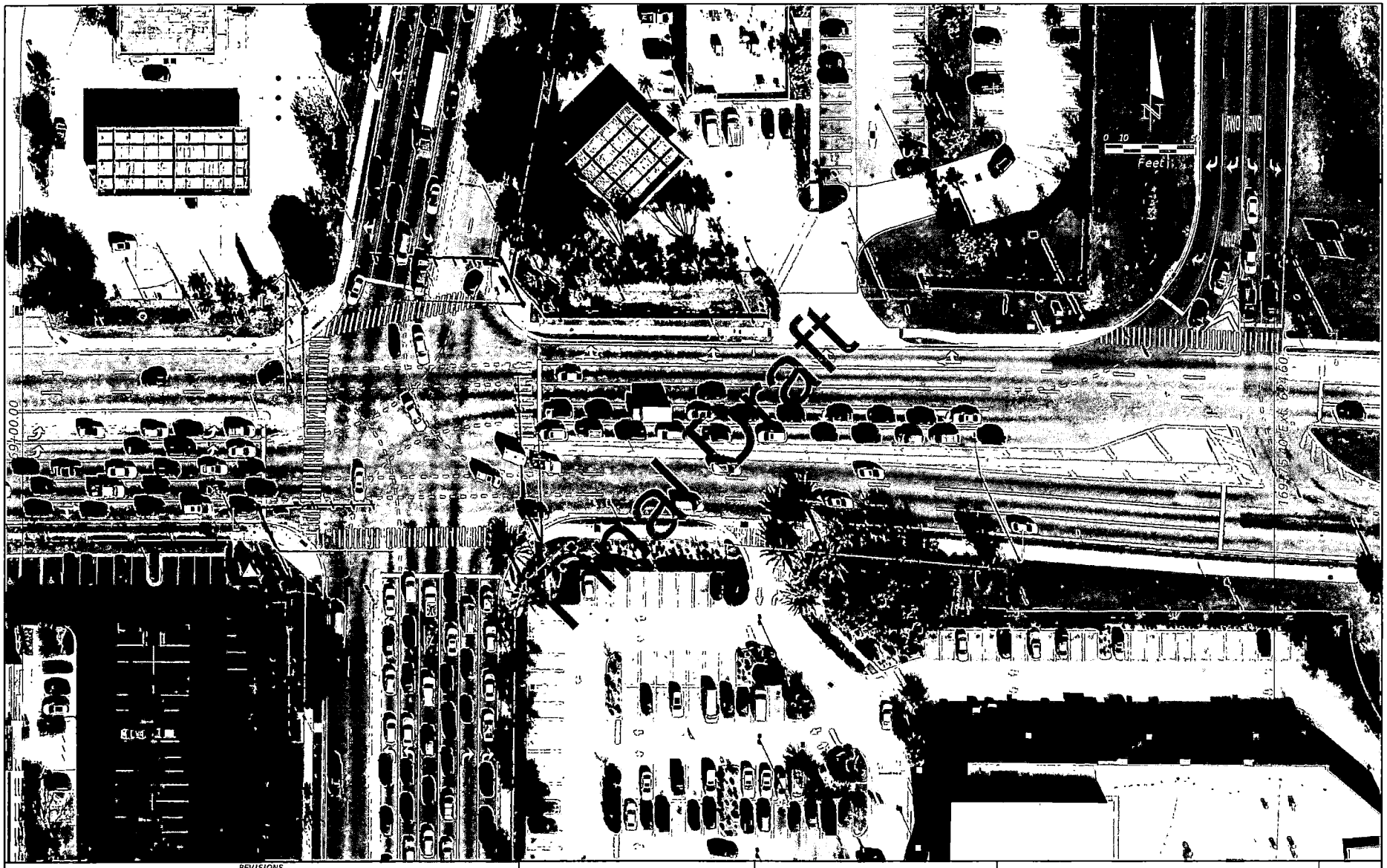

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ORANGE COUNTY GOVERNMENT FLORIDA

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6.2 Final Design Cost Estimate

The anticipated construction costs for the Preferred Alternative are based on 2016 dollars formulated utilizing FDOT Statewide Averages and input from Orange County for adjustments for comparable roadway projects. The preliminary cost estimate for construction of the project is $8,850,000 and does not include lighting, right-of-way, wetland mitigation, or utility relocation cost. Table 30 below itemizes by category the cost items for planning purposes.

