MEMORANDUM

Date: May 31, 2023

To: Michael Coleman, RS&H

From: Domingo Noriega and Tanzina Atique, AECOM

Project: Master Plan Study I-4 (SR 400) from West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2) Financial Project Identification (FPID) Nos.: 442512-1; 442512-2

Subject: Revised Draft Build Alternatives Traffic Analysis Memo (Phase 2)

Florida Department of Transportation (FDOT) District One has initiated a Master Plan study for Interstate 4 (I-4)(SR 400) in Polk County. The study limits extend from west of SR 570 (Polk Parkway) to west of US 27 interchange, about 27.6 miles in length and traverses the major urban area of Lakeland in Polk County. I-4 supports vital commerce and tourism of the state as it connects employment and population centers, including Tampa, Lakeland, Orlando, and Daytona Beach, within Florida. It is one of few east-west limited access facilities in the central portion of the state along with Florida's Turnpike. I-4 is also a designated state hurricane evacuation route and part of Florida's Strategic Intermodal System (SIS) highway network.

Project Background

I-4 Feasibility Study for Phase 1 was completed in October 2021. The study consists of data collection, traffic analyses and public involvement with a focus on the I-4 mainline. Also, it defines the area of traffic influence, determines the year when interchanges are anticipated to fail, and identifies the locations where improvements are needed. A summary of Build Alternatives evaluated under Phase 1 Feasibility Study is as follows:

- Build Alternative 1 – Add 2 general use lanes (GULs) in each direction
- Build Alternative 2 – Add 2 buffer separated express lanes (ELs) in each direction
- Build Alternative 3 – Add 2 barrier separated express lanes (ELs) in each direction
- Build Alternative 4 – Add 1 GUL and 1 HOV lane in each direction

Note: Buffer/barrier separation does not affect traffic operations, so Alternative 2 and Alternative 3 were analyzed as Alternative 2 at the Feasibility stage. Based on operational and safety analyses as well as public input collected, Build Alternative 1 and 2 were recommended to be evaluated further in the Phase 2.

Phase 2 Feasibility Study

It was established that the primary purpose of Phase 2 of the Feasibility Study was to develop interchange improvements, identify long and short-term capacity needs along the I-4 mainline and managed lanes ***(referred to as Express Lanes herein***), and address capacity deficiencies of segments identified as operating below the Level of Service (LOS) target (LOS D) adopted for this facility as part of the Strategic Intermodal System (SIS) designation. The Memorandum of Agreement (MOA) for Phase 2 has been approved by FDOT District One and the I-4 Master Plan team (attached in **Appendix A**) on October 10, 2022.

Following improvements are assumed for the Phase 2 traffic analysis:

No-Build Alternative

- I-4 interchange improvements at CSX Railroad (bridge replacement)
- SR 33 interchange modification - roundabout
- SR 557 interchange modification – roundabout
- SR 559 interchange ramp terminals – signalized

Build Alternative 1

I-4 mainline widening from six to ten lanes: addition of two General Purpose Lanes (GPLs) on each direction.

Build Alternative 2

I-4 mainline widening from six to ten lanes: addition of two Express/High Occupancy Toll (HOT) lanes on each direction.

The purpose of this Draft Build Alternative Traffic Analysis memorandum is to document the Build Alternatives traffic analysis using the Synchro (signalized intersection), SIDRA (roundabout) and HCS (freeway mainline) software for Design Year 2045 within the study limits. Existing conditions Vissim calibration and future analysis using Vissim model for the I-4 at US 98 and I-4 at North Socrum Road/Lakeland Hills Boulevard interchanges along with adjacent arterial intersections will be submitted in a separate memo. The Facility Enhancement Element memorandum will address long-term improvements for I-4.

1.0 Purpose and Need Statement

The purpose of the I-4 Master Plan is to address deficiencies in operational capacity of I-4 in Polk County, also known as Florida's State Road (SR) 400, from west of SR 570 (Polk Parkway) to west of US 27 interchange in Polk County to accommodate future travel demand projected as a result of population and employment growth along the corridor. I-4 also serves significant freight distribution centers in Polk County. Capacity deficiencies are present under the existing condition and are expected to increase in the future. The goal of this Phase 2 study is to evaluate the potential addition of managed lanes, additional general-use lanes, and develop interchange improvements.

Other goals of the project are to:

- Preserve the operational integrity and regional functionality of I-4 (and, therefore, the regional transportation network) by complementing similar corridor improvements to the east and west
- Enhance emergency evacuation and response times

The need for this project is based on the following criteria:

Capacity/Transportation Demand: The project is anticipated to improve traffic operations on I-4 by increasing capacity and better dispersing traffic (i.e., separating managed lanes traffic from general-use traffic). The traffic dispersal and reduced congestion can decrease vehicle conflicts and, therefore, enhance travel conditions of the corridor. Under the current condition, the queue on the I-4 segments approaching US 27 from the west backs up significantly (about 5 miles) at evening peak hours. I-4 within the project limits currently operates at Level of Service (LOS) C to F, with annual average daily traffic volumes ranging from 74,000 vehicles to 140,000 vehicles per day (source: FDOT Florida Traffic Online 2021). Traffic volumes on the corridor are projected to increase to between 151,800 and 203,400 vehicles per day by 2045 (source: I-4 Master Plan Phase 1 Traffic Projection). If the proposed project improvements do not occur, the operating conditions along the corridor will continue to deteriorate as the traffic increases.

Safety: I-4 serves as part of the emergency evacuation route network designated by the Florida Division of Emergency Management. Also designated as an evacuation facility of Polk County, I-4 is vital in facilitating traffic during emergency evacuation periods as it connects to other major arterials and highways of the state evacuation route network [such as SR 570 (Polk Parkway) and US 27].

The project is anticipated to:

- Improve emergency evacuation capabilities by enhancing connectivity and accessibility to other major arterials designated on the state evacuation route network;
- Increase traffic volumes that can be evacuated during an emergency event, and
- Allow for enhanced emergency access and incident response time due to the ability to maintain operational speeds within the managed lanes.

System Linkage: As part of Florida's SIS highway network, I-4 plays a significant role in facilitating commuter, visitor, and freight traffic within the state. The proposed project improvements are part of a larger, regional set of projects on the interstate system to the west [in Hillsborough, Pinellas, Manatee, Sarasota, Charlotte, Lee, and Collier Counties] where managed lanes, additional general use lanes and auxiliary lanes are being considered to increase the operational capacity of not only I-4 but I-75 and I-275 as well. The intent is for all these project improvements to work together to improve the overall reliability and performance of the interstate system in moving high volumes of goods and people at efficient speeds. It is important to note that managed lanes also create an opportunity for the provision of efficient and reliable transit service. As such, these improvements are critical to enhancing regional mobility. They are also key in preserving the operational integrity and regional functionality of the I-4 corridor.

2.0 Project Limits

This project is located along I-4 from west of SR 570 (Polk Parkway) to west of US 27 interchange. The study area is shown in **Figure 1.**

The study area includes seven existing service interchanges on I-4 and two system interchanges at I-4 and Polk Parkway. The on-and off-ramps and merge/diverge areas for the existing interchanges are encompassed along I-4 and Polk Parkway. The interchanges are listed below:

- I-4 and SR 570 (Polk Parkway) System-to-System Interchange
- I-4 and US 92/SR 546 (West Memorial Boulevard)
- I-4 and SR 539 (Kathleen Road)
- I-4 and US 98/SR 35/SR 700
- I-4 and CR 582 (North Socrum Loop Road)/SR 33 (Lakeland Hills Boulevard)
- I-4 and SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)
- I-4 and SR 570 (Polk Parkway) System-to-System Interchange
- I-4 and SR 559
- I-4 and SR 557

This section of I-4 consists of a six-lane divided typical section with a maximum posted speed limit of 70 miles per hour. The functional classification of I-4 within the project limits is Urban Principal Arterial – Interstate. Existing right of way along the corridor ranges from approximately 300 feet to 450 feet in width.

3.0 Data Collection

Traffic and Crash Data

Data collection for the study consists of information from the FDOT, local government officials and other sources as available. It includes existing and field collected data. Sources of information include, but not limited to:

- Straight Line Diagrams (SLDs)
- Roadway Characteristic Inventory (RCI) Data
- Florida Geographic Data Library (FGDL) Geographic Information System (GIS) Data
- FDOT Design Standards
- Latest Five-Year Crash History
- Existing Traffic Signal Timings
- Existing AADT counts along mainline and ramps from the FDOT FTO
- Traffic count data, and
- District One Regional Planning Model (D1RPM v 2.0) 2015 Base Year and 2045 Cost Feasible Model

Figure 1. Project Location and Study Area (Sheet 1 of 3)

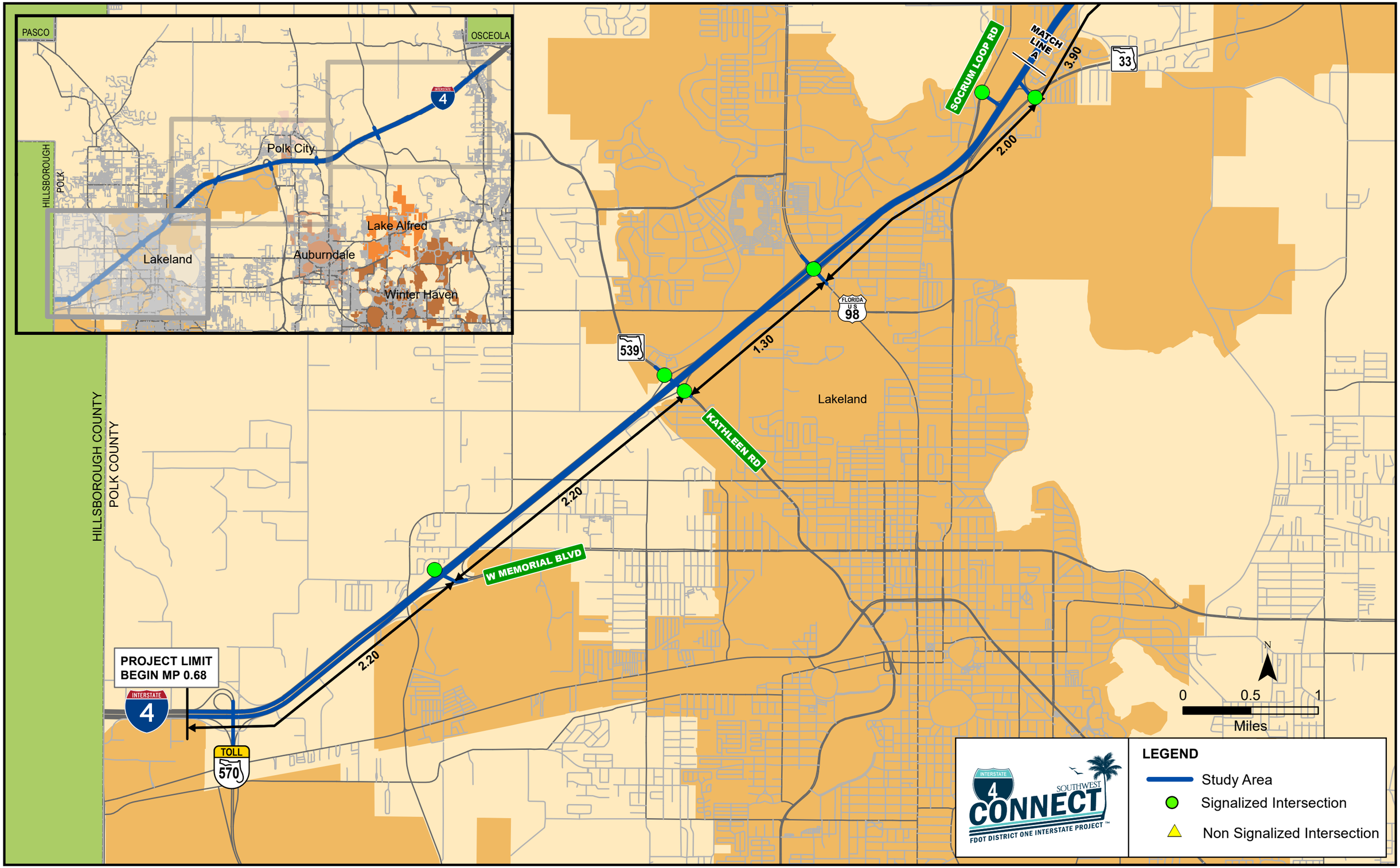


Figure 1. Project Location and Study Area (Sheet 2 of 3)

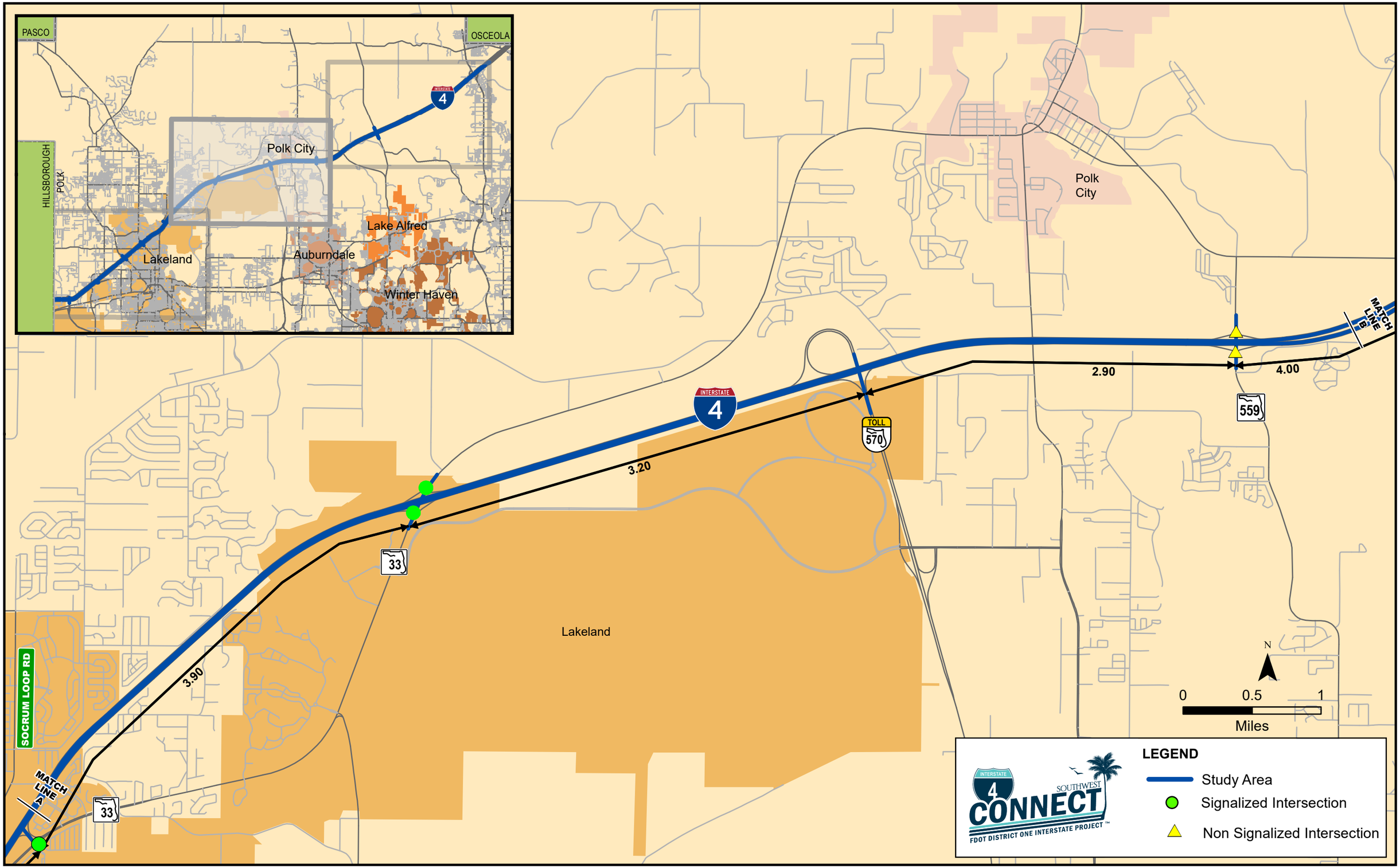


Figure 1. Project Location and Study Area (Sheet 3 of 3)

Based on approved methodology and the scope of service, an assessment of future traffic conditions and year of failure analysis from Phase 1, recent Turning Movement Counts (TMC) were collected at specific locations as discussed below. Other TMCs were considered from Phase 1 traffic analysis.

Traffic Counts

24-hour volume tube counts (bi-directional approach volumes at 15-minute increments with hourly totals) and concurrent 4-hour (two-hour AM and two-hour PM) vehicle turning movement counts (TMC) (at 15-minute increments with hourly totals) for peak periods (7AM to 9 AM and 4PM to 6 PM) were conducted in mid-August 2022 at the following locations (See **Figure 2**):

- US 98 at Lakeland Square Mall (4-hour TMC)
- US 98 at Lakeland Park Center Drive (4-hour TMC)
- US 98 Ramp Terminals (4-hour TMC)
- US 98 at Pyramid Parkway (4-hour TMC)
- US 98 at Griffin Road (4-hour TMC)
- N Socrum Loop Road at Lakeland Park Blvd (4-hour TMC)
- N Socrum Loop Road at Old Combee Road (4-hour TMC)
- Lakeland Hills Blvd. at Melody Lane (4-hour TMC)
- N Socrum Loop/Lakeland Hills Blvd Ramp Terminals (4-hour TMC)
- SR 33 Ramp Terminals (4-hour TMC)
- SR 559 Ramp Terminals (4-hour TMC and including 24-hour volume counts)
- SR 557 Ramp Terminals (4-hour TMC)

Figure 2 Traffic Count Locations (Sheet 1 of 3)

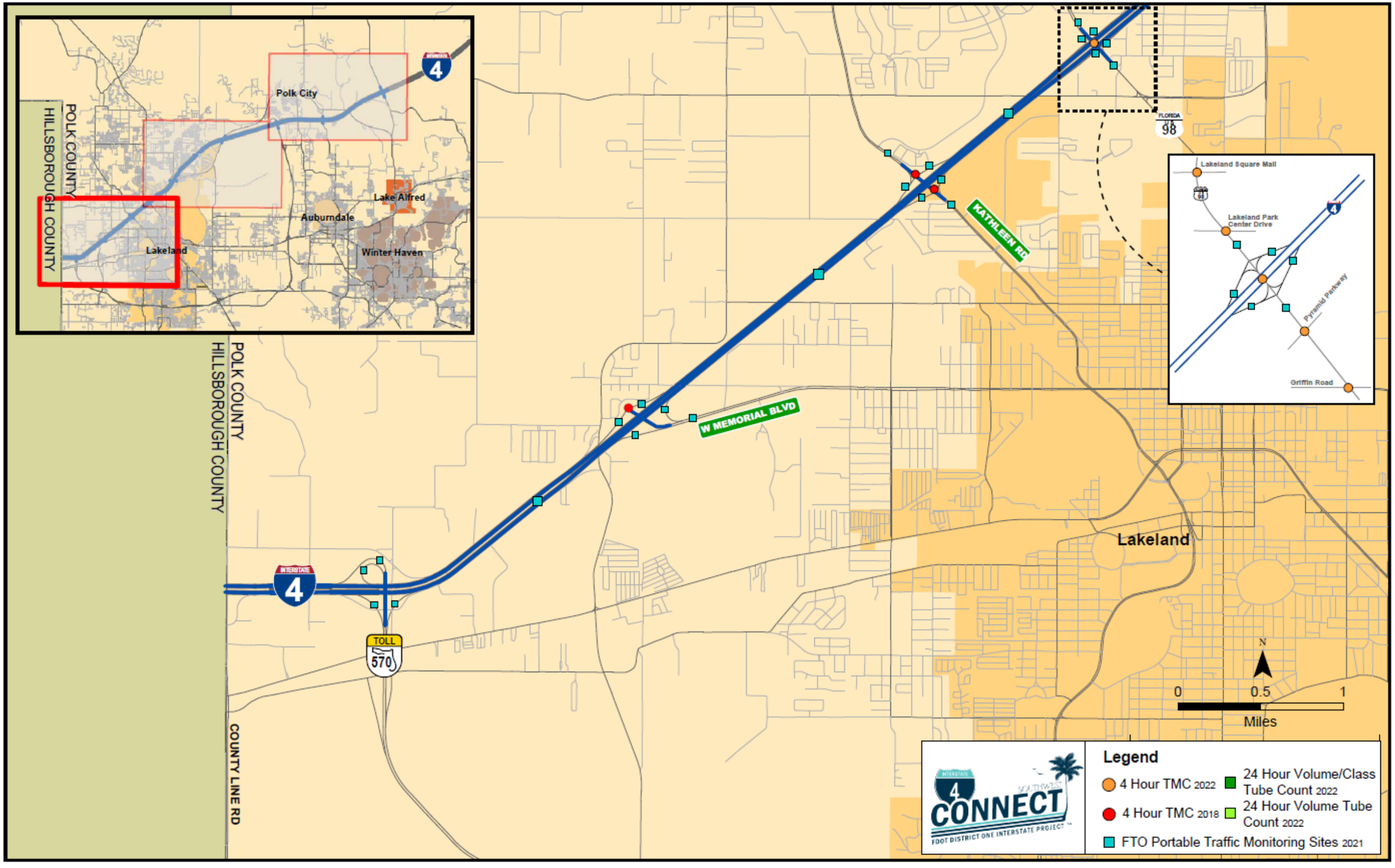


Figure 2 Traffic Count Locations (Sheet 2 of 3)