Table 31 | Preliminary Cost Estimate

Category	Estimated Cost (1/20/2017)
Roadway/Sidewalk/Drainage	$2,800,000
Stormwater Treatment	$3,300,000
Lighting	To be determined
Landscaping (trees and turf)	$125,000
Signalization (if warranted)	$825,000
Contingency (25% overall)	$1,800,000
Total	**~$8,850,000+**

6.3 Environmental and Community Impacts

This section details the environmental and community impacts of the Preferred Alternative. The results of this investigation are detailed extensively in Section 2.11 and Section 2.12 of this report. The findings suggest low to no anticipated environmental and community impacts and are briefly highlighted in the following subsections.

6.3.1 Land use

The current make up of land use existing along the selected section of Sand Lake Road is mainly comprised of residential and commercial usages with assorted tenants. The Preferred Alternative is not anticipated to impact any of the current land uses nor create any future changes to the land uses.

6.3.2 Community Cohesion

Community cohesion is anticipated to be maintained as this project will not create breaks in current neighborhood boundaries. There are no anticipated interruptions in service areas or access of community facilities and services. These facilities will continue to have the same access as they currently experience.

The completion of the improvements along the corridor, such as the shared use path, will allow for greater pedestrian and bicycle access and mobility which should positively influence community cohesion along the corridor.

6.3.3 Cultural Impacts

Review of archeological and historical records of the area indicates that there has been limited historical activity in the area. Due to development and natural weathering, limited features remain of historical significance and what remains is not anticipated to be impacted by the Preferred Alternative implementation.

Much of the recent history is attributed to the influence of Dr. Philips Phillips, a physician from Tennessee who settled within this area in 1905. Phillips established a successful citrus empire on land around this corridor. As time passed, Dr. Phillips's groves would transition to residential and commercial development due to the influence of the tourism industry and also enterprising golf interests. Commemorating this period are the widely-recognized Dr. Phillips Center arches, located along the north and south entrances of Dr. Phillips Boulevard. Characteristic of Florida greenery, Oak trees also thrive throughout the Dr. Phillips community, which enhance the identity and charm of the area. These items were considered in the development of the Preferred Alternative.

6.3.4 Wetlands

Within the study area, there are no direct impacts to wetlands. However, it must be noted that there are wetlands and surface waters existing in adjacent areas including Spring Lake and Little Sand Lake. If any impacts are warranted, permits will be required through the appropriate agencies (detailed in Section 2.11.2). All other wetland and surface water systems outside of the project area will likely not be impacted by the proposed roadway improvements.

6.3.5 Wildlife and Habitat

The existence of protected plant and animal species, as well the possibility of occurrence within the project area, was investigated utilizing state and federal databases, available literature and a field review. Based on these techniques, minimal occurrences of species were observed, suggesting little to no impact from the proposed project. Further results of this evaluation, including a detailed table of existing species, are provided in Section 2.12.1 and Section 2.12.2 of this report.

6.4 Geotechnical Considerations

The Preferred Alternative does not pose any negative impacts or threats to the existing conditions in the corridor. In locations where pavement areas are extended, milling and resurfacing is included to minimize and differences in quality for those sections. Further details on these findings are located in Section 2.6 of this report.

6.5 Environmental Assessment

An environmental assessment was performed for the selected Sand Lake Road corridor and the findings are detailed in Section 2.7 of this report. There are a few sites which currently pose minor contamination risks and are described in Table 5. However, it was determined that there are no

superfund or landfill sites within a 1-mile radius of the project area and therefore will inflict no impacts with implementation of the Preferred Alternative.

6.6 Utility Impacts

The Sunshine 'One-Call' service identified each of the utility providers known to operate within the Sand Lake Road corridor. There are numerous utilities within the study corridor including electric lines, water and sewer lines, cable television, and telephone/communication lines. Contact information for each utility provider is listed in Table 4 of Section 2.4. Information regarding future plans for improvements to utility services will be coordinated during the design phase.