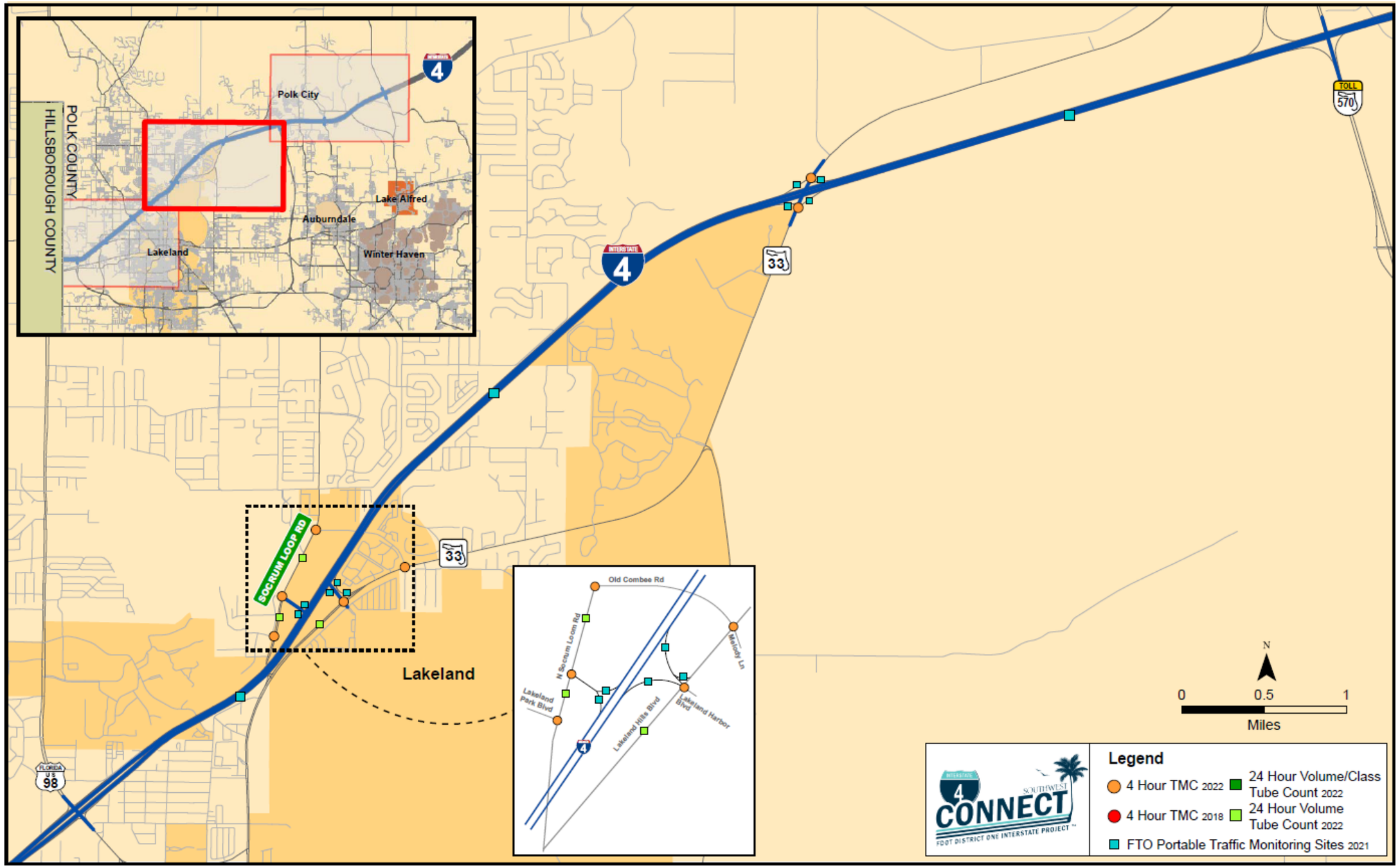
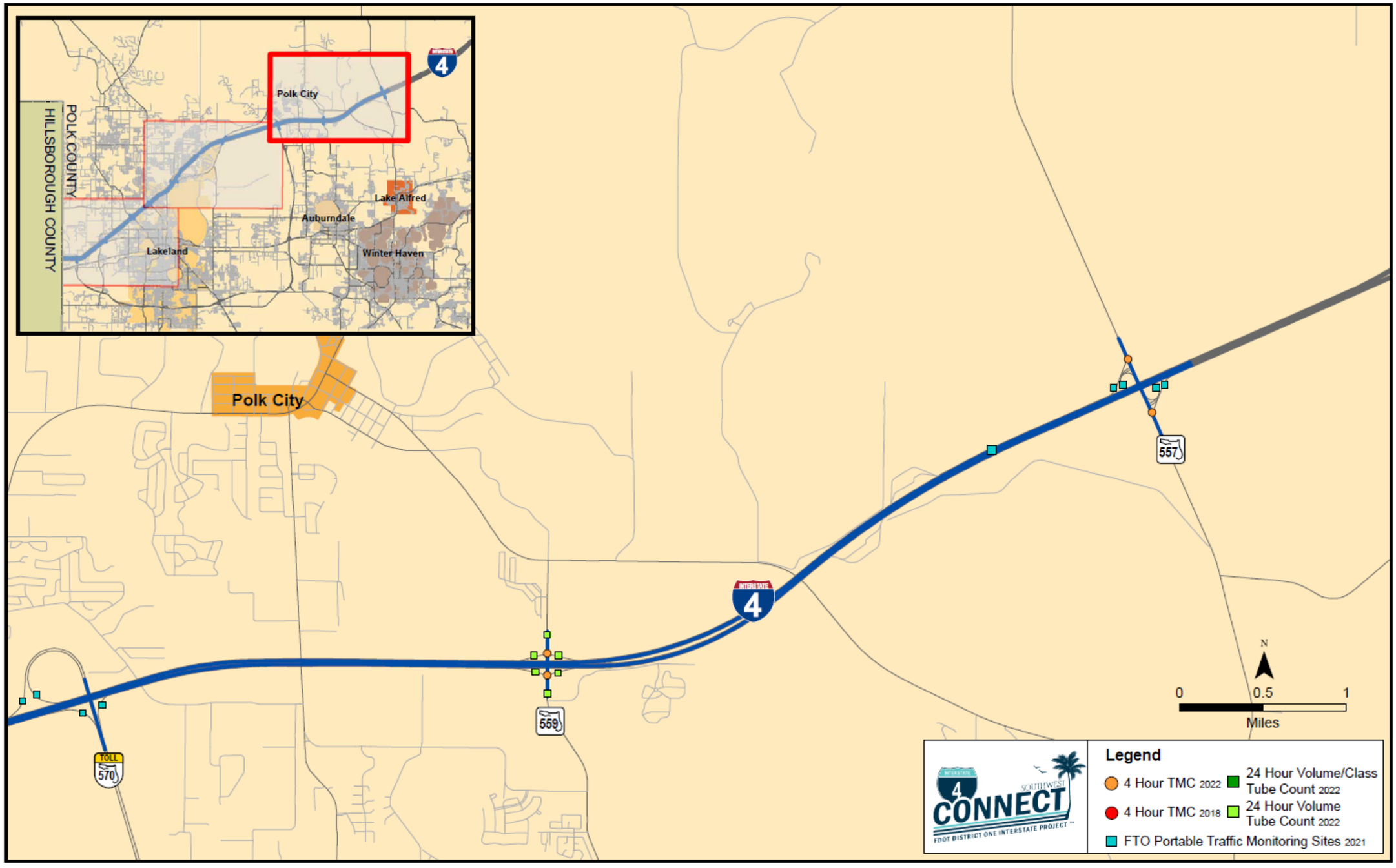


Figure 2 Traffic Count Locations (Sheet 3 of 3)



Following TMCs were taken from the I-4 Selected Interchanges Analysis Report (SIAR):

- I-4 and US 92/SR 546 (West Memorial Boulevard)
- I-4 and SR 539 (Kathleen Road)

Note that SIAR data from year 2018 was used for turning movement percentage only.

I-4 mainline count data was obtained from 2021 FDOT's Florida Traffic Online database. Based on the *FTO and I-4 Selected Interchanges Analysis Report (SIAR),* the peak hours were determined to be 7:15 AM-8:15 AM for the AM peak hour and 4:45 PM – 5:45 PM for the PM peak hour for the I-4 mainline. The supporting traffic counts and signal timing data are included in **Appendix B.**

4.0 Existing Traffic Volumes

Existing Year 2022 Annual Average Daily Traffic (AADT) volumes were developed by applying appropriate seasonal adjustment factors (SF) and axle correction factors (AF) to the Average Daily Traffic (ADT) obtained from recent available traffic counts or new counts collected to supplement available counts. Historical growth rates along I-4 corridor were calculated based on the past 10 years. **Table 1** below shows the comparison of growth rates before and after Covid-19 impacts. The results show two percentage points less between the two scenarios growth rate estimates (4.84% minus 3.03%).

Table 1

Annual Average and Annual Historical Growth Rate on I-4

FDOT Count Site	To/From	Annual Average Growth Rate (2012 - 2021)	Trend Annual Historical Growth Rate (2012-2021)	Annual Average Growth Rate (2010 -2019) Pre COVID	Trend Annual Historical Growth Rate (2010-2019) Pre COVID
I-4 (SR 400)					
160105	Southwest of SR 546/West of Memorial Blvd.	3.33%	2.99%	4.21%	5.05%
160117	Northeast of SR 546/West of Memorial Blvd.	1.52%	2.61%	4.22%	5.12%
160116	Northeast of SR 539/Kathleen Road	3.70%	3.30%	3.87%	4.76%
160115	Northeast of SR 35/700/US 98	0.93%	2.02%	3.90%	4.79%
160114	Northeast of Old Combee Road Overpass	4.58%	4.07%	4.58%	4.92%
160113	East of SR 33	6.05%	5.97%	4.39%	4.98%
169951	0.6 miles of W of SR 559	-0.50%	0.74%	3.96%	4.51%
160112	East of SR 559	0.51%	2.04%	3.89%	4.85%
160108	SW of SR 25/US 27	4.16%	3.81%	4.07%	5.48%
Source: Florida Traffic Online 2021	**Average**	**2.72%**	**3.03%**	**4.02%**	**4.84%**

Arterial growth rates were estimated separately for each individual corridor. **Table 2** shows the estimated historical growth rates for the arterials. It is deemed to use 5% growth rate for arterials as the average growth rate is 4.44%.

Table 2

Crossroads AADTs and Annual Average Growth Rates

FDOT Count Site	Location	AADT 2012	AADT 2021	Annual Average Growth Rate
169927	SR-546/MEMORIAL BLV,0.75 MI E I-4,LAKELAND	14,225	19,181	3.87%
161031	SR 546/MEMORIAL BLVD CONNECTOR, TO WB I-4	9,300	10,700	1.67%
160142	SR 539, SOUTHEAST OF SR 400/I-4	25,500	34,000	3.70%
164964	KATHLEEN ROAD, N OF KNIGHTS-GRIFFIN RD	15,100	18,700	2.65%
165198	SR 35/700/US 98, N OF CR 582/GRIFFIN RD & S OF I-4	44,500	44,000	-0.12%
160135	SR 35/700/US 98, NORTH OF SR 400/I-4	53,000	60,000	1.47%
163030	SR 33, NORTHEAST OF CR 582/SOCRUM LOOP ROAD	14,500	18,400	2.99%
164155	CR 582/SOCRUM LOOP ROAD, N OF I-4	24,500	25,500	0.45%
160118	SR 33, SOUTH OF SR 400/I-4	9,300	12,300	3.58%
160027	SR 33, NORTHEAST OF SR 400/I-4	8,300	13,700	7.23%
160133	SR-559, S OF SR 400/I-4	11,800	21,500	9.13%
160131	SR 559, NORTH OF SR 400/I-4	4,000	6,900	8.06%
165221	SR 557, SOUTH OF SR 400/I-4	10,500	19,300	9.31%
165196	SR 557 ON OVERPASS BRIDGE OVER I-4	6,500	11,300	8.21%
Source: Florida Traffic Online 2021			**Average**	**4.44%**

Anchor Point Selection

A count location just east of SR 539 (Kathleen Road) (FDOT Count Site ID 160116) was selected as an anchor point. The 2021 AADT based on FTO at this location is 112,000 vehicles per day (vpd). The year 2022 AADT at this segment was developed by multiplying the 2021 volume by a 5% growth rate (117,600 vpd). **Table 3** shows the comparison between FTO data from 2019 thru 2021 and estimated AADTs for year 2022. An average growth rate of 3.1% from year 2019 (Pre Covid-19) to year 2022 considered to be reasonable. Additionally, based on the traffic data at station 160108, year 2022 estimated balanced traffic is only 300 vpd more than year 2021 AADT. Using less than 5% growth rate along the corridor will produce estimated 2022 traffic volumes that would be lower than 2021 at this location, which was not deemed reasonable.

Therefore, an average trend annual growth rate of 5% (before COVID-19 pandemic) was applied to previous year counts to develop year 2022 AADTs. The 2021 ramp AADTs then were multiplied by a 5% growth rate and adjusted to achieve mainline balanced volumes in between the interchanges. The 2022 AADTs are presented on **Figure 3**.

Table 3

AADTs Comparison

FDOT Count Site	Segments of I-4 (SR 400)	AADTs from Florida Traffic Online			Est. 2022 AADTs	Growth Rate 2021-2022	Growth Rate 2019-2022	Notes
		2019	2020	2021				
161005	Southwest of SR 546/West of Memorial Blvd.	120,000	102,500	115,000	127,200	10.6%	2.0%	
160117	Northeast of SR 546/West of Memorial Blvd.	109,000	100,500	95,500	117,600	23.1%	2.6%	
160116	Northeast of SR 539/Kathleen Road	104,500	92,000	112,000	117,600	5.0%	4.2%	Controlling Point
160115	Northeast of SR 35/700/US 98	100,000	88,000	84,000	111,400	32.6%	3.8%	
160114	Northeast of Old Combee Road Overpass	92,500	79,500	104,500	105,600	1.1%	4.7%	
160113	East of SR 33	90,000	96,000	105,000	104,400	-0.6%	5.3%	
169951	0.6 miles of W of SR 559	99,000	85,157	74,000	103,800	40.3%	1.6%	Permanent Station
160112	East of SR 559	96,500	84,000	80,000	103,600	29.5%	2.5%	
160108	SW of SR 25/US 27	102,500	86,000	106,500	106,800	0.3%	1.4%	Diff. of only 300 vph between 2021 and 2022
						Average	**3.1%**	

Approved Design Traffic Factors

Table 4 illustrates the traffic factors for I-4 mainline and ramps.

Table 4
Design Traffic Factors for I-4 Corridor

Roadway	K_{STD}	D	T	Tf
I-4 Mainline	9.0	52.0	14.0	7.0
I-4 Ramps	9.0	100.0	14.0	7.0
Arterials	9.0	*	*	*

*Source: * D and T factors were estimated based on 2021 FTO.*
The Standard K is from FDOT Project Traffic Forecasting Handbook

Note that based on the approved methodology, turning movement traffic counts were performed at some selected locations. No tube counts were collected except at SR 559 interchange ramps. Historic D-Factor, heavy vehicle percentage, peak to daily ratios, growth rate estimations were documented in the **Appendix C.** Cross street growth rates, peak directions, D-Factor, and T-Factor were also included in **Appendix C** as a reference**.**

D-Factor

A historical D factor has been developed by averaging the estimated D factor from permanent count stations along I-4 over a ten-year period based on FDOT FTO data.

Peak Hour Factor

Peak Hour Factor (PHF) is the ratio of total peak hour volume to the peak rate of flow within the hour. It accounts for the variability of traffic within the hour. Existing PHFs were considered from the latest count data for existing operations analysis.

T-Factor

The historical T-Factors based on FTO along I-4 corridor and at the individual ramps are summarized in **Table 5** and **6**, respectively. An average daily track percentage at the ramps is approximately 14%, which is similar to I-4 mainline truck daily traffic percentage. Therefore, it was deemed reasonable to assume a T-Factor of 7% on the ramps during the peak hours.

K-Factor

Based on information obtained from FDOT Project Traffic Forecasting (2019) handbook, a Standard K-Factor of 9.0 percent was used in development of the Existing Year (2022) and the future year traffic volumes. This is the predominant K-Factor utilized in urbanized, transitioning to urbanized, and urban areas and represents a typical weekday peak hour. Directional Design Hour Volumes (DDHVs) were developed by applying the Standard K Factor of 9.0 percent and Directional Factor (D) to the AADT volumes based on the approved methodology. Actual peak to daily ratios along I-4 corridor ranges from 5.58% to 7.47% (See **Table** 7).

Existing Traffic Volumes

The peak hours were determined to be 7:15 AM-8:15 AM for the AM peak hour and 4:45 PM – 5:45 PM for the PM peak hour. Directional Design Hour Volumes (DDHVs) for existing year 2022 were developed by applying the Standard K Factor of 9.0 percent and Directional Factor (D) to the 2021 AADT volumes for mainline, ramps and ramp terminals. The peak direction of travel was assumed to be consistent with the existing counts. At the intersections, the existing turning movement volumes were obtained by applying the existing turning movement percentages to the approach volumes. The Vissim model was calibrated based on 'raw' AM and PM peak hour volumes which were collected from the field and have been reviewed and adjusted for accuracy. The Existing Year (2022) AM. and PM peak hour traffic is shown on **Figure 4**. The supporting documentation is included in **Appendix C**.

Table 5
Historical Design Traffic T-Factor (Percentage) on I-4 Corridor

FDOT Count Site	Roadway	To/From	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Average
160105	I-4 (SR 400)	Southwest of SR 546/West of Memorial Blvd.	14.70	14.60	12.90	13.20	13.00	13.00	13.00	13.90	10.60	12.90	14.90	13.00	13.04
160117	I-4 (SR 400)	Northeast of SR 546/West of Memorial Blvd.	15.10	14.50	12.30	14.50	14.40	13.30	13.30	13.30	10.60	14.20	16.10	16.10	13.81
160116	I-4 (SR 400)	Northeast of SR 539/Kathleen Road	15.30	14.00	12.20	14.30	13.90	13.60	12.50	13.90	13.90	13.90	15.00	13.10	13.63
160115	I-4 (SR 400)	Northeast of SR 35/700/US 98	15.40	14.70	13.00	14.70	14.50	13.80	12.60	12.60	12.60	14.20	15.70	15.70	13.94
160114	I-4 (SR 400)	Northeast of Old Combee Road Overpass	16.90	15.40	13.40	16.20	16.20	15.80	15.80	15.80	13.10	15.40	18.20	15.60	15.55
160113	I-4 (SR 400)	East of SR 33	16.50	15.10	14.40	16.00	15.90	15.40	13.70	13.70	13.70	13.50	18.20	18.90	15.34
169951	I-4 (SR 400)	0.6 miles of W of SR 559	N/A	N/A	11.20	11.00	10.50	10.10	9.40	9.40	10.30	11.20	13.80	13.30	11.02
160112	I-4 (SR 400)	East of SR 559	16.60	16.00	14.10	14.60	16.00	15.20	14.50	16.20	15.30	15.30	15.30	18.90	15.54
160108	I-4 (SR 400)	SW of SR 25/US 27	15.70	15.70	13.80	15.70	14.80	15.80	13.60	14.80	13.40	13.40	13.40	18.90	14.76

Source: Florida Traffic Online 2021 **Average** **14.07**

Table 6

Historical Design Traffic T-Factor (Percentage) on Ramps along I-4 Corridor

FDOT Count Site	Ramp Location	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg.
SR 570 (Polk Parkway) System-to-system Interchange																		
974009	Eastbound off-ramp	-	-	-	-	-	-	9.90	10.30	11.00	11.30	11.90	12.90	14.10	14.30	16.10	13.90	12.57
974008	Eastbound on-ramp	-	-	-	-	-	-	9.90	10.30	11.00	11.30	11.90	12.90	14.10	14.30	16.10	13.90	12.57
974001	Westbound off-ramp	-	-	-	-	-	-	9.90	10.30	11.00	11.30	11.90	12.90	14.10	14.30	16.10	13.90	12.57
974002	Westbound on-ramp	-	-	-	-	-	-	9.90	10.30	11.00	11.30	11.90	12.90	14.10	14.30	16.10	13.90	12.57
Memorial Boulevard																		
167101	Eastbound off-ramp	-	-	13.60	13.80	13.80	13.80	13.00	13.00	13.00	11.40	11.40	11.40	13.10	13.50	18.20	13.60	13.33
167102	Eastbound on-ramp	-	-	14.60	14.60	14.60	15.00	13.10	14.40	14.40	14.30	12.60	14.90	13.10	13.50	18.20	18.90	14.73
167105	Westbound off-ramp	-	-	27.60	27.60	27.60	15.00	13.10	14.40	14.40	14.30	12.60	14.90	13.10	13.50	18.20	18.90	17.51
167104	Westbound on-ramp	-	-	13.20	13.20	13.20	15.00	13.10	14.40	14.40	14.30	12.60	14.90	13.10	13.50	18.20	18.90	14.43
SR 539 (Kathleen Road)																		
167110	Eastbound off-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	13.10	13.18
167113	Eastbound on-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	13.10	13.18
167112	Westbound off-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	13.10	13.18
167111	Westbound on-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	13.10	13.18
US 98/SR 35/SR 700																		
167115	Eastbound off-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	9.30	12.84
167116	Eastbound on-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	8.20	12.74
167117	Westbound off-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	8.90	12.80
167114	Westbound on-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	8.80	12.79
CR 582 (North Socrum Loop Road)/SR 33 (Lakeland Hills Boulevard)																		
167120	Eastbound off-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	13.10	13.18
167121	Eastbound on-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	13.10	13.18
167122		-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	13.10	
167119	Westbound off-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	13.10	13.18
167118	Westbound on-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	13.10	13.18

Table 6 (Continued)

Historical Design Traffic T-Factor (Percentage) on Ramps along I-4 Corridor

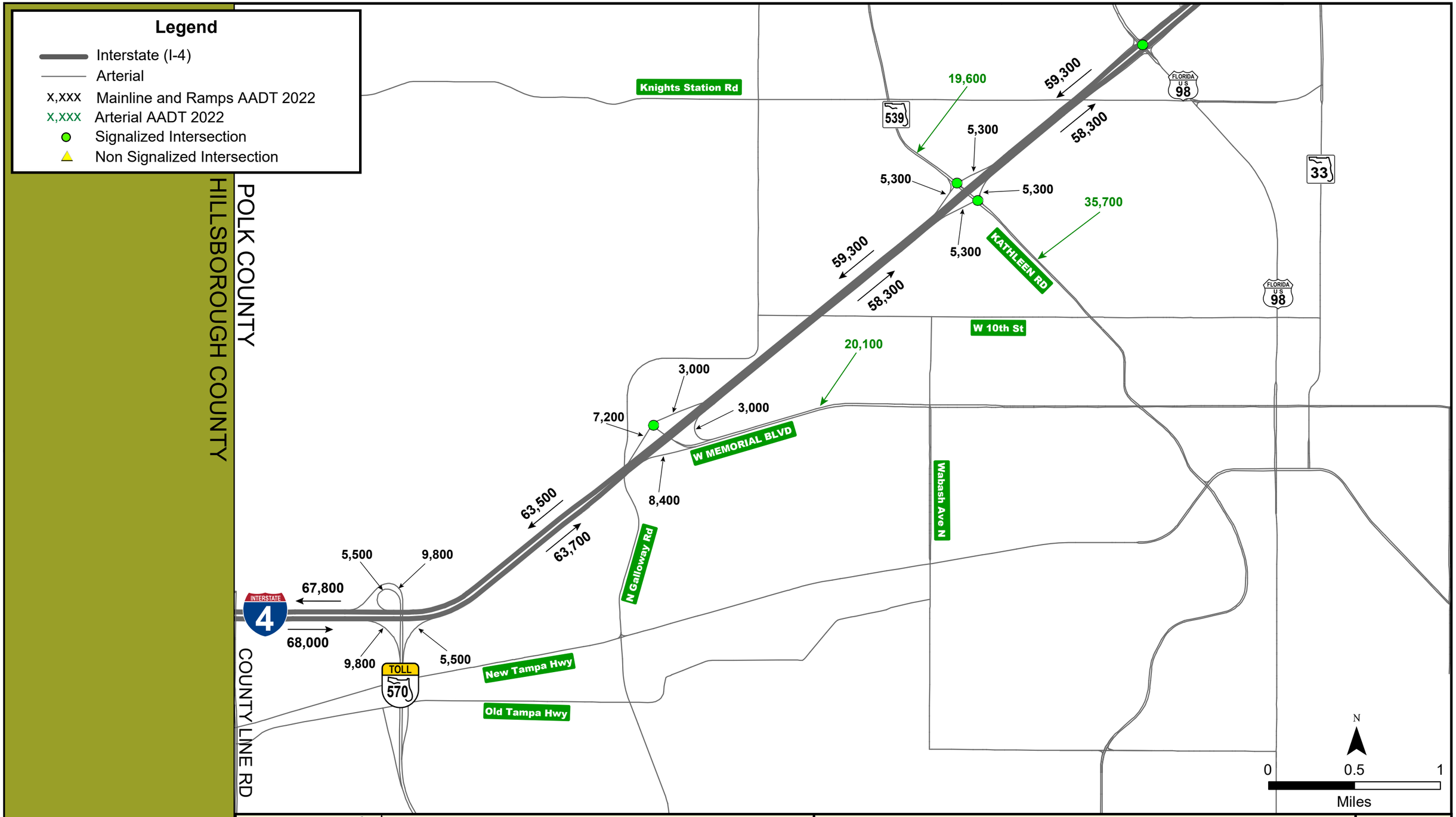
FDOT Count Site	Ramp Location	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg.
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)																		
167123	Eastbound off-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	13.10	13.18
167125	Eastbound on-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	13.10	13.18
167126	Westbound off-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	13.10	13.18
167124	Westbound on-ramp	-	-	-	-	-	14.00	12.20	13.80	13.70	13.40	12.50	13.90	10.60	12.80	15.00	13.10	13.18
SR 570 System-to-System Interchange																		
974082	Eastbound off-ramp	-	-	-	-	-	-	9.90	10.30	11.00	11.30	11.90	12.90	14.10	14.30	16.10	13.90	12.57
974081	Eastbound on-ramp	-	-	-	-	-	-	9.90	10.30	11.00	11.30	11.90	12.90	14.10	14.30	16.10	13.90	12.57
974084	Westbound off-ramp	-	-	-	-	-	-	9.90	10.30	11.00	11.30	11.90	12.90	14.10	14.30	16.10	13.90	12.57
974083	Westbound on-ramp	-	-	-	-	-	-	9.90	10.30	11.00	11.30	11.90	12.90	14.10	14.30	16.10	13.90	12.57
SR 559																		
167051	Eastbound off-ramp	16.70	13.70	29.80	29.80	29.80	15.00	13.10	14.40	14.40	14.30	12.60	14.90	13.10	13.50	18.20	18.90	17.64
167053	Eastbound on-ramp	16.70	13.70	28.90	28.90	28.90	15.00	13.10	14.40	14.40	14.30	12.60	14.90	13.10	13.50	18.20	18.90	17.47
167054	Westbound off-ramp	16.70	13.70	25.50	25.50	25.50	15.00	13.10	14.40	14.40	14.30	12.60	14.90	13.10	13.50	18.20	18.90	16.83
167052	Westbound on-ramp	16.70	13.70	25.10	25.10	25.10	15.00	13.10	14.40	14.40	14.30	12.60	14.90	13.10	13.50	18.20	18.90	16.76
SR 557																		
167061	Eastbound off-ramp	16.70	13.70	23.30	23.30	23.30	15.00	13.10	14.40	14.40	14.30	12.60	14.90	13.10	13.50	18.20	18.90	16.42
167063	Eastbound on-ramp	16.70	13.70	12.20	12.20	12.20	15.00	13.10	14.40	14.40	14.30	12.60	14.90	13.10	13.50	18.20	18.90	14.34
167064	Westbound off-ramp	16.70	13.70	10.50	10.50	10.50	15.00	13.10	14.40	14.40	14.30	12.60	14.90	13.10	13.50	18.20	18.90	14.02
167062	Westbound on-ramp	16.70	13.70	23.00	23.00	23.00	15.00	13.10	14.40	14.40	14.30	12.60	14.90	13.10	13.50	18.20	18.90	16.36

Average 13.88

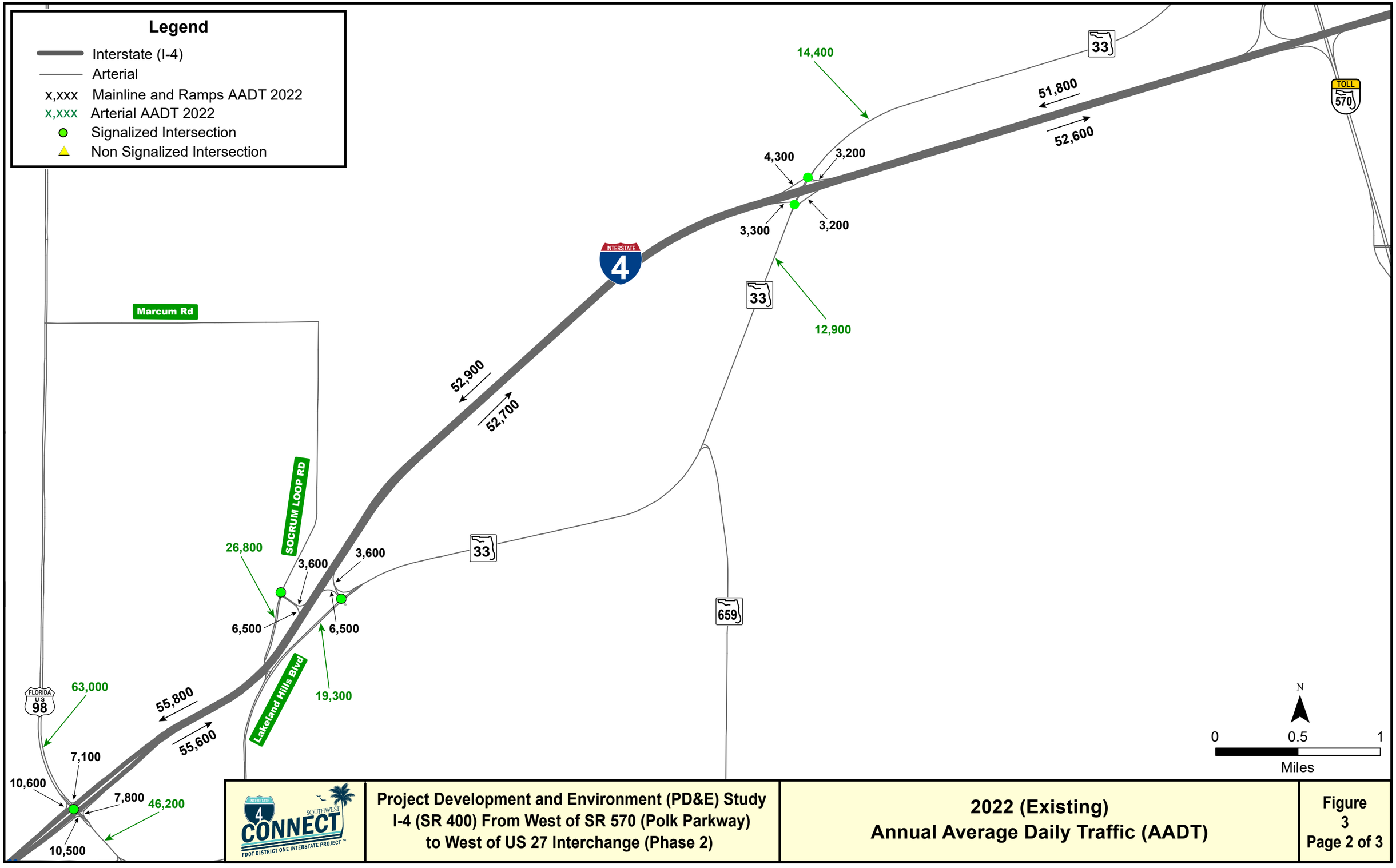
Table 7

Peak to Daily Ratio for I-4 Corridor

FDOT Count Site	Count Site Location Along I-4	2021 AADT Counts[1]	2021 Existing Peak Hour Traffic									
			AM Peak hour 7:15-8:15					PM Peak hour 4:45-5:45				
			EB	WB	Total	Peak Direction	Peak to Daily Ratio	EB	WB	Total	Peak Direction	Peak to Daily Ratio
160103	SR 400/I-4, EAST OF HILLSBOROUGH/ POLK COUNTY LINE	140,000	4,221	4,393	8,614	WB	6.15%	4,887	4,555	9,442	EB	6.74%
161005	SR 400/I-4, SOUTHWEST OF SR 546/WEST MEMORIAL BLVD	115,000	3,063	3,349	6,412	WB	5.58%	4,010	3,298	7,308	EB	6.35%
160117	SR 400/I-4, NORTHEAST OF SR546/WEST MEMORIAL BLVD	95,500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
160116	DESCRIPTION: SR 400/I-4, NORTHEAST OF SR 539/KATHLEEN ROAD	112,000	2,987	3,838	6,825	WB	6.09%	3,998	3,558	7,556	EB	6.75%
160115	SR 400/I-4, NORTHEAST OF SR 35/700/US 98	84,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
160114	SR 400/I-4, EAST OF HILLSBOROUGH/ POLK COUNTY LINE	104,500	2,531	3,555	6,086	WB	5.82%	3,537	3,781	7,318	WB	7.00%
160113	SR 400/I-4, EAST OF SR 33	105,000	2,935	3,903	6,838	WB	6.51%	3,771	4,070	7,841	WB	7.47%
160112	SR 400/I-4, EAST OF SR 559	80,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
160108	SR 400/I-4 SW OF SR 25/US 27, POLK COUNTY	106,500	2,840	3,298	6,138	WB	5.76%	3,507	3,491	6,998	EB	6.57%
						Average	**5.99%**					**6.81%**

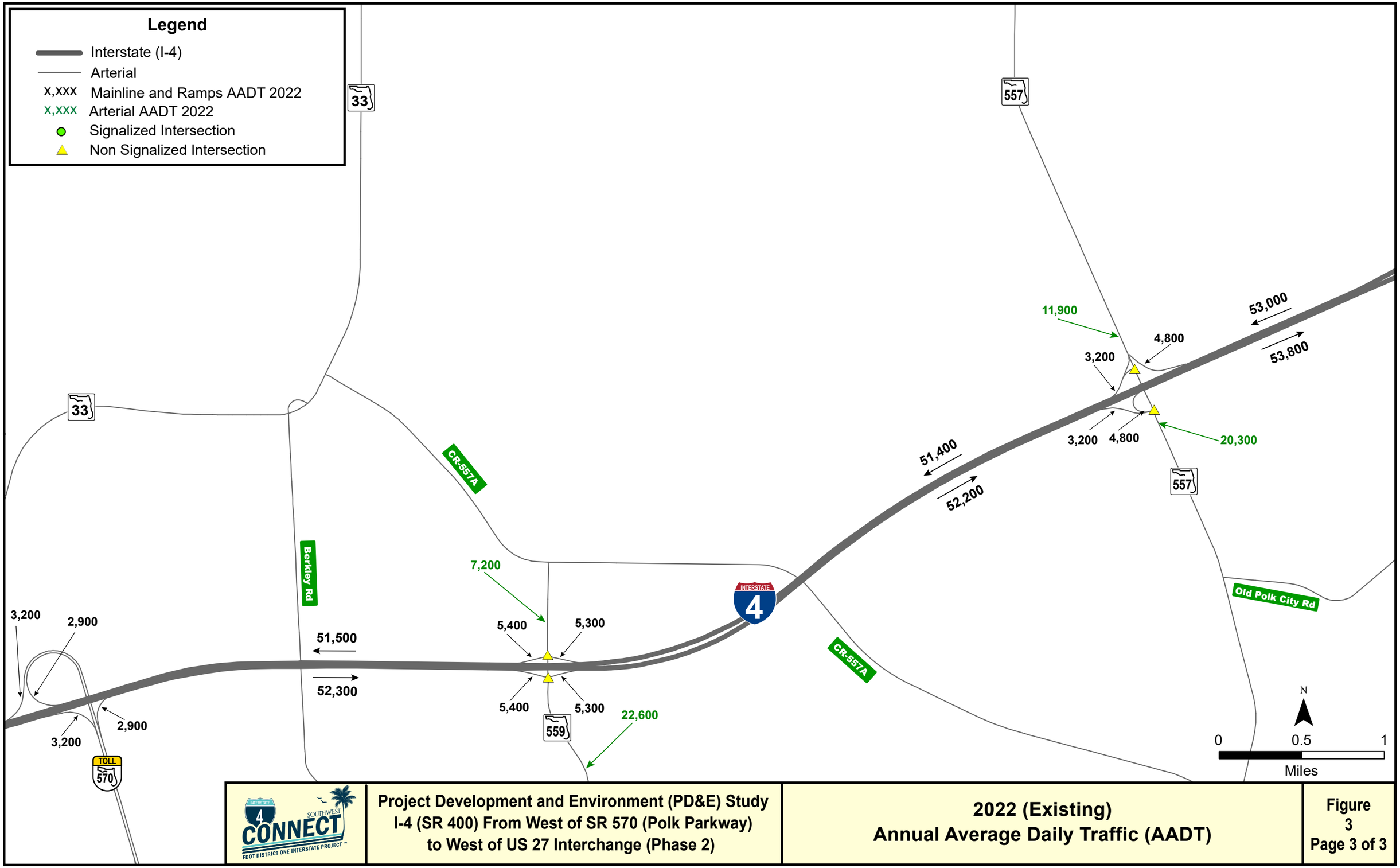


SOUTHWEST I-4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)	**2022 (Existing)** **Annual Average Daily Traffic (AADT)**	Figure 3 Page 1 of 3

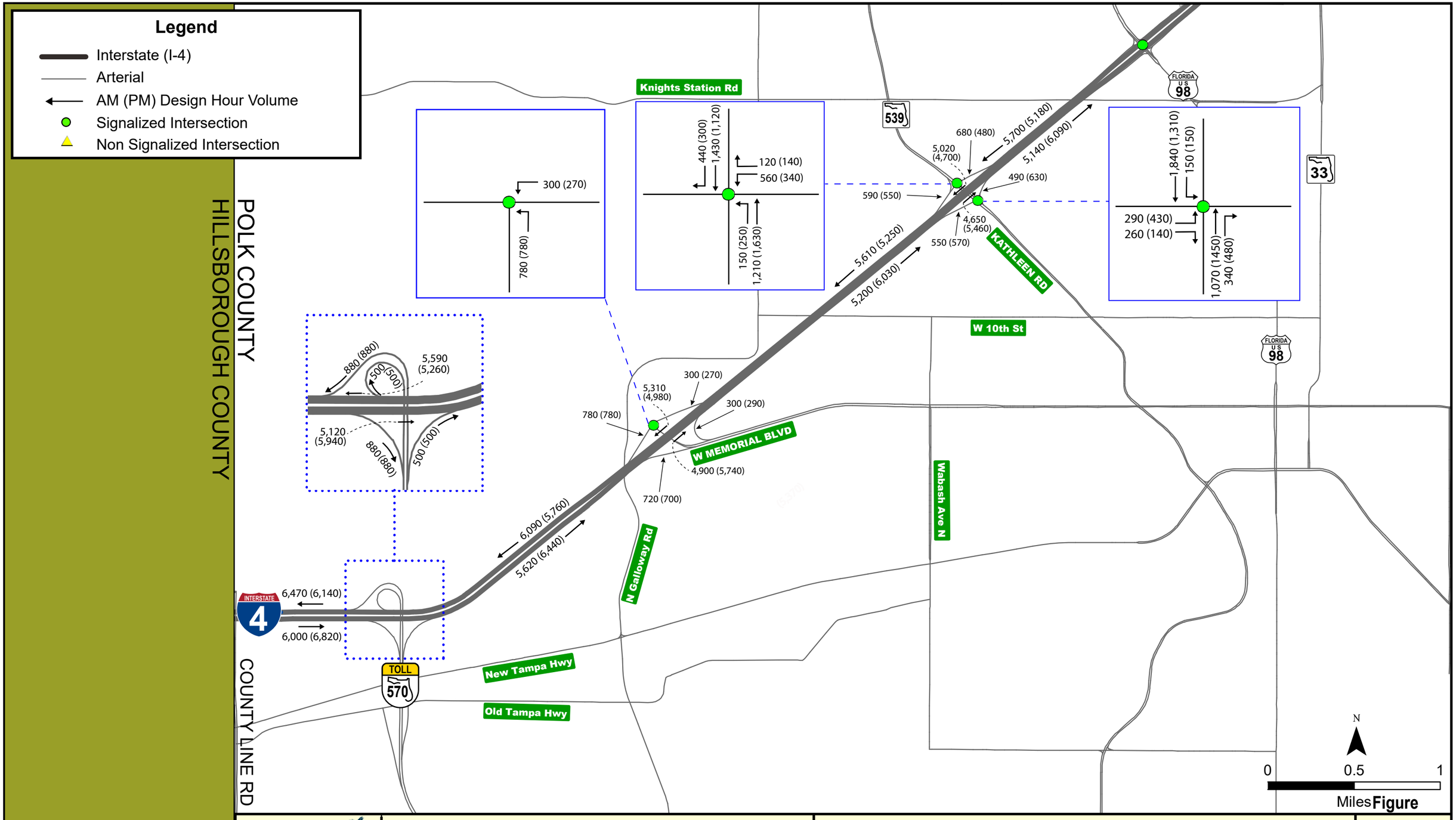


SOUTHWEST I-4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)	**2022 (Existing)** **Annual Average Daily Traffic (AADT)**

Figure 3
Page 2 of 3



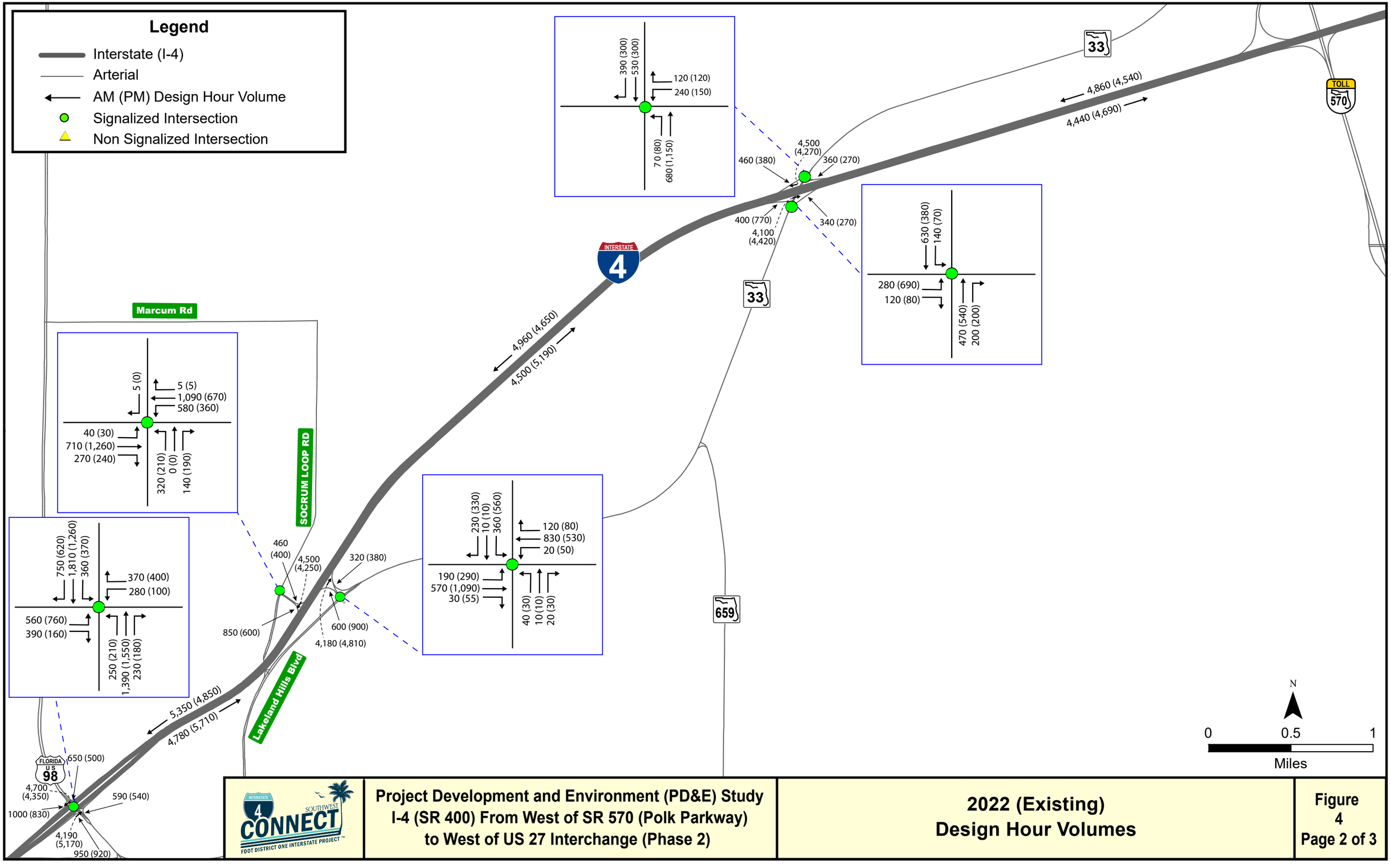
I-4 CONNECT SOUTHWEST FDOT DISTRICT ONE INTERSTATE PROJECT	**Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2022 (Existing) Annual Average Daily Traffic (AADT)**	**Figure 3 Page 3 of 3**



Figure

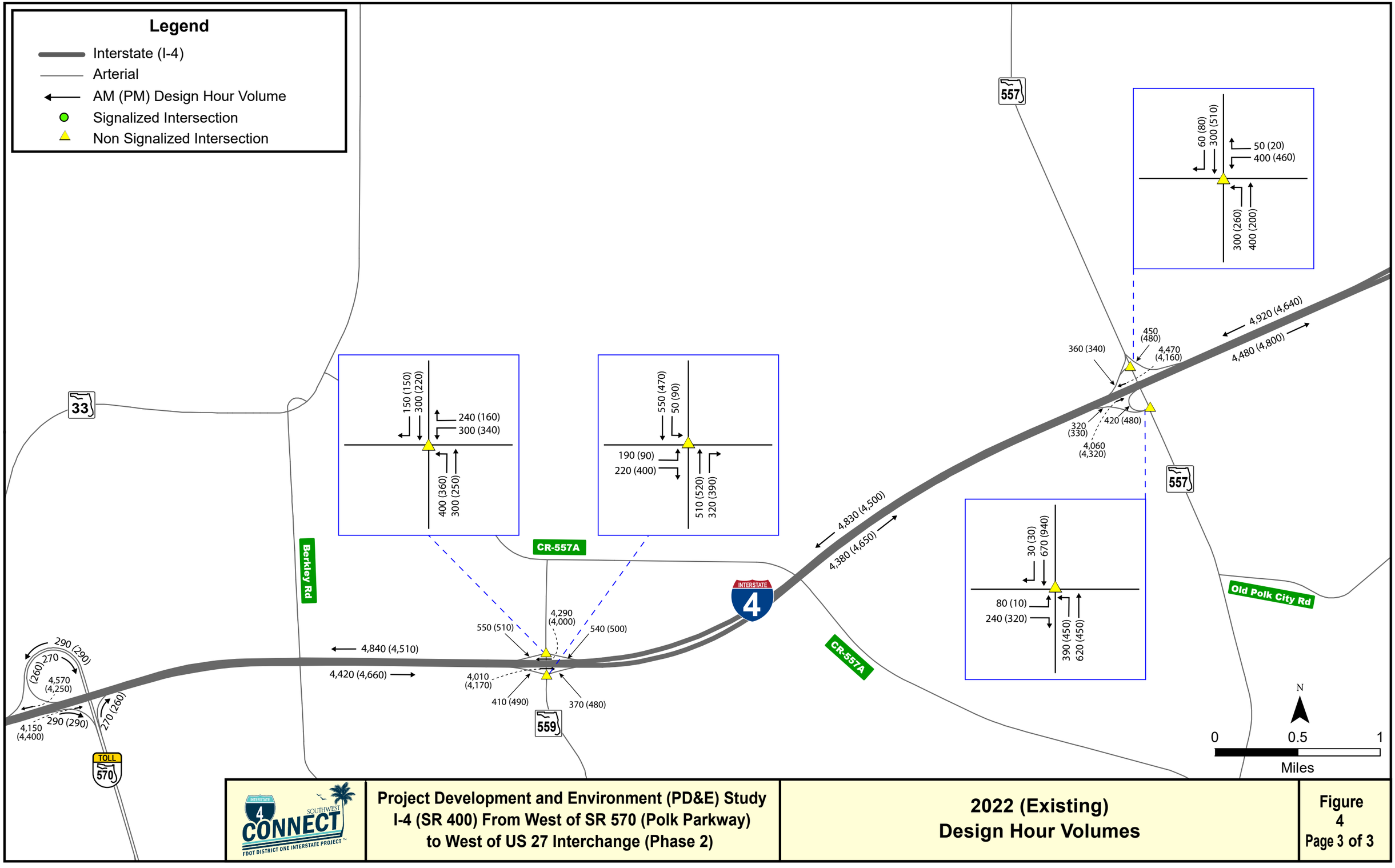
4 CONNECT SOUTHWEST FDOT DISTRICT ONE INTERSTATE PROJECT	**Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2022 (Existing) Design Hour Volumes**

Figure 4 Page 1 of 3



SOUTHWEST I-4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	**Project Development and Environment (PD&E) Study** **I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2022 (Existing)** **Design Hour Volumes**

Figure 4 Page 2 of 3



SOUTHWEST I-4 CONNECT — FDOT DISTRICT ONE INTERSTATE PROJECT

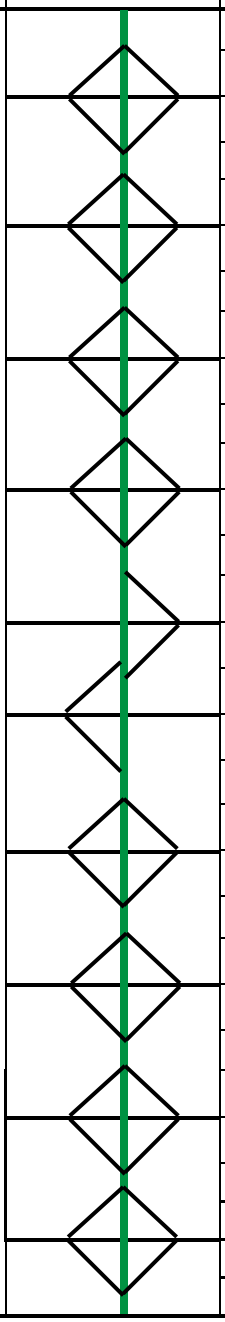
Project Development and Environment (PD&E) Study
I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)

2022 (Existing) Design Hour Volumes

Figure 4 Page 3 of 3

The 2022 AADT volumes along I-4 and ramps are shown in **Table 8.** The daily traffic for I-4 mainline ranges from 103,600 vpd to 135,800 vpd.

Table 8
2022 Existing I-4 Corridor AADTs

Location	Profile	Estimated 2022 AADTs
		**106,800**
		9,600
SR 557		6,400
		103,600
		10,600
SR 559		10,800
		103,800
		5,800
SR 570 (Polk Parkway)		6,400
		104,400
		6,400
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)		7,600
		105,600
		3,600
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)		3,600
		6,500
CR 582 (North Socrum Loop Road)		6,500
		111,400
		14,900
US 98/SR 35/SR 700		21,100
		117,600
		10,600
SR 539 (Kathleen Road)		10,600
		117,600
		6,000
West Memorial Boulevard		15,600
		127,200
		11,000
SR 570 (Polk Parkway)		19,600
		135,800

2,220 = Mainline volume 2,220 = Combined ramp volume

Note: 2021 FDOT's Florida Traffic Online database multiplied with 5% growth rate and balanced mainline traffic

5.0 Traffic Operations Analysis Methodology

The Highway Capacity Software (HCS7) Version 7.9 was used to identify Level of Service (LOS) along freeway segments. The HCS7 is based on Highway Capacity Manual Sixth Edition (HCM 6th Edition) methodologies. The HCM 6th Edition estimates level of service based on density – a function of flow rate (volumes) and travel speed – for uninterrupted flow facilities such as basic freeway/Collector-Distributor (C-D) roadway segments, merge and diverge segments, and freeway/C-D roadway weaving segments. Density is measured in passenger cars per mile per lane (pcpmpl). For freeway merge and diverge areas, the HCM methodology also includes a capacity check for the influence area and the upstream or downstream ramp roadway. The HCM 6th Edition LOS and density targets for freeway segments are listed in **Table 9**.