6.7 Drainage Impacts

Based on the suggested alternative, the impacts to the existing drainage system can be considered minimal. For the entire length of the suggested roadway improvements, approximately 1.78 acres of new impervious area will be added to the corridor. The following is a breakdown of the proposed impervious area within the study area:

Table 32 | Sand Lake Road New Impervious Areas

Type	East of Dr. Phillips Blvd.	West of Dr. Phillips Blvd.	Total
Net New Pavement	4,715 sf	23,302 sf	28,017 sf
Curb	11,574 sf	11,644 sf	23,218 sf
Sidewalk	17,675 sf	8,470 sf	26,145 sf
Total New Impervious	33,964 sf / 0.8ac	43,416 sf / 1.0ac	77,380 sf / 1.8ac

The other impact associated with the suggested roadway improvements involves enclosing the existing ditches with storm pipes. In order to accommodate the slight increase in impervious area and to offset enclosure of the swales with storm pipes, water quality retrofit improvements should be provided to avoid a net increase in pollutant loadings. In regards to the preferred alternative, the recommended water quality retrofit improvements include the installation of nutrient separating baffle boxes (NSBBs). NSBBs effectively capture and remove sediments, debris, and pollutants associated with urban runoff. In regards to the suggested alternative, the following water quality retrofit improvements are recommended:

6.7.1 East of Dr. Phillips Boulevard

In order to offset the 0.8 acres (33,964 sf) of new impervious area and enclosing the existing swales located along the north and south sides of Sand Lake Road, four (4) baffle boxes are proposed. More specifically, two (2) baffle boxes are located on the north side, one on each side of the existing canal that connects Spring Lake to Little Sand Lake, and two (2) baffles boxes are located on the south side, also on both sides of the canal (refer to Appendix I, Figure 2). The locations of these baffle boxes allow the runoff from each drainage system to be treated before discharging into the canal. These four (4)

baffle boxes will treat the runoff associated with Basins B, C, D, and E which are identified in Appendix I, Figure 1.

6.7.2 West of Dr. Phillips Boulevard

In order to offset the 1.0 acre (43,416 sf) of new impervious area and enclosing the existing swales located along the north and south side of Sand Lake Road, one (1) large baffle box is proposed within the Della Drive Outfall System. More specifically, the baffle box will be located within a 50-foot wide Orange County drainage easement associated with a 54-inch outfall pipe located south of Sand Lake Road, between Bonefish Grill and Barnes and Noble which can be seen in Appendix I, Figure 2. The location of this baffle box is conducive to treating runoff from an approximate 184-acre urban basin (Basin F) (refer to Appendix I, Figure 1) which provides a unique opportunity to reduce pollutant loads beyond current conditions and create a "net" benefit to Little Sand Lake.

6.7.3 Stormwater Treatment Summary

In summary, based on the Preferred Alternative Concept Plans, traditional stormwater ponds which require parcel acquisitions should not be required to offset the minor impacts to the existing stormwater system. Furthermore, impacts to the existing 100-year floodplains areas are not anticipated. Lastly, a pre-application conducted on September 28, 2016 with representatives of the SFWMD did not identify any major complications for securing a General Permit to implement the Operational Improvements.

6.8 Transportation and Long Range Plans

The Preferred Alternative aligns with the Transportation and Long Range Plans of Orange County principally by offering an improved system which focuses on safety, accessibility, convenience, as well as imposes minimal impact to the environment. This criterion is very prominent in the Transportation Element of the Comprehensive Plan and as such, is a strong focus of this project. Also, maintaining and even enhancing the character of the corridor, the Preferred Alternative seeks to also enhance its charm by way of streetscaping.

Another factor prominent in Orange County's Transportation and Long Range Plans is that of bicycle and pedestrian network and connectivity. The current infrastructure for this in the area is limited with small sidewalks and various potential conflicts with traffic. This is in need of attention and as such is being incorporated into this project. The Preferred Alternative offers the implementation of a quality, shared-use pedestrian/bicycle path concentrated along the south side of the corridor and extended from Rialto to Apopka Vineland Road.

6.9 Access Management

Detailed in Section 5.3 are the Access Management Options under consideration for implementation within the study area of the corridor. The median opening shared by The Fountains and Plaza Venezia shopping centers is recommended for modification in the Preferred Alternative. The Preferred Alternative advances both Option 1 – Directional Median and Option 2 – Signalization for further consideration and traffic signal warrant analysis closer to the time of design.

7.0 Public Involvement

The Public Involvement for the Sand Lake Road RCA is being implemented in accordance with the Sand Lake Road RCA Public Involvement Plan. The plan identified the stakeholders, both public and private, the outreach activities, and the schedule of meetings. A copy of the public involvement plan and all outreach materials including presentations, newsletters, newspaper advertisements, meeting summaries and mailing lists are included electronically in Appendix J. T

7.1 Study Advisory Group Meetings and Feedback

A study schedule for the Sand Lake Road RCA has been established which includes anticipated dates for the following key outreach meetings. All of these events were open to the public.