Table 9
Freeway Segments HCM 6th Edition Level of Service Criteria

LOS	Basic Density (HCM Exhibit 12-15)	Merge and Diverge Density (HCM Exhibit 14-3)	Weaving Density (HCM Exhibit 13-6)
A	≤ 11	≤ 10	0 – 10
B	> 11 – 18	> 10 – 20	> 10 – 20
C	> 18 – 26	> 20 – 28	> 20 – 28
D	> 26 – 35	> 28 – 35	> 28 – 35
E	> 35 – 45	> 35	> 35 – 43
F	> 45	Demand Exceeds Capacity	Demand Exceeds Capacity

Note: Density measured in passenger cars/mile/lane (pcpmpl). Source: HCM 6th Edition

LOS was used as a primary measure of effectiveness. The LOS target for state roads during peak travel hours is "D" in urban areas, per the State Highway System Policy No. 000-525-006c. The Build Alternative would be designed to meet the established LOS D target to the greatest extent practicable in Design Year 2045.

A capacity and speed adjustment factors were determined based on following factors:

- I-4 Free-Flow Speed (FFS) – 75 mph
- I-4 Ramps Free-Flow Speed (FFS) – Posted or Advisory Speed Limit plus 5 mph
- I-4 peak hour truck percentage – 7%
- Lane width – 12 feet
- Driver Population – Mostly Familiar
- Weather Type – Non-Severe Weather
- Incident Type – No Incident
- Demand Adjustment Factor – 1.000

Signalized intersections were evaluated using Synchro Version 11, with levels of service identified based on the HCM 6th Edition LOS and delay targets presented in **Table 10**. Unlike the HCM, Synchro software has additional procedures for estimating control delay, such as the number of right turns on red and queue delay associated with starvation and spillback. Thus, Synchro delay estimation yields more accurate results than HCM because of these additional refinements.

Table 10
Signalized Intersection HCM 6th Edition Level of Service Criteria

Control Delay (sec/veh)	LOS by Volume-to-Capacity Ratio*	
	≤1.0	>1.0
(HCM Exhibit 19-8)		
≤10	A	F
>10 – 20	B	F
>20 – 35	C	F
>35 – 55	D	F
>55 – 80	E	F
>80	F	F

*For approach-based and intersection-wide assessments, LOS is defined solely by control delay. Delay is measured in seconds per vehicle. Control delay and volume-to-capacity ratio are used to characterize LOS for a lane group. Source: HCM 6th Edition. Note that Synchro delay has been reported for this study.

Unsignalized intersections were evaluated using the HCS Version 7.9, following the criteria presented in **Table 11**.

Table 11
Unsignalized Intersection HCM 6th Edition Level of Service Criteria

Control Delay (sec/veh)	LOS by Volume-to-Capacity Ratio*	
	≤1.0	>1.0
(HCM Exhibit 20-2)		
≤10	A	F
>10 – 15	B	F
>15 – 25	C	F
>25 – 35	D	F
>35 – 50	E	F
>50	F	F

*For approach-based and intersection-wide assessments, LOS is defined solely by control delay. Delay is measured in seconds per vehicle. Control delay and volume-to-capacity ratio are used to characterize LOS for a lane group. Source: HCM 6th Edition

Two-Way Stop Controlled intersection

The capacity of a minor-street approach depends on two factors:

- The distribution of available gaps in the major-street traffic stream
- The gap size required by drivers in other traffic streams to execute their desired movements

Selection of Measures of Effectiveness (MOE)

- Signalized/unsignalized Intersections – Volume, control delay, LOS, maximum queue lengths (95th percentile queues)
- Freeway Segments – Volume, density, LOS; demand to capacity ratio, speed
- Ramp Merge/Diverge – Volume, density, LOS, demand to capacity ratio, speed

6.0 Existing Conditions Traffic Operations Analysis

Traffic operations analyses for the AM and PM peak hours were conducted to document the LOS within the study area for the Existing Year (2022). **Figure 5** shows the existing lane configuration of I-4 mainline, ramps and ramp terminals used in the operational analysis.

The 2022 AM and PM peak hour traffic volumes were evaluated in each direction for freeway segments: basic, weave, and merge/diverge influence areas. HCS results are summarized in **Tables 12** and **13** for the eastbound and westbound directions, respectively. Most of the segments along I-4 operate at LOS D or better, except for these locations, which operate at an unacceptable LOS E/LOS F in one or both AM and PM peak hours:

- I-4 eastbound at Polk Parkway off-ramp diverge segment
- I-4 eastbound from Polk Parkway off-ramp to on-ramp basic segment
- I-4 eastbound from Polk Parkway on-ramp merge segment
- I-4 eastbound from Polk Parkway on-ramp to West Memorial Boulevard off-ramp basic segment
- I-4 eastbound at West Memorial Boulevard off-ramp diverge segment
- I-4 westbound from US 98 on-ramp to SR 539 (Kathleen Road) off-ramp basic segment
- I-4 westbound at SR 539 (Kathleen Road) off-ramp diverge segment
- I-4 westbound from SR 539 (Kathleen Road) on-ramp to West Memorial Boulevard off-ramp basic segment
- I-4 westbound at West Memorial Boulevard off-ramp diverge segment
- I-4 westbound from Polk Parkway off-ramp to on-ramp basic segment

Note that current conditions along I-4 may be different than the results listed above due to the calculated

design hour volumes using K-factor of 9% whereas actual the peak to daily ratios along I-4 corridor range from 5.58% to 7.47%.

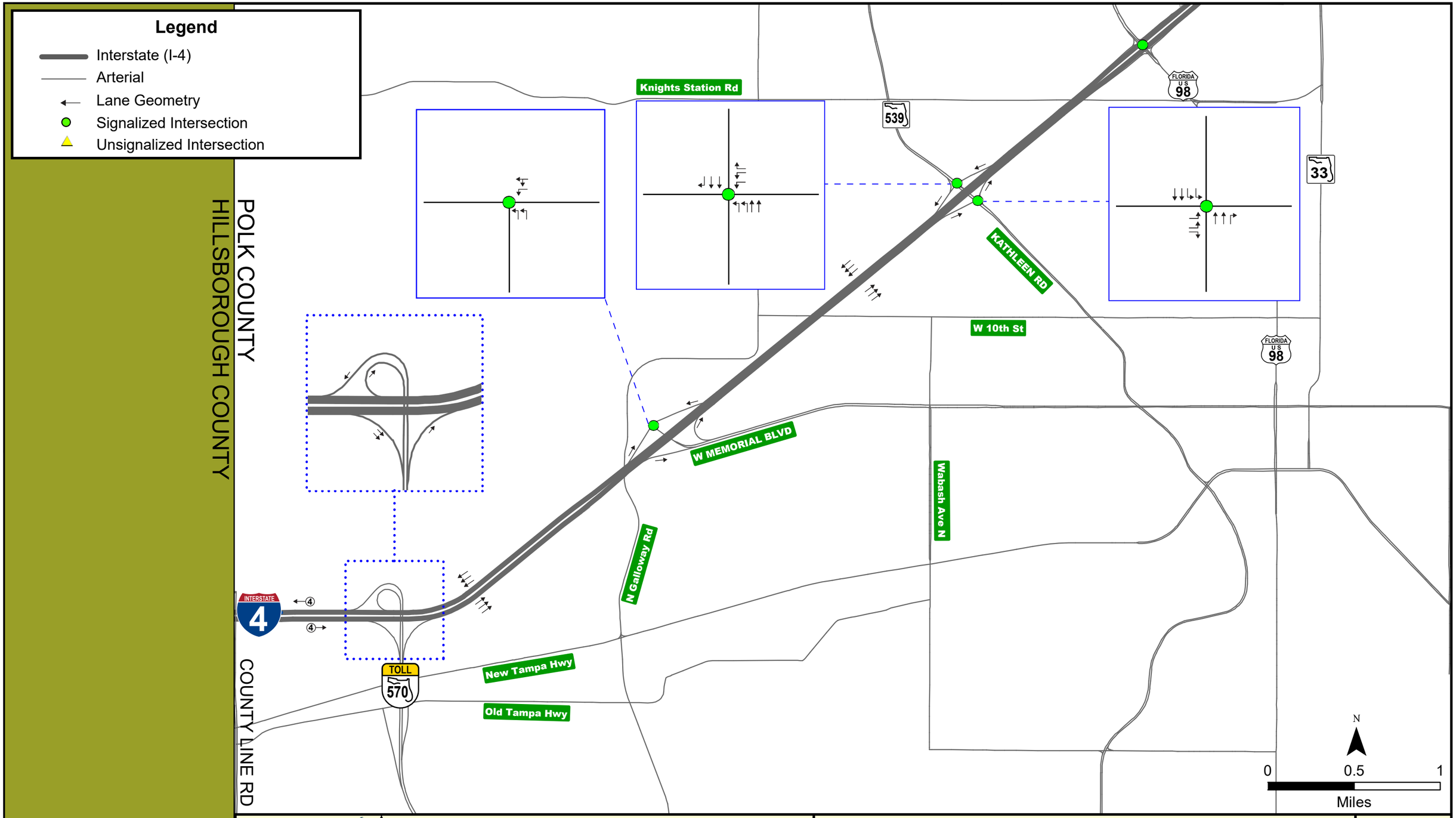
Ramp speed reported under HCS7 is the speed of the ramp influence area and depends on the mainline speed. I-4 free flow speed is 75 mph, and the ramp influence area speeds are below that limit.

Signalized intersections were analyzed using Synchro Version 11. Unsignalized intersections were analyzed using the HCS software Version 7.9. Unsignalized LOS/Delay reported for worst movement. Note that heavy vehicle input for major street through and right movements at Two-Way Stop Control is not required based on HCM.

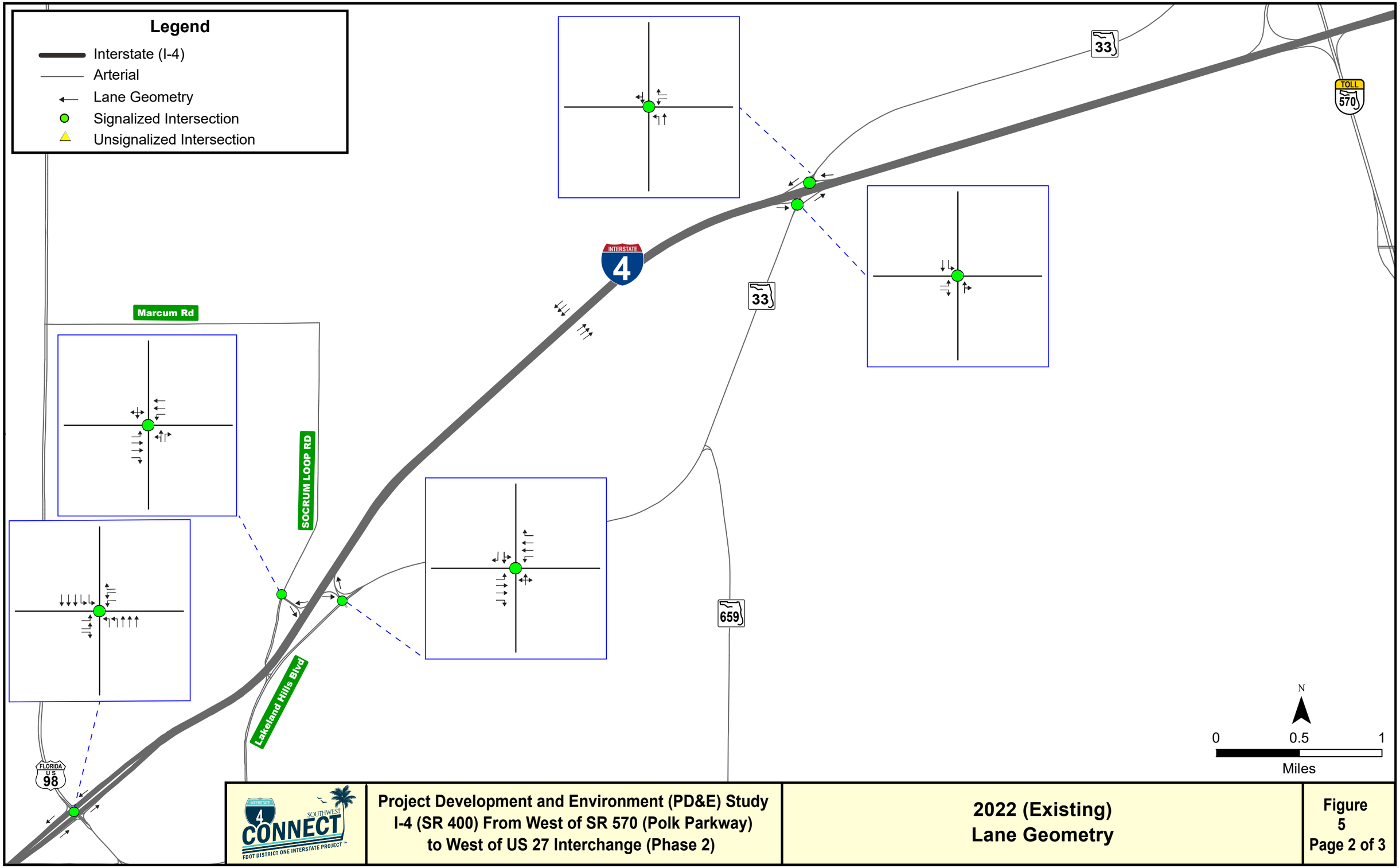
The analysis output summary for AM and PM peak hours are presented in **Table 14**. Several intersections within the study area are operating at LOS E or F in one or both AM and PM peak hours. These intersections include:

- I-4 and US 98 interchange
- I-4 and N Socrum Loop (CR 582) westbound ramp terminal
- I-4 and Lakeland Hills Boulevard eastbound ramp terminal
- I-4 and SR 33 eastbound ramp terminal
- I-4 and SR 559 both ramp terminals (unsignalized)
- I-4 and SR 557 both ramp terminals (unsignalized)

The existing Synchro and HCS output sheets are included in **Appendix D**.



SOUTHWEST I-4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	**Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2022 (Existing) Lane Geometry**	**Figure 5 Page 1 of 3**

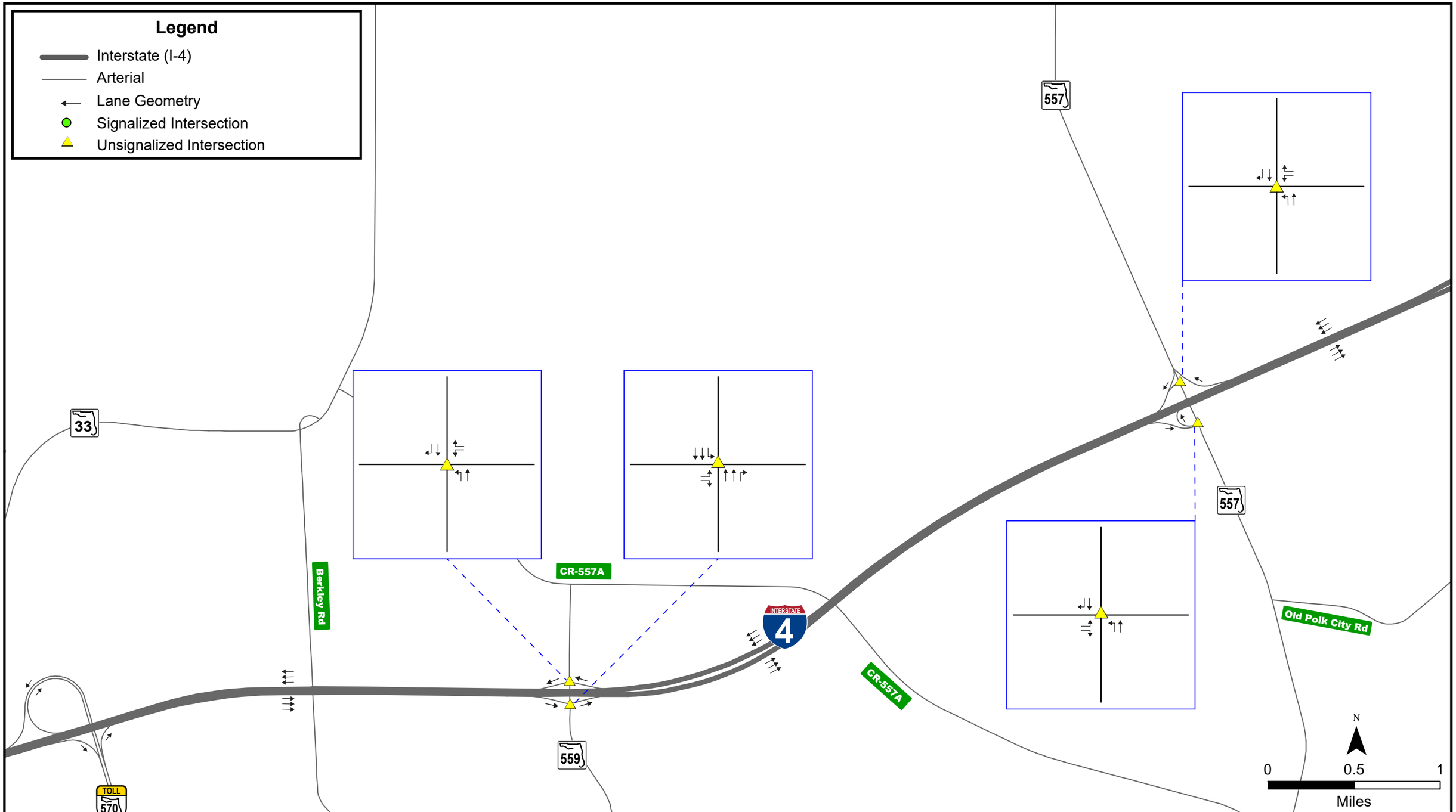


SOUTHWEST I-4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	**Project Development and Environment (PD&E) Study** **I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2022 (Existing)** **Lane Geometry**

Figure 5 Page 2 of 3

Legend

- Interstate (I-4)
- Arterial
- Lane Geometry
- Signalized Intersection
- Unsignalized Intersection



SOUTHWEST I-4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	**Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2022 (Existing) Lane Geometry**	**Figure 5 Page 3 of 3**

Table **12**: Existing Year 2022 HCS Level of Service and Density for I-4 Eastbound Segments

No.	Segment	Segment Type	Number of Lanes	AM Peak Hour								PM Peak Hour							
				Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)	Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)
1	West of Polk Parkway off-ramp	Basic	4	6,000	25.1	-	C	0.7	-	67.3	-	6,820	28.2	-	D	0.8	-	64.8	-
2	Polk Parkway off-ramp	Diverge	4	6,000	24.1	14.0	B	0.7	0.2	70.1	62.6	6,820	58.2	16.6	F	0.8	0.2	30.3	62.7
3	Polk Parkway off-ramp to on-ramp	Basic	3	5,120	30.6	-	D	0.8	-	62.8	-	5,940	63.3	-	F	0.9	-	31.3	-
4	Polk Parkway on-ramp	Merge	3	5,620	34.5	32.5	D	0.9	0.3	61.2	58.5	6,440	35.7	33.2	F	0.9	0.3	60.6	57.8
5	Polk Parkway on-ramp to West Memorial Boulevard off-ramp	Basic	3	5,620	36.3	-	E	0.9	-	58.1	-	6,440	38.3	-	F	1.0	-	56.5	-
6	West Memorial Boulevard off-ramp	Diverge	3	5,620	31.5	35.8	E	0.9	0.4	67.0	63.1	6,440	32.2	36.3	F	0.9	0.4	67.1	63.2
7	West Memorial Boulevard off-ramp to on-ramp	Basic	3	4,900	28.5	-	D	0.8	-	64.5	-	5,740	30.2	-	D	0.9	-	63.1	-
8	West Memorial Boulevard on-ramp	Merge	3	5,200	31.3	30.2	D	0.8	0.2	62.3	59.8	6,030	32.5	31.0	D	0.9	0.2	61.9	59.3
9	West Memorial Boulevard on-ramp to SR 539 off-ramp	Basic	3	5,200	31.4	-	D	0.8	-	62.1	-	6,030	33.2	-	D	1.0	-	60.6	-
10	SR 539 off-ramp	Diverge	3	5,200	28.9	29.4	D	0.8	0.3	67.6	63.6	6,030	29.8	30.1	D	0.9	0.3	67.5	63.6
11	SR 539 off-ramp to on-ramp	Basic	3	4,650	26.3	-	D	0.8	-	66.4	-	5,460	27.7	-	D	0.9	-	65.2	-
12	SR 539 on-ramp	Merge	3	5,140	30.9	30.9	D	0.8	0.3	62.4	59.9	6,090	33.1	32.7	D	0.9	0.3	61.4	58.6
13	SR 539 on-ramp to US 98 off-ramp	Basic	3	5,140	30.8	-	D	0.8	-	62.6	-	6,090	33.9	-	D	1.0	-	60.0	-
14	US 98 off-ramp	Diverge	3	5,140	29.0	33.7	D	0.8	0.5	66.6	62.4	6,090	30.5	34.8	D	0.9	0.5	66.7	62.5
15	US 98 off-ramp to on-ramp	Basic	3	4,190	22.7	-	C	0.7	-	69.2	-	5,170	25.3	-	C	0.8	-	67.2	-
16	US 98 on-ramp	Merge	3	4,780	28.2	28.1	D	0.8	0.3	63.5	61.3	5,710	30.1	29.3	D	0.8	0.3	62.9	60.6
17	US 98 on-ramp to Lakeland Hills Boulevard off-ramp	Basic	3	4,780	27.4	-	D	0.8	-	65.4	-	5,710	29.9	-	D	0.9	-	63.3	-
18	Lakeland Hills Boulevard off-ramp	Diverge	3	4,780	29.1	29.1	D	0.8	0.4	61.6	55.6	5,710	31.2	30.9	D	0.8	0.5	60.8	54.7
19	Lakeland Hills Boulevard off-ramp to on-ramp	Basic	3	4,180	22.7	-	C	0.7	-	69.2	-	4,810	22.6	-	C	0.8	-	69.1	-
20	Lakeland Hills Boulevard on-ramp	Merge	3	4,500	26.5	26.1	C	0.7	0.2	63.7	61.4	5,190	26.8	26.5	C	0.7	0.2	63.7	61.3
21	Lakeland Hills Boulevard on-ramp to SR 33 off-ramp	Basic	3	4,500	25.1	-	C	0.7	-	67.3	-	5,190	25.4	-	C	0.8	-	67.1	-
22	SR 33 off-ramp	Diverge	3	4,500	27.2	30.2	D	0.7	0.2	62.1	56.2	5,190	27.9	31.1	D	0.7	0.5	61.0	55.1
23	SR 33 off-ramp to on-ramp	Basic	3	4,100	22.1	-	C	0.7	-	69.6	-	4,420	20.0	-	C	0.7	-	71.0	-
24	SR 33 on-ramp	Merge	3	4,440	25.8	25.2	C	0.7	0.2	64.6	62.6	4,690	23.3	22.9	C	0.7	0.2	65.2	63.3
25	SR 33 on-ramp to SR 570 off-ramp	Basic	3	4,440	24.6	-	C	0.7	-	67.7	-	4,690	21.8	-	C	0.7	-	69.8	-
26	SR 570 off-ramp	Diverge	3	4,440	23.8	29.9	D	0.7	0.2	69.9	66.4	4,690	21.7	28.0	C	0.7	0.2	70.0	66.4
27	SR 570 off-ramp to on-ramp	Basic	3	4,150	22.4	-	C	0.7	-	69.4	-	4,400	19.9	-	C	0.7	-	71.1	-
28	SR 570 on-ramp	Merge	3	4,420	25.4	22.6	C	0.7	0.2	65.2	63.5	4,660	22.9	20.5	C	0.7	0.1	65.8	64.2
29	SR 570 on-ramp to SR 559 off-ramp	Basic	3	4,420	24.5	-	C	0.7	-	67.8	-	4,660	21.6	-	C	0.7	-	70.0	-
30	SR 559 off-ramp	Diverge	3	4,420	24.3	30.0	D	0.7	0.2	68.2	64.1	4,660	22.2	28.2	D	0.7	0.3	68.0	63.9
31	SR 559 off-ramp to on-ramp	Basic	3	4,010	21.5	-	C	0.7	-	70.0	-	4,170	18.5	-	C	0.7	-	71.8	-
32	SR 559 on-ramp	Merge	3	4,380	25.4	25.2	C	0.7	0.2	64.6	62.5	4,650	23.2	23.6	C	0.7	0.3	65.0	63.0
33	SR 559 on-ramp to SR 557 off-ramp	Basic	3	4,380	24.1	-	C	0.7	-	68.1	-	4,650	21.5	-	C	0.7	-	70.0	-
34	SR 557 off-ramp	Diverge	3	4,380	26.4	29.5	D	0.7	0.2	62.3	56.4	4,650	24.2	27.6	C	0.7	0.2	62.3	56.4
35	SR 557 off-ramp to on-ramp	Basic	3	4,060	21.8	-	C	0.7	-	68.1	-	4,320	19.4	-	C	0.7	-	68.1	-
36	SR 557 on-ramp	Merge	3	4,480	26.0	24.8	C	0.7	0.2	64.6	62.7	4,800	24.0	23.4	C	0.7	0.3	65.0	63.1
37	East of SR 557 on-ramp	Basic	3	4,480	24.9	-	C	0.7	-	67.5	-	4,800	22.5	-	C	0.8	-	69.3	-

Density – passenger cars/mile/lane; Highlighted – LOS E/LOS F
The results are based on the HCS 7.9

Table **13**: Existing Year 2022 HCS Level of Service and Density for I-4 Westbound Segments

No.	Segment	Segment Type	Number of Lanes	AM Peak Hour								PM Peak Hour							
				Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)	Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)
1	East of SR 557 off-ramp	Basic	3	4,920	28.7	-	D	0.8	-	64.4	-	4,640	25.4	-	C	0.7	-	67.1	-
2	SR 557 off-ramp	Diverge	3	4,920	29.8	32.7	D	0.8	0.3	62.0	56.0	4,640	27.5	31.0	D	0.7	0.3	62.0	56.0
3	SR 557 off-ramp to on-ramp	Basic	3	4,470	24.8	-	C	0.7	-	66.8	-	4,160	21.9	-	C	0.7	-	66.8	-
4	SR 557 on-ramp	Merge	3	4,830	28.5	27.8	C	0.8	0.2	63.6	61.4	4,500	25.7	25.5	C	0.7	0.2	64.4	62.4
5	SR 557 on-ramp to SR 559 off-ramp	Basic	3	4,830	27.8	-	D	0.8	-	65.1	-	4,500	24.4	-	C	0.7	-	67.9	-
6	SR 559 off-ramp	Diverge	3	4,830	26.7	31.5	D	0.8	0.3	67.8	63.7	4,500	24.4	29.5	D	0.7	0.3	67.9	63.8
7	SR 559 off-ramp to on-ramp	Basic	3	4,290	23.5	-	C	0.7	-	68.6	-	4,000	20.9	-	C	0.6	-	70.5	-
8	SR 559 on-ramp	Merge	3	4,840	28.7	28.9	D	0.8	0.3	63.2	60.9	4,510	25.9	26.5	C	0.7	0.3	64.1	61.9
9	SR 559 on-ramp to SR 570 off-ramp	Basic	3	4,840	27.9	-	D	0.8	-	65.0	-	4,510	24.4	-	C	0.7	-	67.9	-
10	SR 570 off-ramp	Diverge	3	4,840	26.6	31.6	D	0.8	0.2	68.4	64.5	4,510	24.2	29.5	D	0.7	0.1	68.6	64.6
11	SR 570 off-ramp to on-ramp	Basic	3	4,570	25.6	-	C	0.7	-	66.9	-	4,250	22.5	-	C	0.7	-	69.3	-
12	SR 570 on-ramp	Merge	3	4,860	28.7	27.9	C	0.8	0.2	63.6	61.4	4,540	25.9	25.7	C	0.7	0.2	64.4	62.3
13	SR 570 on-ramp to SR 33 off-ramp	Basic	3	4,860	28.1	-	D	0.8	-	64.8	-	4,540	24.7	-	C	0.7	-	67.7	-
14	SR 33 off-ramp	Diverge	3	4,860	26.7	32.1	D	0.8	0.2	68.2	64.2	4,540	24.4	29.9	D	0.7	0.2	68.5	64.5
15	SR 33 off-ramp to on-ramp	Basic	3	4,500	25.1	-	C	0.7	-	67.3	-	4,270	22.7	-	C	0.7	-	69.2	-
16	SR 33 on-ramp	Merge	3	4,960	29.6	29.6	D	0.8	0.3	62.9	60.5	4,650	26.7	27.2	C	0.7	0.2	63.9	61.7
17	SR 33 on-ramp to CR 582 (North Socrum Loop Road) off-ramp	Basic	3	4,960	29.0	-	D	0.8	-	64.1	-	4,650	25.5	-	C	0.7	-	67.0	-
18	CR 582 (North Socrum Loop Road) off-ramp	Diverge	3	4,960	30.0	21.2	C	0.8	0.3	62.0	56.0	4,650	27.5	19.2	B	0.7	0.2	62.2	56.2
19	CR 582 (North Socrum Loop Road) off-ramp to on-ramp	Basic	3	4,500	25.1	-	C	0.7	-	67.3	-	4,250	22.5	-	C	0.7	-	69.3	-
20	CR 582 (North Socrum Loop Road) on-ramp	Merge	3	5,350	32.8	28.7	D	0.9	0.5	61.2	58.4	4,850	28.1	24.7	C	0.8	0.4	63.5	61.3
21	CR 582 (North Socrum Loop Road) on-ramp to US 98 off-ramp	Basic	3	5,350	33.1	-	D	0.9	-	60.7	-	4,850	27.2	-	D	0.8	-	65.6	-
22	US 98 off-ramp	Diverge	3	5,350	29.8	35.0	D	0.9	0.4	67.3	63.3	4,850	26.3	32.0	D	0.8	0.3	67.9	63.8
23	US 98 off-ramp to on-ramp	Basic	3	4,700	26.7	-	D	0.8	-	66.0	-	4,350	23.2	-	C	0.7	-	68.8	-
24	US 98 on-ramp	Merge	3	5,700	35.9	34.6	D	0.9	0.6	59.5	56.3	5,180	30.6	30.7	D	0.8	0.5	62.3	59.7
25	US 98 on-ramp to SR 539 off-ramp	Basic	3	5,700	37.4	-	E	0.9	-	57.2	-	5,180	30.2	-	D	0.8	-	63.1	-
26	SR 539 off-ramp	Diverge	3	5,700	31.9	36.2	E	0.9	0.4	67.1	63.2	5,180	28.0	33.2	D	0.8	0.3	67.9	63.9
27	SR 539 off-ramp to on-ramp	Basic	3	5,020	29.6	-	D	0.8	-	63.6	-	4,700	25.9	-	C	0.7	-	66.7	-
28	SR 539 on-ramp	Merge	3	5,610	34.4	32.1	D	0.9	0.3	61.2	58.5	5,250	30.7	29.5	D	0.8	0.3	62.8	60.5
29	SR 539 on-ramp to West Memorial Boulevard off-ramp	Basic	3	5,610	36.2	-	E	0.9	-	58.2	-	5,250	30.9	-	D	0.8	-	62.5	-
30	West Memorial Boulevard off-ramp	Diverge	3	5,610	31.0	35.3	E	0.9	0.2	68.0	64.4	5,250	28.3	33.2	D	0.8	0.2	68.3	64.5
31	West Memorial Boulevard off-ramp to on-ramp	Basic	3	5,310	32.6	-	D	0.9	-	61.1	-	4,980	28.3	-	D	0.8	-	64.7	-
32	Memorial Boulevard on-ramp to Polk Parkway off-ramp	Weaving	4	6,154	26.0	-	C	0.8	-	66.6	-	5,828	23.2	-	C	0.7	-	68.8	-
33	Polk Parkway off-ramp to on-ramp	Basic	3	5,590	35.9	-	E	0.9	-	58.4	-	5,260	30.9	-	D	0.8	-	62.5	-
34	Polk Parkway on-ramp	Merge	4	6,470	28.1	32.0	D	0.8	0.5	64.9	64.9	6,140	25.1	31.8	C	0.7	0.5	67.3	67.3
35	West of Polk Parkway on-ramp	Basic	4	6,470	28.1	-	D	0.8	-	64.9	-	6,140	25.1	-	C	0.7	-	67.3	-

Density – passenger cars/mile/lane; Highlighted – LOS E/LOS F
The results are based on the HCS 7.9

Table 14: Existing Year 2022 Intersection Level of Service/Delay

Interstate	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			AM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
I-4	West Memorial Boulevard & I-4 Westbound	Volume					300			780						B (13.0)
		LOS (Delay)	Movement				B (16.3)			B (11.7)						
			Approach				B (16.3)			B (11.7)						
		Queue Length 95th (ft)	Movement				71			126						
	Kathleen Road (SR 539) & I-4 Westbound	Volume					560		120	150	1210			1430	440	C (26.9)
		LOS (Delay)	Movement				**E (56.1)**		B (12.2)	**E (70.1)**	A (8.0)			D (35.5)	A (3.4)	
			Approach				D (48.3)			B (14.8)				C (27.9)		
		Queue Length 95th (ft)	Movement				304		66	104	145			#812	59	
	Kathleen Road (SR 539) & I-4 Eastbound	Volume		290		260					1070	340	150	1840		B (18.7)
		LOS (Delay)	Movement	**E (59.5)**		D (44.4)					C (21.2)	A (2.6)	D (43.5)	A (8.1)		
			Approach	D (52.3)						B (16.7)			B (10.8)			
		Queue Length 95th (ft)	Movement	174		214					434	47	m73	326		
	US-98 & I-4	Volume		560			280			250	1390		360	1810		D (51.5)
		LOS (Delay)	Movement	**F (115.4)**			**E (61.6)**			**F (96.4)**	C (21.3)		**F (170.3)**	C (23.5)		
			Approach	**F (115.4)**			**E (61.6)**			C (33.0)			D (47.9)			
		Queue Length 95th (ft)	Movement	#464			191			#240	355		#341	490		
	North Socrum Loop Road (CR 582) & I-4 Westbound	Volume				5	320		140	40	710	270	580	1090	5	**E (61.2)**
		LOS (Delay)	Movement			A (0.2)	D (48.3)		D (37.6)	**E (62.4)**	**F (131.9)**	A (9.8)	**E (63.3)**	C (33.9)		
			Approach	A (0.2)			D (45.0)			**F (96.9)**			D (44.1)			
		Queue Length 95th (ft)	Movement		0		#480		177	71	#512	83	#751	539		
	Lakeland Hills Boulevard & Lakeland Harbor Boulevard/I-4 Eastbound	Volume		360	10	230	40	10	20	190	570	30	20	830		D (40.3)
		LOS (Delay)	Movement		D (46.7)	A (5.4)	**E (60.7)**		A (1.0)	D (53.0)	C (28.0)	A (0.1)	C (21.1)	**E (55.1)**		
			Approach	C (30.9)			D (35.4)			C (32.9)			D (54.3)			
		Queue Length 95th (ft)	Movement		393	55	72		0	#257	283	0	26	#530		
	SR 33 & I-4 Westbound	Volume					240			70	680			530		C (26.3)
		LOS (Delay)	Movement				**E (62.6)**			A (8.9)	B (15.7)			C (25.8)		
			Approach				**E (62.6)**			B (15.0)			C (25.8)			
		Queue Length 95th (ft)	Movement				#270			m35	343			422		
	SR 33 & I-4 Eastbound	Volume		280		120					470		140	630		C (23.5)
		LOS (Delay)	Movement	D (44.7)		A (4.6)					C (32.8)		B (11.2)	B (13.6)		
			Approach	C (32.7)							C (32.8)			B (13.1)		
		Queue Length 95th (ft)	Movement	255		32					#498		m64	m262		

Interstate	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			PM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
I-4	West Memorial Boulevard & I-4 Westbound	Volume					270			780						B (12.7)
		LOS (Delay)	Movement				B (16.1)			B (11.5)						
			Approach				B (16.1)			B (11.5)						
		Queue Length 95th (ft)	Movement				63			123						
	Kathleen Road (SR 539) & I-4 Westbound	Volume					340		140	250	1630			1120	300	C (22.1)
		LOS (Delay)	Movement				**E (73.3)**		C (31.6)	**F (87.8)**	A (4.0)			C (22.4)	A (2.5)	
			Approach				**E (61.1)**			B (15.1)				B (18.2)		
		Queue Length 95th (ft)	Movement				236		131	m188	247			538	47	
	Kathleen Road (SR 539) & I-4 Eastbound	Volume		430		140					1450	480	150	1310		C (24.8)
		LOS (Delay)	Movement	**E (71.7)**		A (9.9)					C (28.6)	A (5.3)	**E (71.9)**	A (8.5)		
			Approach	**E (56.5)**						C (22.8)			B (15.0)			
		Queue Length 95th (ft)	Movement	292		61					849	139	127	260		
	US-98 & I-4	Volume		760			100			210	1550		370	1260		**E (55.1)**
		LOS (Delay)	Movement	**F (80.4)**			D (50.2)			**E (67.4)**	D (43.0)		**F (88.8)**	D (43.3)		
			Approach	**F (80.4)**			D (50.2)			D (45.9)			D (53.6)			
		Queue Length 95th (ft)	Movement	546			75			172	663		287	478		
	North Socrum Loop Road (CR 582) & I-4 Westbound	Volume					210		190	30	1260	240	360	670	5	D (43.4)
		LOS (Delay)	Movement				**E (67.9)**		**E (70.2)**	**E (71.0)**	D (54.8)	A (4.7)	D (52.7)	B (14.6)		
			Approach				**E (69.0)**			D (47.2)			C (27.9)			
		Queue Length 95th (ft)	Movement				276		256	65	#946	62	#425	268		
	Lakeland Hills Boulevard & Lakeland Harbor Boulevard/I-4 Eastbound	Volume		560	10	330	30	10	30	290	1090	55	50	530		**F (80.3)**
		LOS (Delay)	Movement		D (53.8)	A (8.5)	**E (69.6)**		A (1.2)	**F (85.9)**	**F (120.9)**	A (0.4)	D (38.8)	**F (85.7)**		
			Approach	D (37.2)			C (30.6)			**F (109.2)**			**F (81.7)**			
		Queue Length 95th (ft)	Movement		#740	121	66		0	#465	#895	0	65	#423		
	SR 33 & I-4 Westbound	Volume					150			80	1150			300		C (27.4)
		LOS (Delay)	Movement				**E (63.7)**			A (4.5)	C (27.7)			B (14.0)		
			Approach				**E (63.7)**			C (26.2)			B (14.0)			
		Queue Length 95th (ft)	Movement				188			m26	m714			209		
	SR 33 & I-4 Eastbound	Volume		690		80					540		70	380		**F (97.6)**
		LOS (Delay)	Movement	**F (206.9)**		A (2.1)					D (39.2)		B (14.7)	B (17.4)		
			Approach	**F (185.7)**						D (39.2)			B (17.0)			
		Queue Length 95th (ft)	Movement	#974		13					#553		44	167		

Synchro Version 11 Build 168.

LOS notes:

Delay is in sec/veh units

:Level Of Service (LOS) E reflecting at capacity operations

:Level Of Service (LOS) F reflecting over capacity operations

Queue notes:

~: Volume exceeds capacity, queue is theoretically infinite

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 14: Existing Year 2022 Intersection Level of Service/Delay (Continued)

Interstate	Stop Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection AM LOS (Delay)
				Eastbound			Westbound			Northbound			Southbound			
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
I-4	*SR 559 & I-4 Westbound	Volume					300		240	400	300			300	150	F (>999)
		LOS (Delay)	Movement				F (>999)		B (14.2)	B (10.1)	A (0)			A (0)	A (0)	
			Approach				F (888.9)			A (5.8)				A (0)		
		Queue Length 95th (ft)	Movement				950		75	50	0			0	0	
	*SR 559 & I-4 Eastbound	Volume		190		220					510	320	50	550		E (43.6)
		LOS (Delay)	Movement	E (43.6)		B (13.8)					A (0)	A (0)	A (9.1)	A (0)		
			Approach	D (27.6)							A (0)			A (0.8)		
		Queue Length 95th (ft)	Movement	150		50					0	0	25	0		
	*SR 557 & I-4 Westbound	Volume					400		50	300	400			300	60	F (896.3)
		LOS (Delay)	Movement				F (896.3)		B (11.6)	A (9.5)	A (0)			A (0)	A (0)	
			Approach				F (798.0)			A (4.1)				A (0)		
		Queue Length 95th (ft)	Movement				1025		25	50	0			0	0	
	*SR 557 & I-4 Eastbound	Volume		80		240				390	620			670	30	F (198.1)
		LOS (Delay)	Movement	F (198.1)		D (28.2)				B (14.1)	A (0)			A (0)	A (0)	
			Approach	F (70.7)						A (5.5)				A (0)		
		Queue Length 95th (ft)	Movement	150		125				100	0			0	0	

Interstate	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection PM LOS (Delay)
				Eastbound			Westbound			Northbound			Southbound			
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
I-4	*SR 559 & I-4 Westbound	Volume					340		160	360	250			220	150	F (732.5)
		LOS (Delay)	Movement				F (732.5)		B (11.3)	A (9.1)	A (0)			A (0)	A (0)	
			Approach				F (501.7)			A (5.3)				A (0)		
		Queue Length 95th (ft)	Movement				825		25	50	0			0	0	
	*SR 559 & I-4 Eastbound	Volume		90		400					520	390	90	470		C (22.4)
		LOS (Delay)	Movement	C (22.4)		C (17.3)					A (0)	A (0)	A (9.2)	A (0)		
			Approach	C (18.2)							A (0)			A (1.5)		
		Queue Length 95th (ft)	Movement	50		125					0	0	25	0		
	*SR 557 & I-4 Westbound	Volume					460		20	260	200			510	80	F (>999)
		LOS (Delay)	Movement				F (>999)		A (9.7)	B (11.2)	A (0)			A (0)	A (0)	
			Approach				F (>999)			A (6.3)				A (0)		
		Queue Length 95th (ft)	Movement				1450		25	50	0			0	0	
	*SR 557 & I-4 Eastbound	Volume		10		320				450	450			940	30	F (185.7)
		LOS (Delay)	Movement	F (121.5)		F (185.7)				D (28.2)	A (0)			A (0)	A (0)	
			Approach	F (183.8)						B (14.1)				A (0)		
		Queue Length 95th (ft)	Movement	25		450				200	0			0	0	

* HCS 7.9 Unsignalized Intersection

*Unsignalized Level of Service/Delay reported for worst movement

LOS notes:

Delay is in sec/veh units

:Level Of Service (LOS) E reflecting at capacity operations

:Level Of Service (LOS) F reflecting over capacity operations

Queue notes:

~: Volume exceeds capacity, queue is theoretically infinite

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

7.0 Transportation Systems Management and Operations

As part of I-4 Master Plan, the widening of I-4 and improvement of the interchanges within the study area are being evaluated. With long-term solutions several years out, the benefits of near-term Transportation Systems Management and Operations (TSM&O) improvements at the ramp merge/diverge areas were evaluated to assess the effectiveness to eliminate potential unsafe queuing into the mainline lanes and improve overall near-term operational benefits.

TSM&O alternatives are generally low-cost improvements which are designed to maximize the use and efficiency of the existing transportation facilities through improved systems management. The purpose of this study is to identify the existing general problems and recommend low-cost interim improvements which will improve the mobility of users at the existing interchange. The analysis was based on existing year 2022 traffic volumes.

There are several merge/diverge segments within the study area that operate at undesirable LOS of E or F in either of the AM or PM peak hours in year 2022. These ramp junctions along with the deficiencies are listed below:

- I-4 eastbound at Polk Parkway off-ramp diverge segment: Upstream mainline deficiency. Needs widening of thru lanes which is part of the long-term solutions (Master Plan study).
- I-4 eastbound from Polk Parkway on-ramp merge segment: Downstream mainline deficiency. Needs widening of thru lanes which is part of the long-term solutions (Master Plan study).
- I-4 eastbound at West Memorial Boulevard off-ramp diverge segment: Upstream mainline deficiency. Needs widening of thru lanes which is part of the long-term solutions (Master Plan study).
- I-4 westbound at SR 539 (Kathleen Road) off-ramp diverge segment: Extend the deceleration length to maximum 1500 feet if feasible. With the improvement, the diverge segment is anticipated to operate at LOS C during AM and PM, respectively.
- I-4 westbound at West Memorial Boulevard off-ramp diverge segment: Extend the deceleration length to maximum 1500 feet if feasible. With the improvement, the diverge segment is anticipated to operate at LOS C during AM and PM, respectively.

The TSM&O improvements will also enhance safety as it reduces congestion.

8.0 Alternatives

Phase 1 Feasibility Study Summary:

- Alt. 1 – Add 2 general use lanes (GULs) in each direction
- Alt. 2 – Add 2 buffer separated express lanes (ELs) in each direction
- Alt. 3 – Add 2 barrier separated express lanes (ELs) in each direction
- Alt. 4 – Add 1 GUL and 1 HOV lane in each direction

(Note: Buffer/barrier separation does not affect traffic operations, so Alternative 2 and Alternative 3 were analyzed as Alternative 2 at the Feasibility stage. HOV lanes can be accommodated in express lanes, but not vice versa, so Alternative 4 is not recommended to be carried forward.)

Based on operational and safety analyses as well as public input collected, Build Alternative 1 and 2 were recommended to be evaluated further in the Phase 2/Master Plan.

The following alternatives were considered during the preliminary analysis Phase 2 of the project using the Design Year traffic forecasts for I-4 and interchanges within the project limits.

- No-Build Alternative: The No-Build (no action) Alternative will include currently planned and programmed improvements or projects with construction phases identified in cost feasible plans:
    - I-4 interchange improvements at CSX Railroad (bridge replacement)
    - SR 33 interchange modification - roundabout
    - SR 557 interchange modification – roundabout
    - SR 559 interchange ramp terminals – signalized
- Build Alternatives: Addition of General Purpose (GP) lanes and addition of Managed lanes
    - **Build Alternative 1** included I-4 mainline widening from six to ten lanes: addition of two General Purpose Lanes (GPLs) on each direction.
    - **Build Alternative 2** included I-4 mainline widening from six to ten lanes: addition of two Express/High Occupancy Toll (HOT) lanes on each direction.

Build Alternatives were selected based on discussion with FDOT D1 and I-4 Master Plan team.

9.0 Travel Demand Forecasting (No-Build Alternatives)

The District One Regional Planning Model (D1RPM) 2015 Base Year and the 2045 Cost Feasible Model were provided by the Department. Calibration and validation of the D1RPM was completed by the PD&E Team.

The model AADTs from Phase 1 study were reviewed for reasonableness. The National Cooperative Highway Research Project (NCHRP) Report 765, ratio and difference smoothing method was applied to obtain reasonable 2045 AADTs between 2021 and 2045 data. Note that year 2022 data was not utilized to develop the Design Year 2045 AADTs. The future 2045 DDHVs were developed by applying the existing turning movement percentages only to the 2045 approach volumes based on the approved methodology. Detailed tables showing the projected No-Build traffic estimations are provided in **Appendix C**. Growth rates and/or forecasted AADT volumes at the ramps are illustrated in **Table 16**. I-4 mainline corridor AADTs were developed by balancing the traffic in between the interchanges. The average annual growth rate from year 2022 thru 2045 along I-4 corridor within study area is 1.91%. **Table 17** illustrates the 2045 Design Year No-Build AADTs within the study area. Historical and population [Bureau of Economic and Business Research (BEBR)] growth rates in addition to model growth rates were compared.

The Design Hour Volumes (DHVs) for Design Year 2045 was developed by applying the Standard K Factor of 9.0 percent and Directional Factor (D) to the Design Year 2045 AADT volumes. The future year DDHVs were then derived by applying turn percentages obtained from the existing turning movement counts to the DHVs at the ramp terminals and other intersections. A smoothing process was employed to ensure that the resulting design hour traffic volumes comply with the design traffic factors K_{STD}, D, and that traffic flows balance between intersections/interchanges. The initial DDHVs were reviewed for reasonableness and were ensured to be higher than the existing peak hour turning movement volumes. The Design Year 2045 No-Build DDHVS during the PM peak hour were developed first and DDHVs for the AM peak hour were determined using the reciprocal movement of the PM peak hour volumes along mainline and ramps. The supporting future traffic projection documentations are in **Appendix E**. 2045 DDHVs are shown in **Figure 6**.

Table 15 shows the U.S. Census population data and population projections for 2020, 2025, 2035 and 2045 for Polk County based on Bureau of Economic and Business Research Report (BEBR), published by the University of Florida. Between 2021 and 2045, Polk County has an estimated growth rate of approximately 0.33% and 2.57% per year based on BEBR's low and high population estimates, respectively. The 2045 No-Build DDHVs is shown in **Figure 6**.