The Study Advisory Group (SAG) was comprised of key area stakeholders and was established to assist with the public engagement efforts of the project. Meetings were held to explore and discuss the project in depth and inform the design elements from a business leader perspective. Some key takeaways from the meetings include:

- Improvements should preserve area character while accommodating all users – *July 27,2016*
- Selected option should be strategically designed to include aesthetics where applicable -*September 29, 2016*
- Excitement about the project and considerable interest in stormwater treatment, wayfinding and landscaping that will help define the look and feel of the Dr. Phillips Community – *January 25, 2017*

7.2 Community Meetings and Feedback

The community meetings were held October 26, 2016 and February 23, 2017 for the public to review the information and provide input. The meetings began with a formal presentation followed by a question and answer forum, displayed in an open forum format, and the study team members were available to answer individual questions or concerns. Ariel maps, potential improvements, and other project related information was available. Questions about the design features, costs, traffic and other area projects were answered and comments about each of the alternatives were made and noted. Some key takeaways from these meetings include:

- Support for Alternative #2 involving lane improvements from Dr. Phillips Blvd to Rialto with aesthetics and landscaping where possible – *October 26, 2016*
- Continued support for Alternative #2 with minor opposition; landscaping and hardscaping remain a challenge ; design will need to address signage and stormwater – *February 23, 2017*

7.3 Local Planning Agency & Board of County Commissioners

8.0 Conclusion and Recommendations

The objective of the Sand Lake Road RCA was to develop and evaluate alternatives for improvement of the Sand Lake Road corridor between Apopka Vineland Road and I-4. The alternatives sought to provide for cost-feasible operational enhancements to the corridor, based on a context-sensitive analysis, in order to balance the safety and mobility needs of all mode users in the corridor. The process incorporated the insights from planning, engineering, and the public to refine the alternatives and ultimately advance a preferred alternative. It is recommended that the preferred alternative detailed in Section 6 of this report is advanced by Orange County to a design phase.

Further, it is recommended that during or in advance of the design phase, a number of detailed design features are addressed to allow for the identified improvements on Sand Lake Road to be enjoyed at their full potential.

8.1 Community Character

The Sand Lake Road community was actively engaged throughout the process in a number of ways. Well attended Study Advisory Group meetings and Community meetings allowed for in-person discussion of the alternatives. Comment forms and the project website allowed many others to participate. Consistently, a message of Community Character was communicated. Though not all members of the community see the same aspects in character; landscaping and hardscaping improvements were consistently brought forward as key items that make Sand Lake Road and the Dr. Phillips Community a special part of Orange County. It is recommended that the County continue to work on means to partner with local entities and other possible contributors to maximize the landscaping opportunities created by the preferred alterative improvements.

8.2 Wayfinding

The Sand Lake Road corridor extends from International Drive, a robust corridor centered on Orlando's world class tourist industry. Many of the destinations on the Sand Lake Road corridor are shared by locals and tourist alike. It has been repeated throughout this process that any improvements need to be intuitive and well explain so that drivers new to the area can easily navigate the community. Wayfinding through signage and other available means should be evaluated as design advances.

8.3 Access Management Options

It is recommended in this study that a major, uncontrolled median opening between The Fountains and Plaza Venezia shopping centers is modified to improve safety and operations along Sand Lake Road. Two options are presented in this report, both needing consideration. A Traffic Signal Warrant Study should be conducted independent of this RCA to determine if a signal is warranted at the time of design.

APPENDICES

Appendix A – Crash Data

Crash Data from Signal Four Analytics – Electronic Only

Appendix B – Geotechnical Investigation Report

Geotechnical Investigation Report for Sand Lake Road – Electronic Only

Appendix C – FNAI Report

Florida Natural Areas Inventory (FNAI) Report for Sand Lake Road – Electronic Only

Appendix D – Traffic Counts

Traffic Count Data – Electronic Only

Appendix E – Traffic Volumes Analyzed

Traffic Volume Maps Sheets – Electronic Only

Appendix F – VISSIM Support

VISSIM Support Tables – Electronic Only

Appendix G – Synchro Summary Reports

Synchro Summary Reports and Concept Plan Sheets for Wallace Road– Electronic Only

Appendix H – Initial DTTM / Methodology Discussion

Correspondence with Orange County based on Initial Design Traffic Meeting and Review of Volume and Growth Rates. – Electronic Only

Appendix I – Drainage Exhibits

Drainage Exhibit showing Public and Private Drainage Systems – Electronic Only

Appendix J – Public Involvement

Public Involvement Plan and Summary Materials– Electronic Only