Table 15

Historical Population and Growth

Type of Projection	Estimated 2020 Population	Population Projection			Average Annual Growth Rate (2021-2045)
		2025	2035	2045	
Polk County					
Low Population Projection	748,365	762,300	804,500	810,500	0.33%
Medium Population Projection		810,900	932,700	1,019,500	1.45%
High Population Projection		859,600	1,061,000	1,228,500	2.57%

Source: Bureau of Economic and Business Research (BEBR), Florida Population Studies, Bulletin 192

Table 16

2045 No-Build Future I-4 Corridor Ramp AADTs

Ramp Location	2021 AADT	Adjusted 2045 AADT	Average Annual Growth Rate 2021 thru 2045
SR 570 (Polk Parkway) System-to-system Interchange			
Eastbound off-ramp	9,300	15,700	2.87%
Eastbound on-ramp	5,200	8,200	2.40%
Westbound off-ramp	5,200	8,200	2.40%
Westbound on-ramp	9,300	15,700	2.87%
Memorial Boulevard			
Eastbound off-ramp	8,000	13,500	2.86%
Eastbound on-ramp	2,900	5,000	3.02%
Westbound off-ramp	2,900	5,000	3.02%
Westbound on-ramp	6,900	13,500	3.99%
SR 539 (Kathleen Road)			
Eastbound off-ramp	5,000	8,100	2.58%
Eastbound on-ramp	5,000	8,000	2.50%
Westbound off-ramp	5,000	8,000	2.50%
Westbound on-ramp	5,000	8,100	2.58%

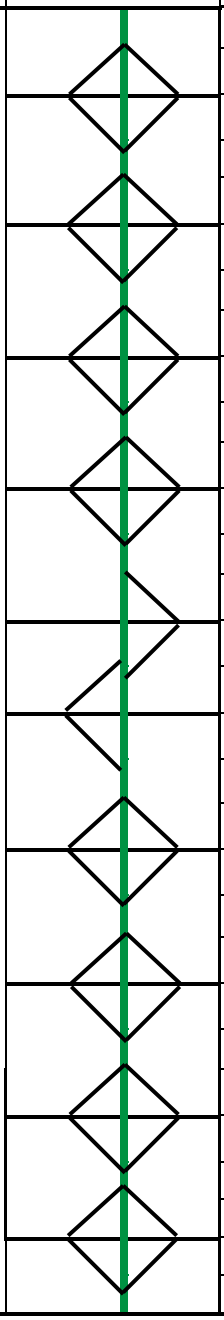
Table 16

2045 No-Build Future I-4 Corridor Ramp AADTs (Continued)

Ramp Location	2021 AADT	Adjusted 2045 AADT	Average Annual Growth Rate 2021 thru 2045
US 98/SR 35/SR 700			
Eastbound off-ramp	10,000	13,500	1.46%
Eastbound on-ramp	7,400	9,800	1.35%
Westbound off-ramp	6,800	9,800	1.84%
Westbound on-ramp	11,000	13,500	0.95%
CR 582 (North Socrum Loop Road)/SR 33 (Lakeland Hills Boulevard)			
Eastbound off-ramp	6,200	7,800	1.08%
Eastbound on-ramp	2,800	5,000	3.27%
Westbound off-ramp	3,400	5,000	1.96%
Westbound on-ramp	5,900	7,800	1.34%
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)			
Eastbound off-ramp	3,100	8,600	7.39%
Eastbound on-ramp	2,900	7,500	6.61%
Westbound off-ramp	3,000	7,500	6.25%
Westbound on-ramp	4,100	8,600	4.57%
SR 570 System-to-System Interchange			
Eastbound off-ramp	3,000	6,600	5.00%
Eastbound on-ramp	1,600	12,000	27.08%
Westbound off-ramp	1,600	12,000	27.08%
Westbound on-ramp	3,000	6,600	5.00%
SR 559			
Eastbound off-ramp	4,200	7,300	3.08%
Eastbound on-ramp	4,900	8,900	3.40%
Westbound off-ramp	3,800	8,900	5.59%
Westbound on-ramp	3,300	7,300	5.05%
SR 557			
Eastbound off-ramp	3,000	8,200	7.22%
Eastbound on-ramp	4,400	12,000	7.20%
Westbound off-ramp	4,600	12,000	6.70%
Westbound on-ramp	3,000	8,200	7.22%

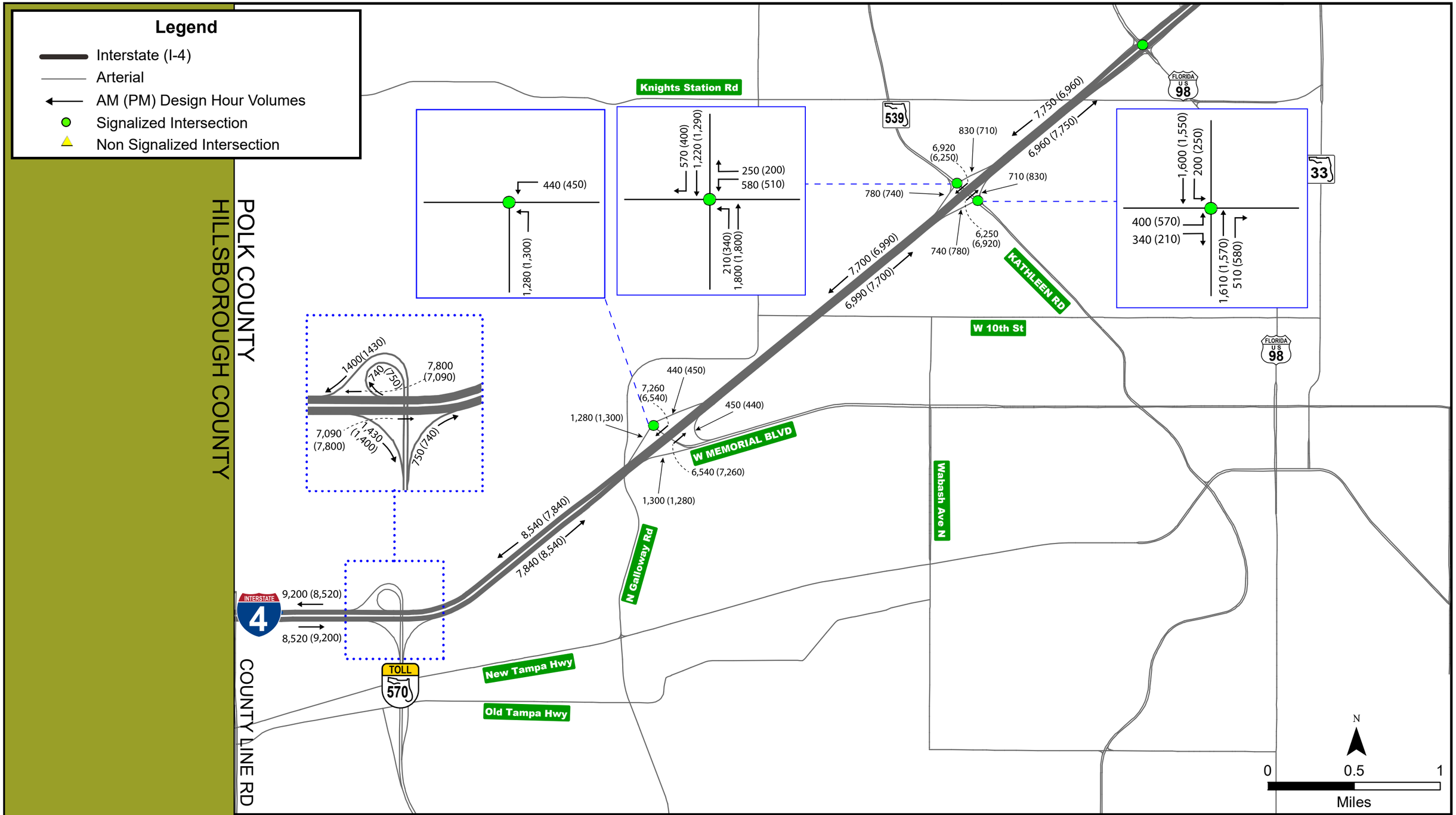
Table 17

2045 No-Build Future I-4 Corridor AADTs

Milepost – Location	Profile	2022 AADT	2045 Adjusted AADT*	Average Annual Growth Rates 2022 - 2045
		**106,800**	**167,800**	**2.48%**
SR 557		9,600	24,000	
		6,400	16,400	
		103,600	**160,200**	**2.38%**
SR 559		10,600	17,800	
		10,800	14,600	
		103,800	**157,000**	**2.23%**
SR 570 (Polk Parkway)		5,800	24,000	
		6,400	13,200	
		104,400	**146,200**	**1.74%**
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)		6,400	15,000	
		7,600	17,200	
		105,600	**148,400**	**1.76%**
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)		3,600	5,000	
		6,500	7,800	
CR 582 (North Socrum Loop Road)		3,600	5,000	
		6,500	7,800	
		111,400	**154,000**	**1.66%**
US 98/SR 35/SR 700		14,900	19,600	
		21,100	27,000	
		117,600	**161,400**	**1.62%**
SR 539 (Kathleen Road)		10,600	16,000	
		10,600	16,200	
		117,600	**161,200**	**1.61%**
West Memorial Boulevard		6,000	10,000	
		15,600	27,000	
		127,200	**178,200**	**1.74%**
SR 570 (Polk Parkway)		11,000	16,400	
		19,600	31,400	
		135,800	**193,200**	**1.84%**

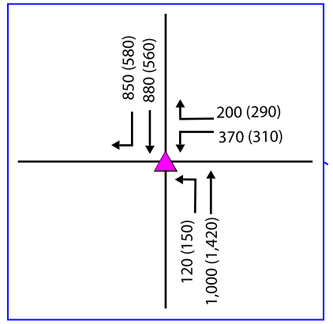
2,220 = Mainline volume 2,220 = Combined ramp volume ***Average 1.91%***

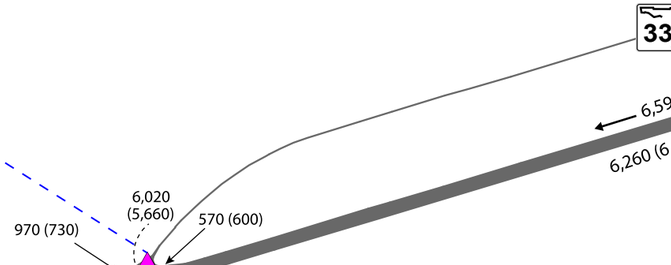
Source: *District One Regional Planning Model (D1RPM)

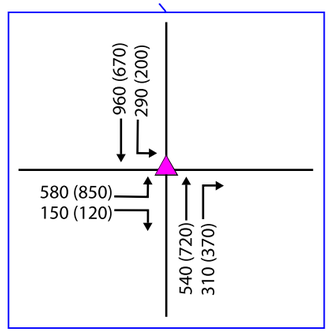


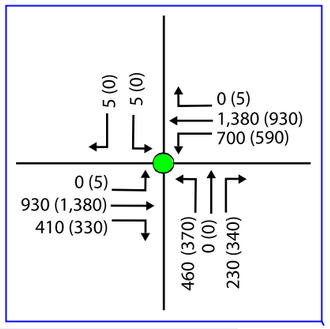
SOUTHWEST I-4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	**Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2045 (No-Build) Design Hour Volumes**

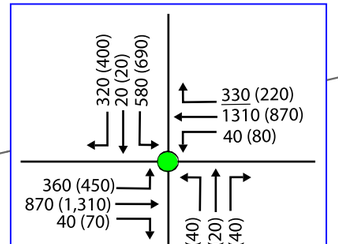
Figure 6 Page 1 of 3











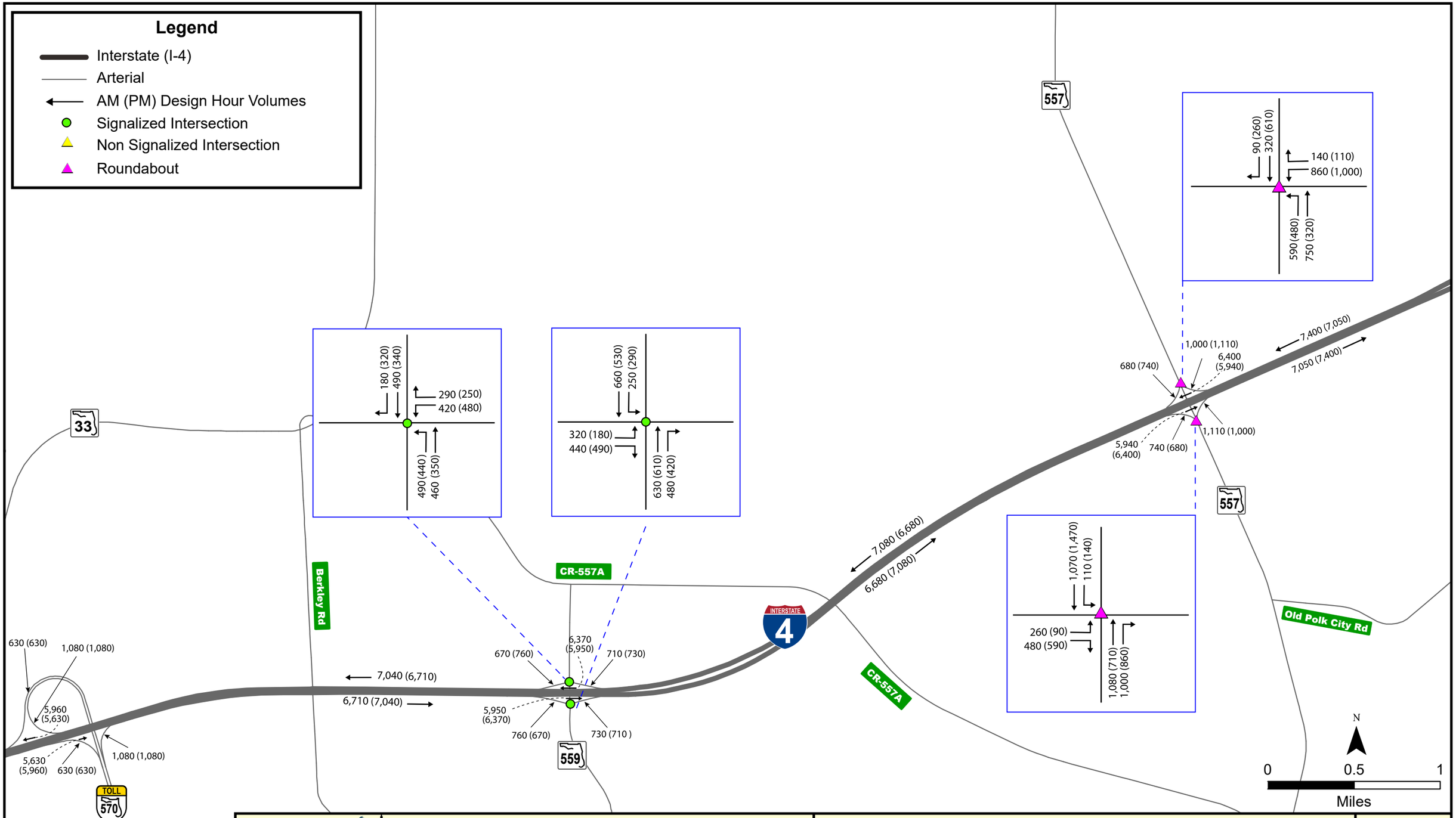
Project Development and Environment (PD&E) Study
I-4 (SR 400) From West of SR 570 (Polk Parkway)
to West of US 27 Interchange (Phase 2)

2045 (No-Build)
Design Hour Volumes

Figure
6
Page 2 of 3

Legend

- Interstate (I-4)
- Arterial
- AM (PM) Design Hour Volumes
- Signalized Intersection
- Non Signalized Intersection
- Roundabout



SOUTHWEST I-4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	**Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2045 (No-Build) Design Hour Volumes**

Figure 6 Page 3 of 3

10.0 Travel Demand Forecasting (Build Alternatives)

The following Build Alternatives were considered during the preliminary analysis for Phase 2 of the project using the Design Year traffic forecasts for I-4 and interchanges within the project limits.

- **Build Alternative 1** included I-4 mainline widening from six to ten lanes: addition of two General Purpose Lanes (GPLs) on each direction.
- **Build Alternative 2** included I-4 mainline widening from six to ten lanes: addition of two Express/High Occupancy Toll (HOT) lanes on each direction.

Build Alternatives 1

The Build Alternative 1 model AADTs from Phase 1 study were reviewed for reasonableness. The National Cooperative Highway Research Project (NCHRP) Report 765, ratio and difference smoothing method was applied to obtain reasonable 2045 AADTs. Detailed tables showing the projected Build Alternative 1traffic estimations are provided in **Appendix E**. The smoothing method was performed between 2021 count data and 2045 model AADTs for the mainline and ramps. Ramps and Mainline AADTs for Build Alternative 1 are shown in **Table 18** and **Table 19**, respectively. Build Alternative 1 2045 DDHVs are shown in **Figure 12**.

Table 18
2045 Build Alternative 1 Future I-4 Corridor Ramp AADTs

Ramp Location	2021 AADT	Adjusted 2045 AADT	Average Annual Growth Rate 2021 thru 2045
SR 570 (Polk Parkway) System-to-system Interchange			
Eastbound off-ramp	9,300	15,700	2.87%
Eastbound on-ramp	5,200	8,700	2.80%
Westbound off-ramp	5,200	8,700	2.80%
Westbound on-ramp	9,300	15,700	2.87%
Memorial Boulevard			
Eastbound off-ramp	8,000	13,500	2.86%
Eastbound on-ramp	2,900	5,000	3.02%
Westbound off-ramp	2,900	5,000	3.02%
Westbound on-ramp	6,900	13,500	3.99%
SR 539 (Kathleen Road)			
Eastbound off-ramp	5,000	9,200	3.50%
Eastbound on-ramp	5,000	8,900	3.25%
Westbound off-ramp	5,000	8,900	3.25%
Westbound on-ramp	5,000	9,200	3.50%

Table 18 (Continued)
2045 Build Alternative 1 Future I-4 Corridor Ramp AADTs

Ramp Location	2021 AADT	Adjusted 2045 AADT	Average Annual Growth Rate 2021 thru 2045
US 98/SR 35/SR 700			
Eastbound off-ramp	10,000	14,000	1.67%
Eastbound on-ramp	7,400	10,600	1.80%
Westbound off-ramp	6,800	10,600	2.33%
Westbound on-ramp	11,000	14,000	1.14%
CR 582 (North Socrum Loop Road)/SR 33 (Lakeland Hills Boulevard)			
Eastbound off-ramp	6,200	9,000	1.88%
Eastbound on-ramp	2,800	5,100	2.08%
Westbound off-ramp	3,400	5,100	2.08%
Westbound on-ramp	5,900	9,000	2.19%
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)			
Eastbound off-ramp	3,100	9,500	8.60%
Eastbound on-ramp	2,900	7,500	6.61%
Westbound off-ramp	3,000	7,500	6.25%
Westbound on-ramp	4,100	9,500	5.49%
SR 570 System-to-System Interchange			
Eastbound off-ramp	3,000	8,800	8.06%
Eastbound on-ramp	1,600	12,000	27.08%
Westbound off-ramp	1,600	12,000	27.08%
Westbound on-ramp	3,000	8,800	8.06%
SR 559			
Eastbound off-ramp	4,200	8,900	4.66%
Eastbound on-ramp	4,900	8,900	3.40%
Westbound off-ramp	3,800	8,900	5.59%
Westbound on-ramp	3,300	8,900	7.07%
SR 557			
Eastbound off-ramp	3,000	8,200	7.22%
Eastbound on-ramp	4,400	12,500	7.67%
Westbound off-ramp	4,600	12,500	7.16%
Westbound on-ramp	3,000	8,200	7.22%

Table 19

2045 Build Alternative 1 Future I-4 Corridor AADTs

Milepost – Location	Profile	2022 AADT	2045 Adjusted AADT*	Average Annual Growth Rates 2022 - 2045
		106,800	**169,600**	2.56%
SR 557		9,600	25,000	
		6,400	*16,400*	
		103,600	**161,000**	2.41%
SR 559		10,600	17,800	
		10,800	17,800	
		103,800	**161,000**	2.40%
SR 570 (Polk Parkway)		5,800	24,000	
		6,400	17,600	
		104,400	**154,600**	2.09%
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)		6,400	15,000	
		7,600	19,000	
		105,600	**158,600**	2.18%
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)		3,600	5,100	
		6,500	9,000	
CR 582 (North Socrum Loop Road)		3,600	*5,100*	
		6,500	9,000	
		111,400	**166,400**	2.15%
US 98/SR 35/SR 700		14,900	21,200	
		21,100	28,000	
		117,600	**173,200**	2.06%
SR 539 (Kathleen Road)		10,600	17,800	
		10,600	18,400	
		117,600	**173,800**	2.08%
West Memorial Boulevard		6,000	*10,000*	
		15,600	*27,000*	
		127,200	**190,800**	2.17%
SR 570 (Polk Parkway)		11,000	*17,400*	
		19,600	31,400	
		135,800	**204,800**	2.21%

2,220 = Mainline volume 2,220 = Combined ramp volume ***Average 2.23%***

Source: *District One Regional Planning Model (D1RPM)

Build Alternatives 2

Build Alternative 2 included I-4 mainline widening from six to ten lanes: addition of two Express/High Occupancy Toll (HOT) lanes on each direction. This section provides information on the development of future traffic daily forecasts, and design hour volumes using Express Lane Time-of-Day (ELToD) Model.

The ELToD Model v2.3 was the primary forecasting tool used to estimate 2045 traffic on the I-4 Managed Lanes (ML) and General Use Lanes (GUL) in the Phase 2 traffic analysis of the I-4 PD&E Study.

The ELToD Model is a forecasting tool developed by the Florida Turnpike Enterprise (FTE) to determine the percent share of traffic that chooses managed lanes during each hour of the day. It estimates the volume of traffic on both general use and managed lanes. In addition, it identifies the managed lanes dynamic toll by hour based on dynamic traffic conditions. The model works in conjunction with Florida's travel demand models which provide the basis for the total corridor traffic.

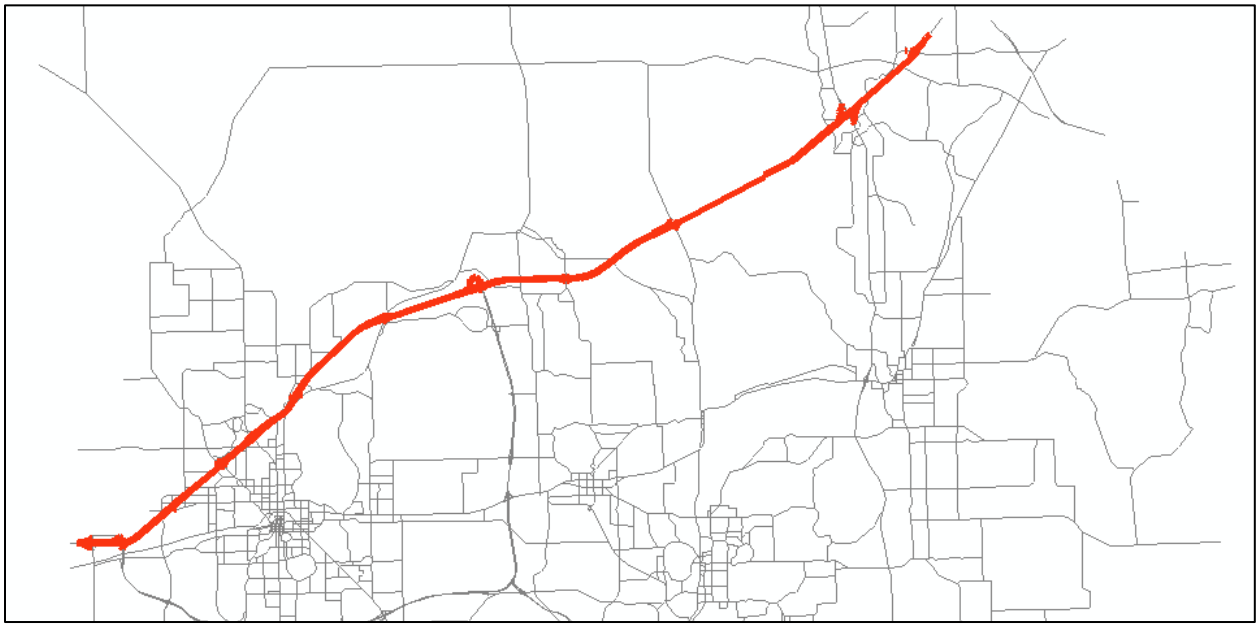
ELToD Setup

Phase 1 of the I-4 PD&E Study developed 2045 forecast AADTs for a Build alternative that included the addition of 4 tolled managed lanes to the existing 6 general use lanes on I-4 from the Polk Parkway (West) to SR 532. The 2045 I-4 No Build D1RPM developed by the IPM (based on the currently adopted 2045 D1RPM v2.0) was the primary travel demand forecasting tool used to model the Build alternative. The D1RPM v2.0 reports highway assignments in AADTs; therefore, the application of a Model Output Conversion Factor was not used. The Phase 1 Managed Lane Build model was the primary input into the ELToD Model used for the Phase 2 analysis. While the overall forecast corridor demand is the same as what was developed in Phase 1, the assignment of trips between the managed lanes and general use lanes is different due to the use of the ELToD model in Phase 2.

The I-4 corridor was extracted from the D1RPM Build model for input into the ELToD Model. When creating a corridor network file from a demand model, it is recommended that the subarea network polygon be designed so that one external node is created for each entrance or exit ramp. The **Figure 7** depicts the extent of the I-4 corridor that was extracted.

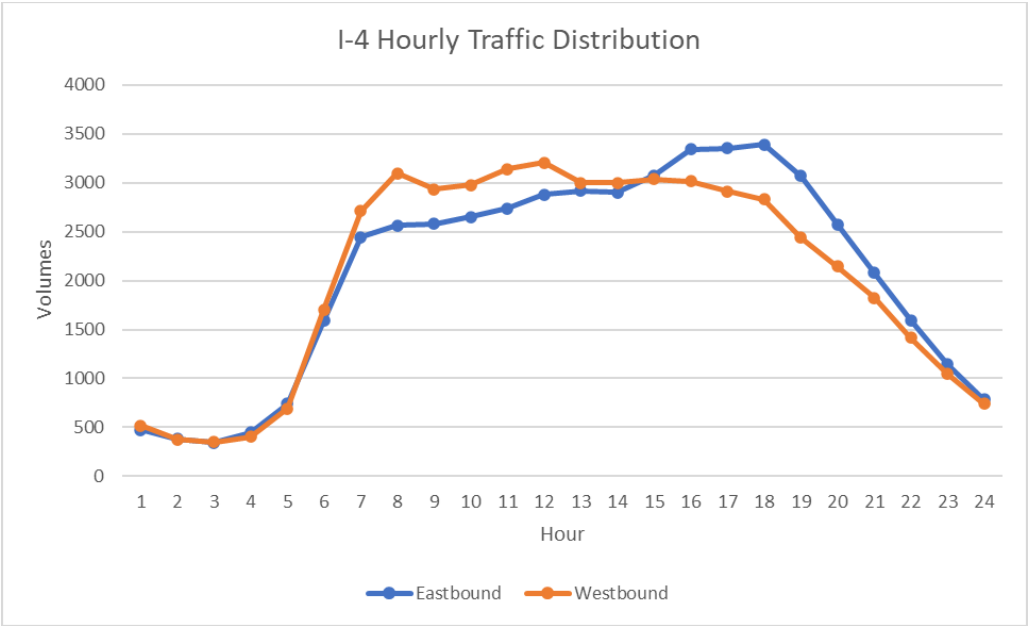
The location of the ingress/egress points for the managed lanes are consistent with those developed for the Phase 1 analysis. In the Phase 1 analysis, Streetlight and D1RPM origin/destination data was analyzed to develop an initial set of managed lanes access points. The D1RPM I-4 model was used to conduct sensitivity tests to determine the impact on managed lane utilization of various access scenarios. These tests along with coordination and direction from the I-4 PD&E Project Team determined the final set of access points that were used.

Figure 7
D1RPM Build Model Extracted Corridor



Hourly traffic counts were the primary data source used to calculate the temporal distribution of traffic. To obtain the necessary continuous traffic count data needed for input into the model, the identification of a FDOT Telemetered Traffic Monitoring Site was conducted and Polk County count station 9951: I-4, 0.6 MI W OF SR-559 was used. **Figure 8** illustrates the hourly traffic distribution that was input into the model.

Figure 8
I-4 Hourly Traffic Distribution



Toll Rates

Minimum toll rates for the managed lane system were input into the ELToD Model at $0.14/mile which is consistent with the Phase 1 analysis.

Model Inputs

Network attributes for Facility Type, Area Type, Free Flow Speed and Per Lane Capacity were used from the D1RPM Phase 1 Build model. Volume Delay Function and Toll Choice Coefficient attributes included in the ELToD Model dataset were used as they have been calibrated by FTE based on observed data from existing managed lane systems in the state.

ELToD Results

The ELToD Model produces 24 one-hour forecasts. For the purposes of the traffic analysis, focus was put on the AM peak hour (8 AM – 9 AM) and the PM peak hour (5PM - 6PM). **Figure 9** illustrates the 2045 AM and PM peak traffic for the GUL and ML system.

Figure 10 illustrates the managed lane utilization by direction for the AM and PM peak hours. As the figure shows the demand for managed lanes during the peak hour varies along different segments of the corridor. For example, for both eastbound and westbound direction, segment 4, from Kathleen Rd to SR 33 W Socrum Loop Rd, has the lowest managed lane demand of total peak hour traffic whereas segment 9, from CR 557 to US 27, has the highest managed lane utilization percent during the AM and PM peak hours. The figure sheds light on geographical distribution of managed lane traffic volume along the corridor and can be used to further refine minimum toll amount for each segment and the location of slip ramps.

Figure 11 provides additional information on toll pricing structure in the model where toll amounts are calculated based on travel demand in the express lanes. The figure presents the minimum toll amount which was input by the modeler and the calculated maximum toll amounts for each segment along the corridor during peak travel periods. The calculated tolls are the maximum amounts that can be charged without deterring road users from using the managed lanes on each segment. This is helpful in deciding setting the toll amounts or adjusting the minimum toll for the segments.

Figure 9

2045 Build Alt 2 Peak Hour Traffic

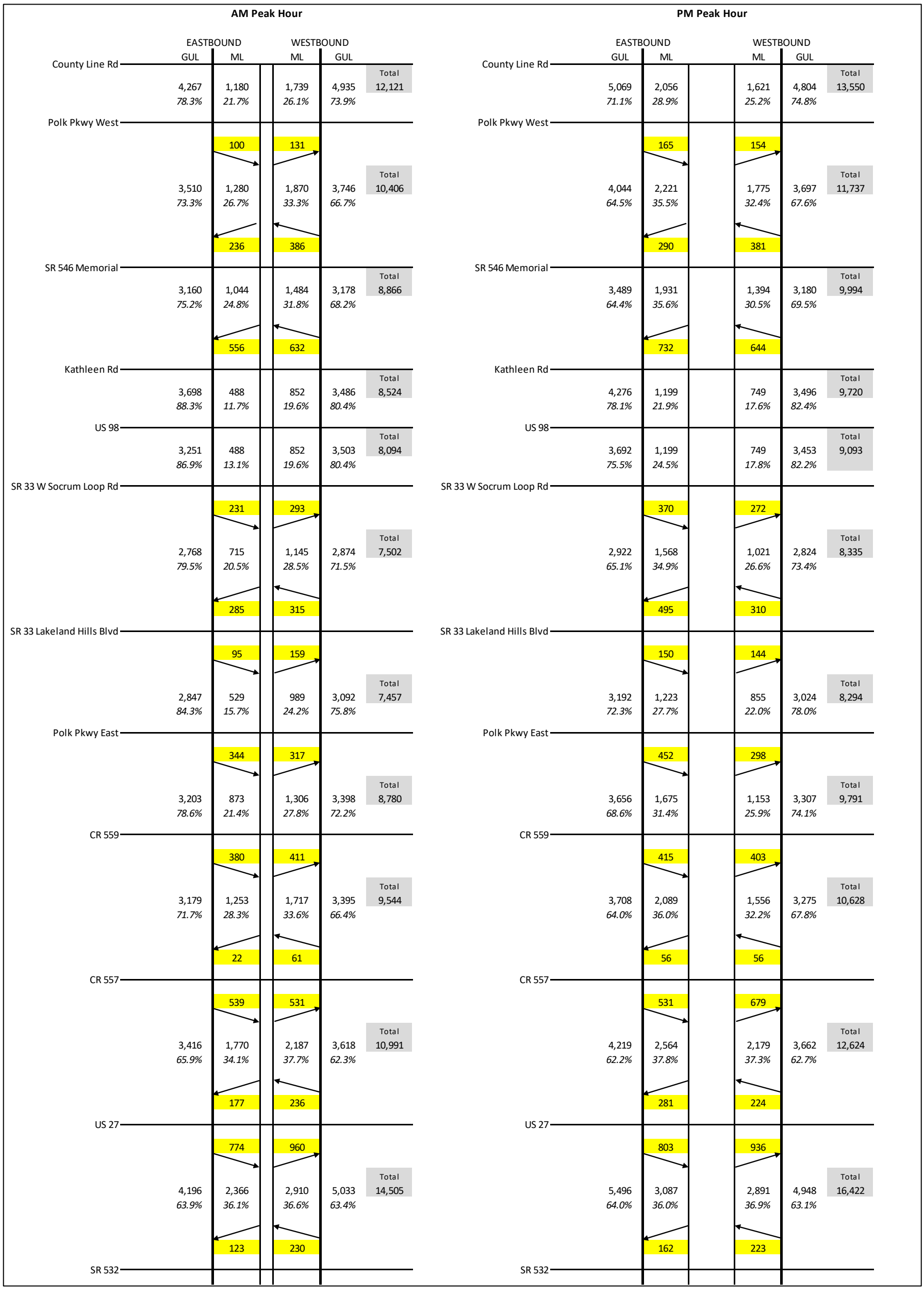
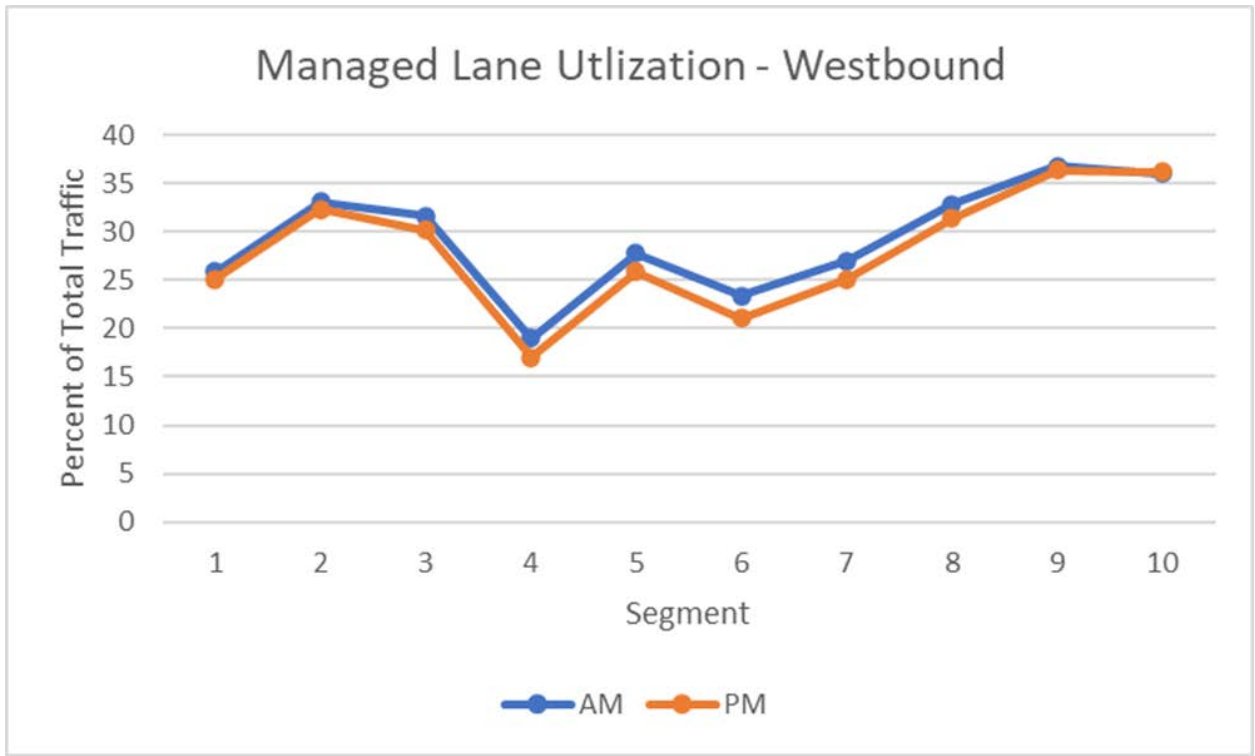
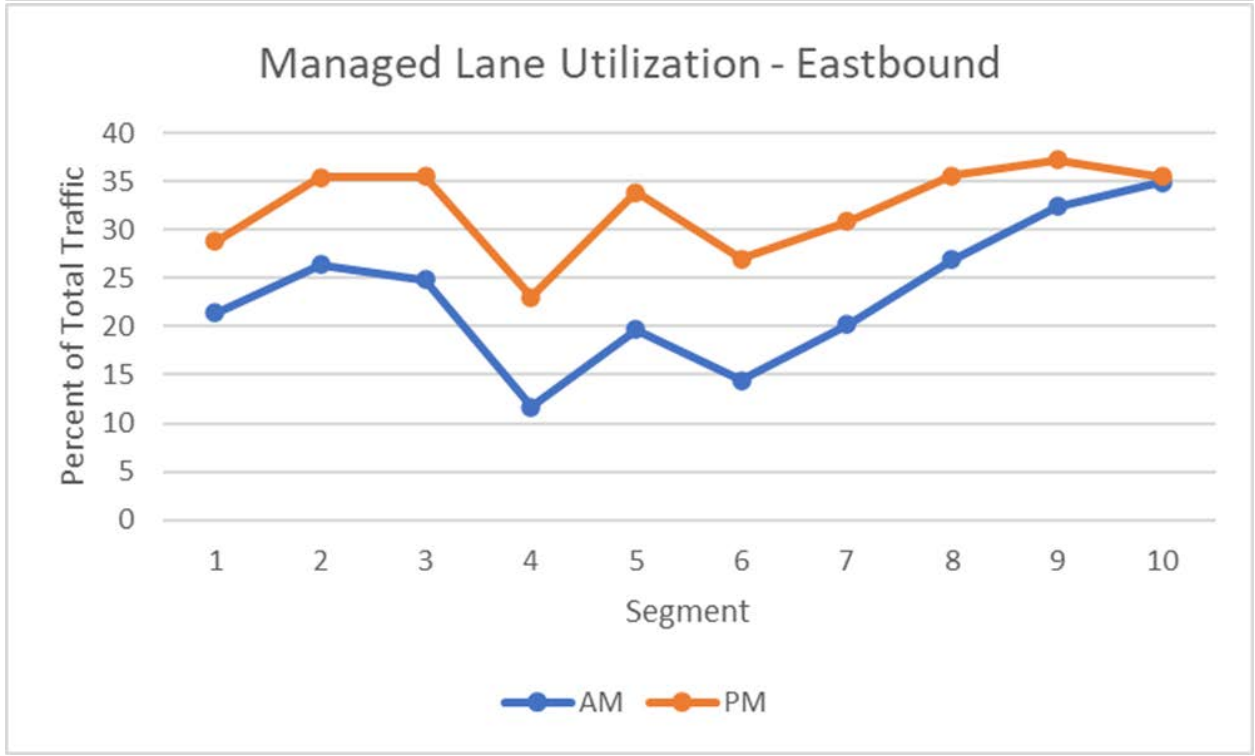


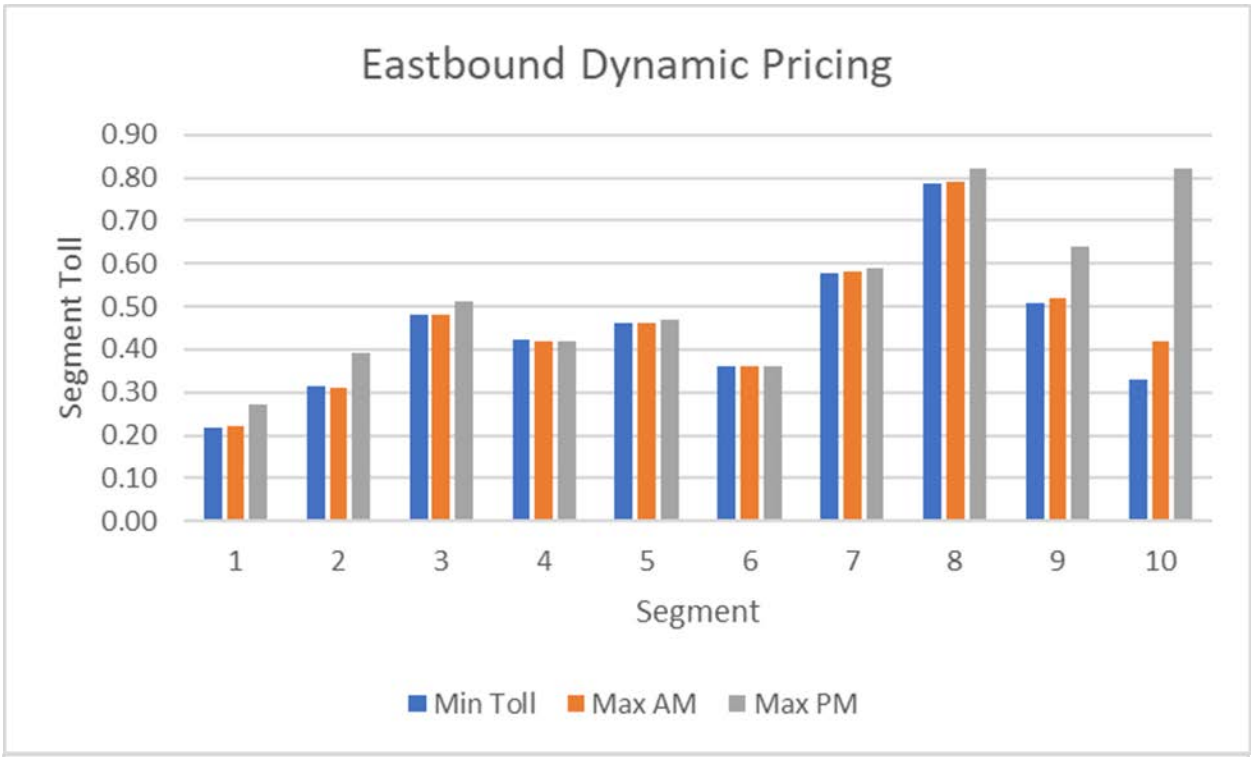
Figure 10
Managed Lane Peak Hour Utilization

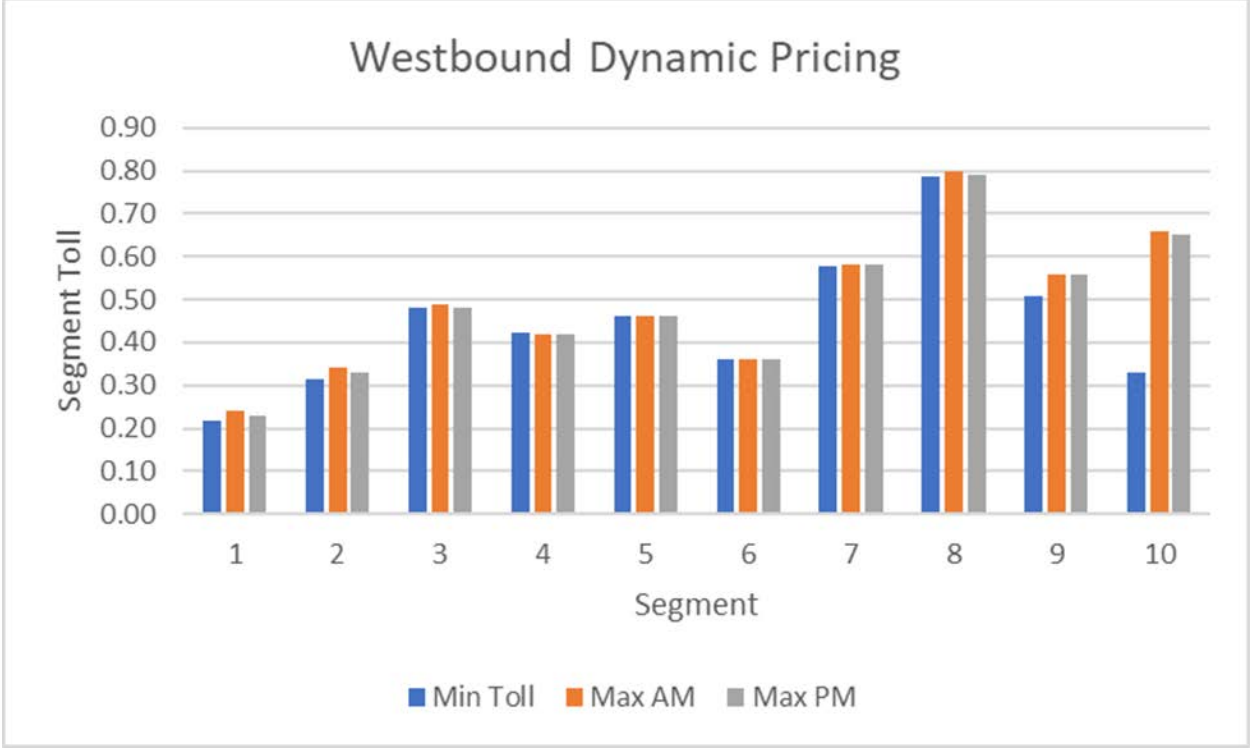




1	County Line Rd	Polk Pkwy West
2	Polk Pkwy West	SR 546 Memorial
3	SR 546 Memorial	Kathleen Rd
4	Kathleen Rd	SR 33 W Socrum Loop Rd
5	SR 33 W Socrum Loop Rd	SR 33 Lakeland Hills
6	SR 33 Lakeland Hills	Polk Pkwy East
7	Polk Pkwy East	CR 559
8	CR 559	CR 557
9	CR 557	US 27
10	US 27	SR 532

Figure 11
Dynamic Pricing Structure





1	County Line Rd	Polk Pkwy West
2	Polk Pkwy West	SR 546 Memorial
3	SR 546 Memorial	Kathleen Rd
4	Kathleen Rd	SR 33 W Socrum Loop Rd
5	SR 33 W Socrum Loop Rd	SR 33 Lakeland Hills
6	SR 33 Lakeland Hills	Polk Pkwy East
7	Polk Pkwy East	CR 559
8	CR 559	CR 557
9	CR 557	US 27
10	US 27	SR 532

Balanced DDHVs for Design Year 2045 Build Alternative 2 figures are shown in **Figure 13**. The smoothing method was performed between 2021 count data and 2045 model AADTs for the mainline and ramps. Ramps and Mainline AADTs for Build Alternative 2 are shown in **Table 20** and **Table 21**, respectively.

Table 20
2045 Build Alternative 2 Future I-4 Corridor Ramp AADTs

Ramp Location	2021 AADT	Adjusted 2045 AADT	Average Annual Growth Rate 2021 thru 2045
SR 570 (Polk Parkway) System-to-system Interchange			
Eastbound off-ramp	9,300	15,700	2.87%
Eastbound on-ramp	5,200	8,400	2.56%
Westbound off-ramp	5,200	8,400	2.56%
Westbound on-ramp	9,300	15,700	2.87%
Memorial Boulevard			
Eastbound off-ramp	8,000	13,500	2.86%
Eastbound on-ramp	2,900	5,000	3.02%
Westbound off-ramp	2,900	5,000	3.02%
Westbound on-ramp	6,900	13,500	3.99%
SR 539 (Kathleen Road)			
Eastbound off-ramp	5,000	8,100	2.58%
Eastbound on-ramp	5,000	8,000	2.50%
Westbound off-ramp	5,000	8,000	2.50%
Westbound on-ramp	5,000	8,100	2.58%
US 98/SR 35/SR 700			
Eastbound off-ramp	10,000	17,000	2.92%
Eastbound on-ramp	7,400	12,200	2.70%
Westbound off-ramp	6,800	12,200	3.31%
Westbound on-ramp	11,000	17,000	2.27%

Table 20 (Continued)

2045 Build Alternative 2 Future I-4 Corridor Ramp AADTs

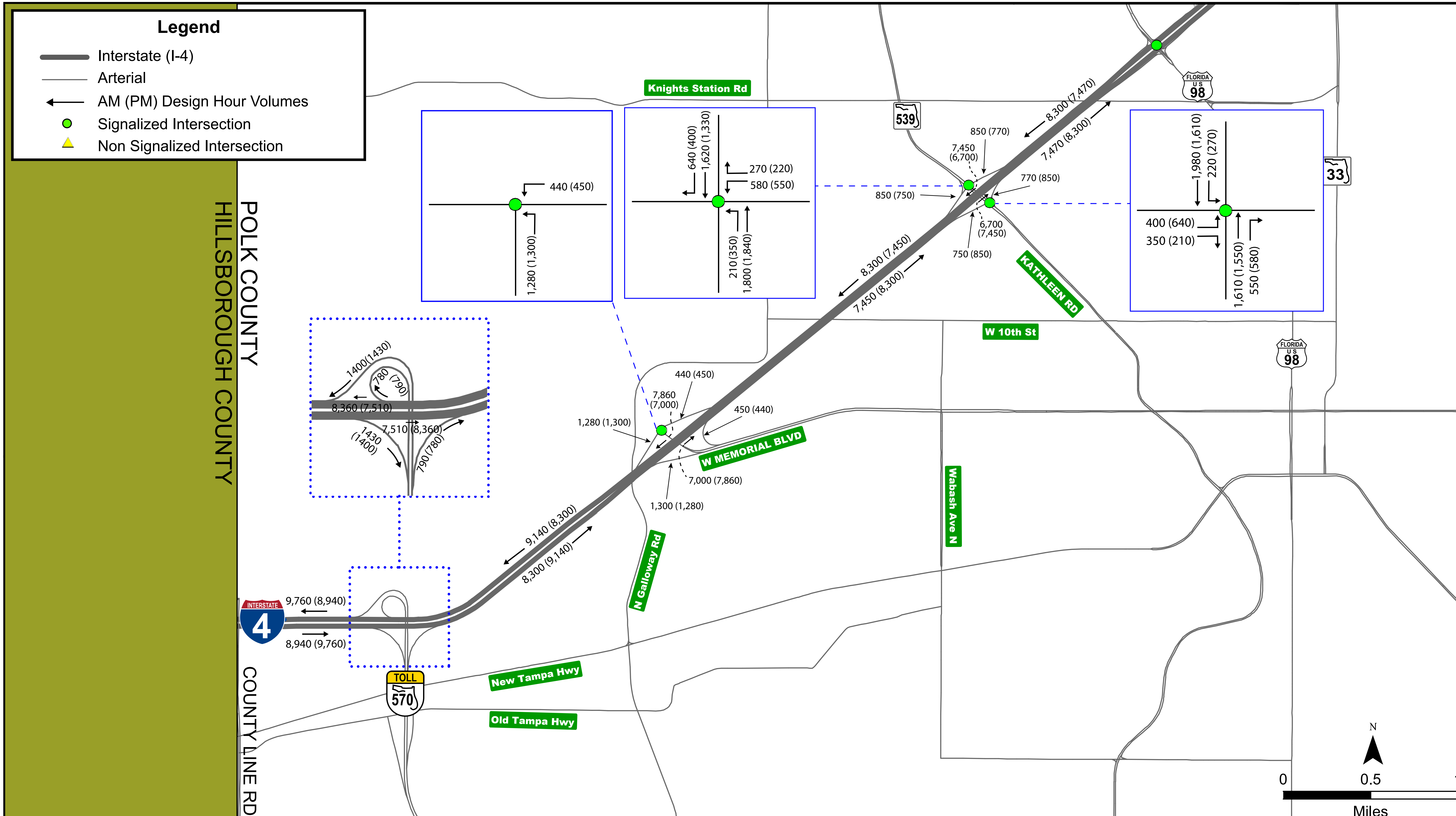
Ramp Location	2021 AADT	Adjusted 2045 AADT	Average Annual Growth Rate 2021 thru 2045
CR 582 (North Socrum Loop Road)/SR 33 (Lakeland Hills Boulevard)			
Eastbound off-ramp	6,200	8,500	1.55%
Eastbound on-ramp	2,800	5,000	3.27%
Westbound off-ramp	3,400	5,000	1.96%
Westbound on-ramp	5,900	8,500	1.84%
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)			
Eastbound off-ramp	3,100	10,000	9.27%
Eastbound on-ramp	2,900	7,500	6.61%
Westbound off-ramp	3,000	7,500	6.25%
Westbound on-ramp	4,100	10,000	6.00%
SR 570 System-to-System Interchange			
Eastbound off-ramp	3,000	6,600	5.00%
Eastbound on-ramp	1,600	12,000	27.08%
Westbound off-ramp	1,600	12,000	27.08%
Westbound on-ramp	3,000	6,600	5.00%
SR 559			
Eastbound off-ramp	4,200	7,900	3.67%
Eastbound on-ramp	4,900	9,200	3.66%
Westbound off-ramp	3,800	9,200	5.92%
Westbound on-ramp	3,300	7,900	5.81%
SR 557			
Eastbound off-ramp	3,000	8,300	7.36%
Eastbound on-ramp	4,400	12,500	7.67%
Westbound off-ramp	4,600	12,500	7.16%
Westbound on-ramp	3,000	8,300	7.36%

Table 21
2045 Build Alternative 2 Future I-4 Corridor AADTs

Milepost – Location	Profile	2022 AADT	2045 Adjusted AADT*	Average Annual Growth Rates 2022 - 2045
		106,800	**169,600**	2.56%
SR 557		9,600	25,000	
		6,400	16,600	
		103,600	**161,200**	2.42%
SR 559		10,600	18,400	
		10,800	15,800	
		103,800	**158,600**	2.30%
SR 570 (Polk Parkway)		5,800	24,000	
		6,400	13,200	
		104,400	**147,800**	1.81%
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)		6,400	15,000	
		7,600	20,000	
		105,600	**152,800**	1.94%
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)		3,600	5,000	
		6,500	8,500	
CR 582 (North Socrum Loop Road)		3,600	5,000	
		6,500	8,500	
		111,400	**159,800**	1.89%
US 98/SR 35/SR 700		14,900	24,400	
		21,100	34,000	
		117,600	**169,400**	1.92%
SR 539 (Kathleen Road)		10,600	16,000	
		10,600	16,200	
		117,600	**169,600**	1.92%
West Memorial Boulevard		6,000	10,000	
		15,600	27,000	
		127,200	**186,600**	2.03%
SR 570 (Polk Parkway)		11,000	16,800	
		19,600	31,400	
		135,800	**201,200**	2.09%

2,220 = Mainline volume 2,220 = Combined ramp volume ***Average 2.09%***

Source: *District One Regional Planning Model (D1RPM)



Legend
Interstate (I-4)
Arterial
AM (PM) Design Hour Volumes
Signalized Intersection
Non Signalized Intersection
POLK COUNTY
HILLSBOROUGH COUNTY
COUNTY LINE RD
Knights Station Rd
W 10th St
KATHLEEN RD
W MEMORIAL BLVD
Wabash Ave N
N Galloway Rd
New Tampa Hwy
Old Tampa Hwy
9,760 (8,940)
8,940 (9,760)
9,140 (8,300)
8,300 (9,140)
8,300 (7,450)
7,450 (8,300)
8,300 (7,470)
7,470 (8,300)
1400(1430)
780 (790)
8,360 (7,510)
7,510 (8,360)
1430 (1400)
790 (780)
440 (450)
1,280 (1,300)
640 (400)
1,620 (1,330)
270 (220)
580 (550)
210 (350)
1,800 (1,840)
7,860 (7,000)
450 (440)
7,000 (7,860)
1,300 (1,280)
850 (770)
7,450 (6,700)
770 (850)
850 (750)
6,700 (7,450)
750 (850)
1,980 (1,610)
220 (270)
400 (640)
350 (210)
1,610 (1,550)
550 (580)
0
0.5
1
Miles
N

Project Development and Environment (PD&E) Study
I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)

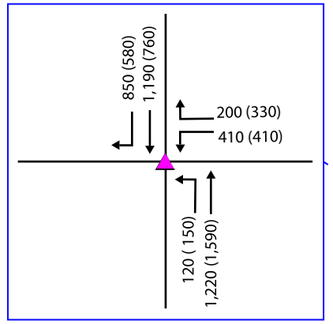
2045 (Build Alternative 1) Design Hour Volumes

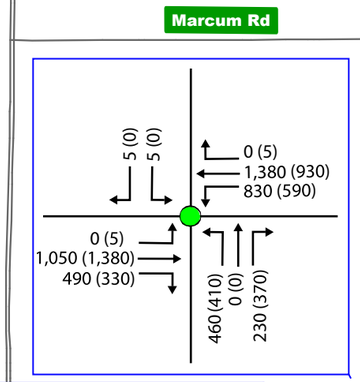
Figure 12

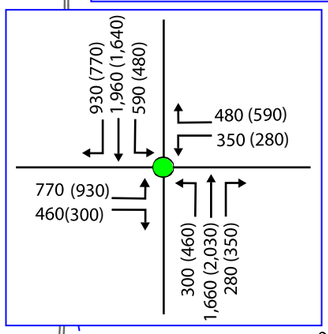
Page 1 of 3

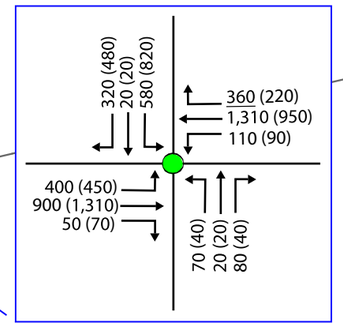
Legend

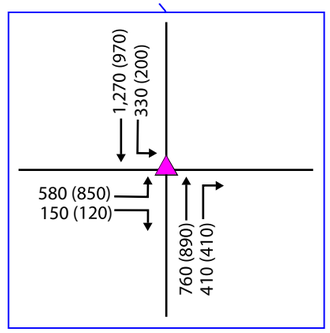
- Interstate (I-4)
- Arterial
- AM (PM) Design Hour Volumes
- Signalized Intersection
- Non Signalized Intersection
- Roundabout











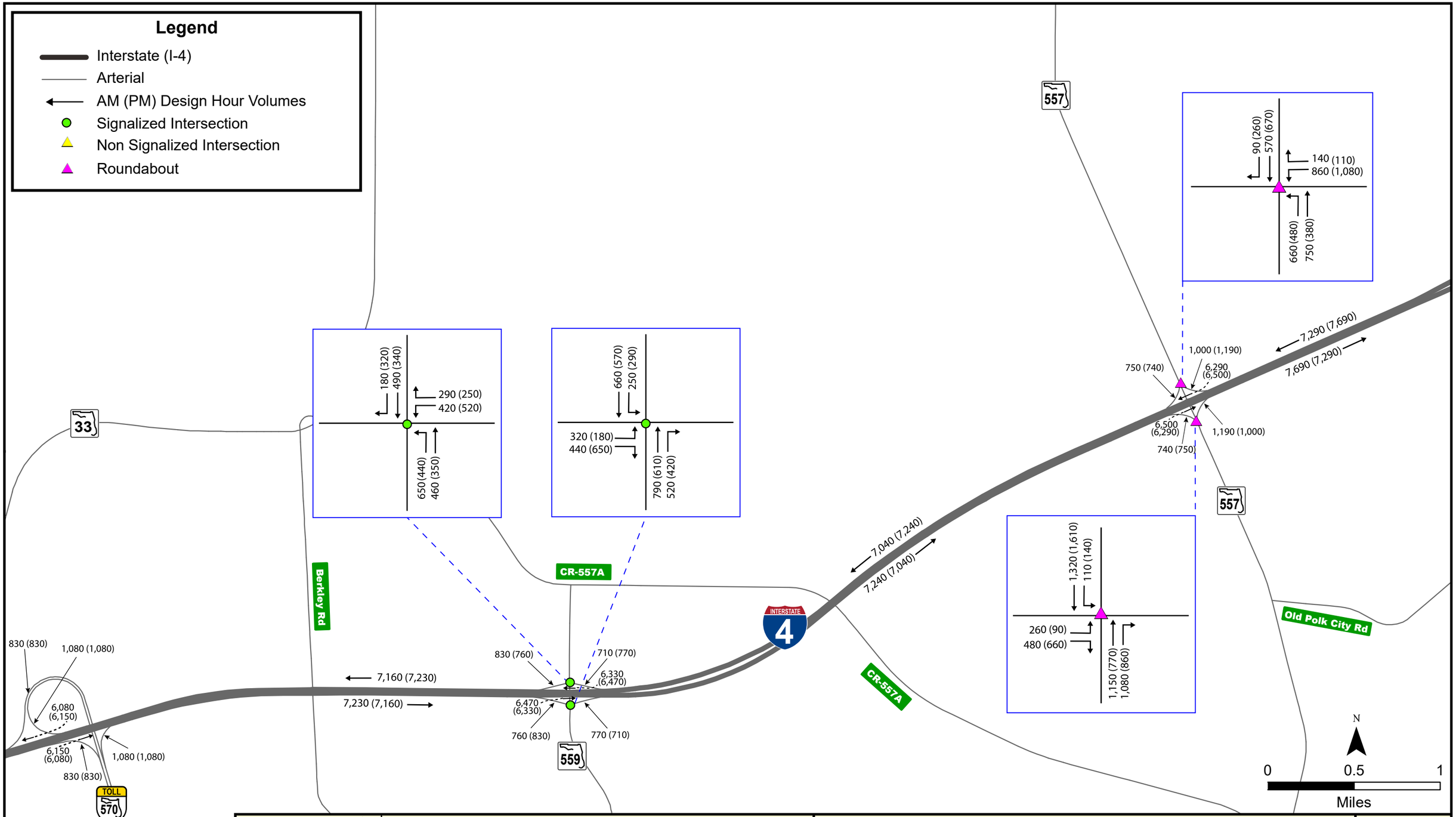
Project Development and Environment (PD&E) Study
I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)

2045 (Build Alternative 1) Design Hour Volumes

Figure 12 Page 2 of 3

Legend

- Interstate (I-4)
- Arterial
- AM (PM) Design Hour Volumes
- Signalized Intersection
- Non Signalized Intersection
- Roundabout



Project Development and Environment (PD&E) Study
I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)

2045 (Build Alternative 1)
Design Hour Volumes

Figure 12
Page 3 of 3

Legend

- Interstate (I-4)
- Arterial
- Express Lane
- xx(xx) AM(PM) Peak Hour Volume
- Signalized Intersection
- Non Signalized Intersection

POLK COUNTY

HILLSBOROUGH COUNTY

COUNTY LINE RD

Knights Station Rd

W 10th St

W MEMORIAL BLVD

KATHLEEN RD

N Galloway Rd

Wabash Ave N

New Tampa Hwy

Old Tampa Hwy

INTERSTATE 4

FLORIDA US 98

539

33

TOLL 570

440 (450)
1,280 (1,300)

640 (400)
1,620 (1,330)
270 (220)
580 (550)
210 (350)
1,800 (1,840)

1400 (1430)
780 (790)
6,280 (5,680)
6,130 (5,970)
1430 (1400)
790 (780)

1,750(1,630)
7,680(7,110)
7,560(7,370)
1,180(2,060)

6,040 (5,400)
440(450)
1,280(1,300)
450(440)
390(380)
6,930(6,320)
5,760 (5,590)
1,300(1,280)
240(290)
1,880(1,780)
130(150)
6,820(6,580)
1,280(2,230)
100(170)

6,260 (5,740)
850(770)
850(750)
860(760)
7,110(6,510)
6,790(6,760)
480(1,210)
770(850)
6,020 (5,910)
750(850)
630(640)
6,480(5,850)
1,490(1,400)
560(730)
6,210(6,030)
1,040(1,940)

1,980 (1,610)
220 (270)
400 (640)
350 (210)
550 (580)
1,610 (1,550)

N

0 0.5 1

Miles

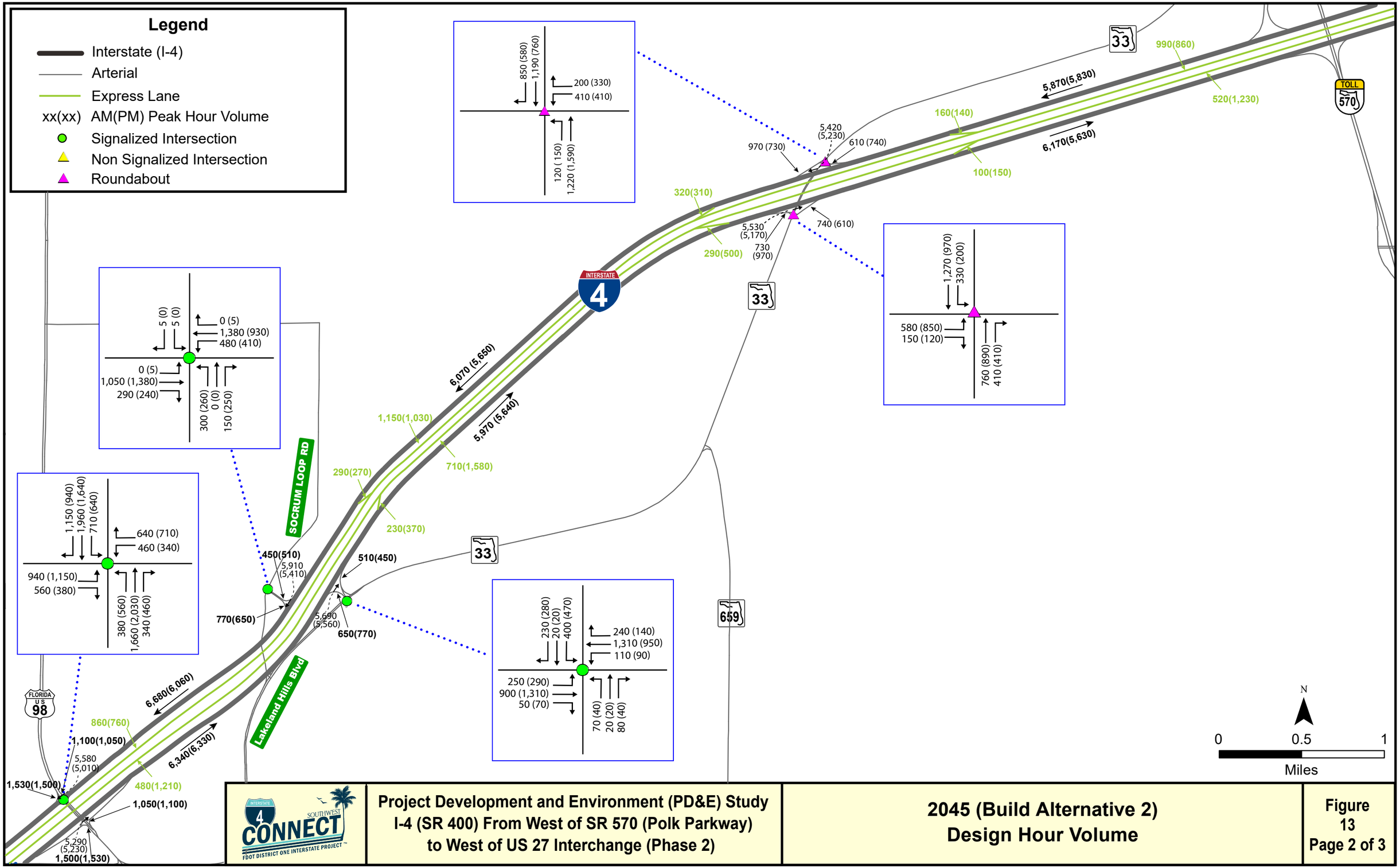
SOUTHWEST 4 CONNECT

FDOT DISTRICT ONE INTERSTATE PROJECT

Project Development and Environment (PD&E) Study
I-4 (SR 400) From West of SR 570 (Polk Parkway)
to West of US 27 Interchange (Phase 2)

2045 (Build Alternative 2)
Design Hour Volumes

Figure 13
Page 1 of 3



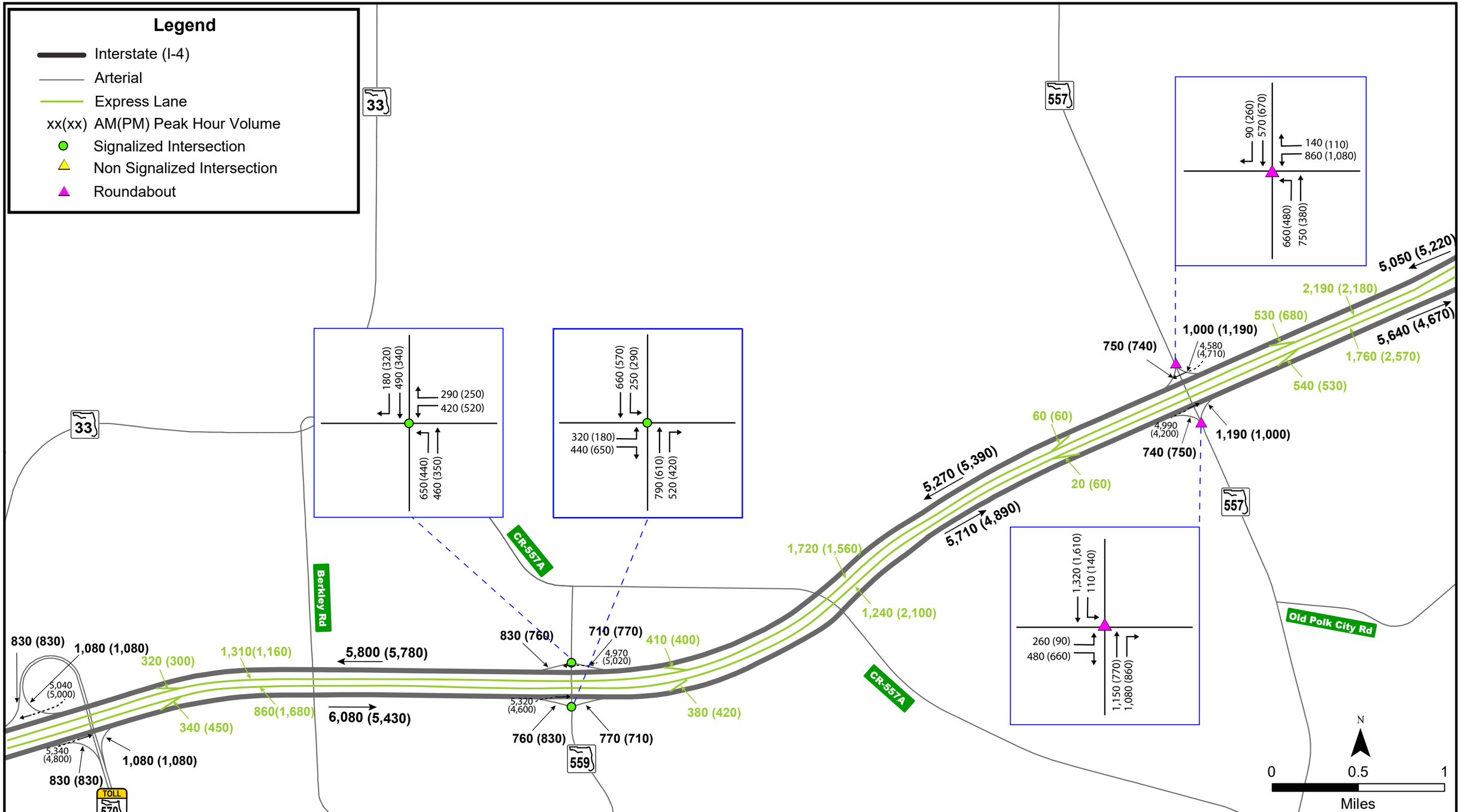
Project Development and Environment (PD&E) Study
I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)

2045 (Build Alternative 2) Design Hour Volume

Figure 13 Page 2 of 3

Legend

- Interstate (I-4)
- Arterial
- Express Lane
- xx(xx) AM(PM) Peak Hour Volume
- Signalized Intersection
- Non Signalized Intersection
- Roundabout



SOUTHWEST I-4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	**Project Development and Environment (PD&E) Study** **I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2045 (Build Alternative 2)** **Design Hour Volumes**

Figure 13 Page 3 of 3

11.0 Consistency with Plans/Projects

Funding for the Project development and Environment (PD&E) study is in the currently adopted Five-Year Work Program as listed below:

- 442512-1 and 442512-2: I-4 (SR 400) west of SR 570 (Polk Parkway) to west of US 27 interchange, PD&E Study, FY 2020/2021
- Florida's SIS Long Range Cost Feasible Plan FY 2029 – 2045 has identified funds for Design and Right of Way

The I-4 PD&E study has maintained consistency with the FDOT Work Program:

- I-4 interchange improvements at CSX Railroad (bridge replacement), Currently under construction.
- SR 33 interchange modification – roundabout, Highways/Preliminary Engineering and Right-of-Way acquisition underway. Fiscal Year 2028 for Construction.
- SR 557 interchange modification – roundabout, under construction.
- SR 559 interchange ramp terminals – signalized, Fiscal Year 2024 for construction.

There is no letting plan till beginning of the Fiscal year.

12.0 No-Build Alternative Traffic Operations Analysis

Traffic operations analyses for the AM and PM peak hours were conducted to document the LOS within the study area for No-Build Design Year 2045. **Figure 14** shows the existing plus committed improvements lane configuration of I-4 mainline, ramps and ramp terminals used in the operational analysis.

The Design Year 2045 AM and PM peak hour traffic volumes were evaluated in each direction for freeway segments: basic, weave, and merge/diverge influence areas. HCS results are summarized in **Tables 22** and **Table 23** for the eastbound and westbound directions, respectively.

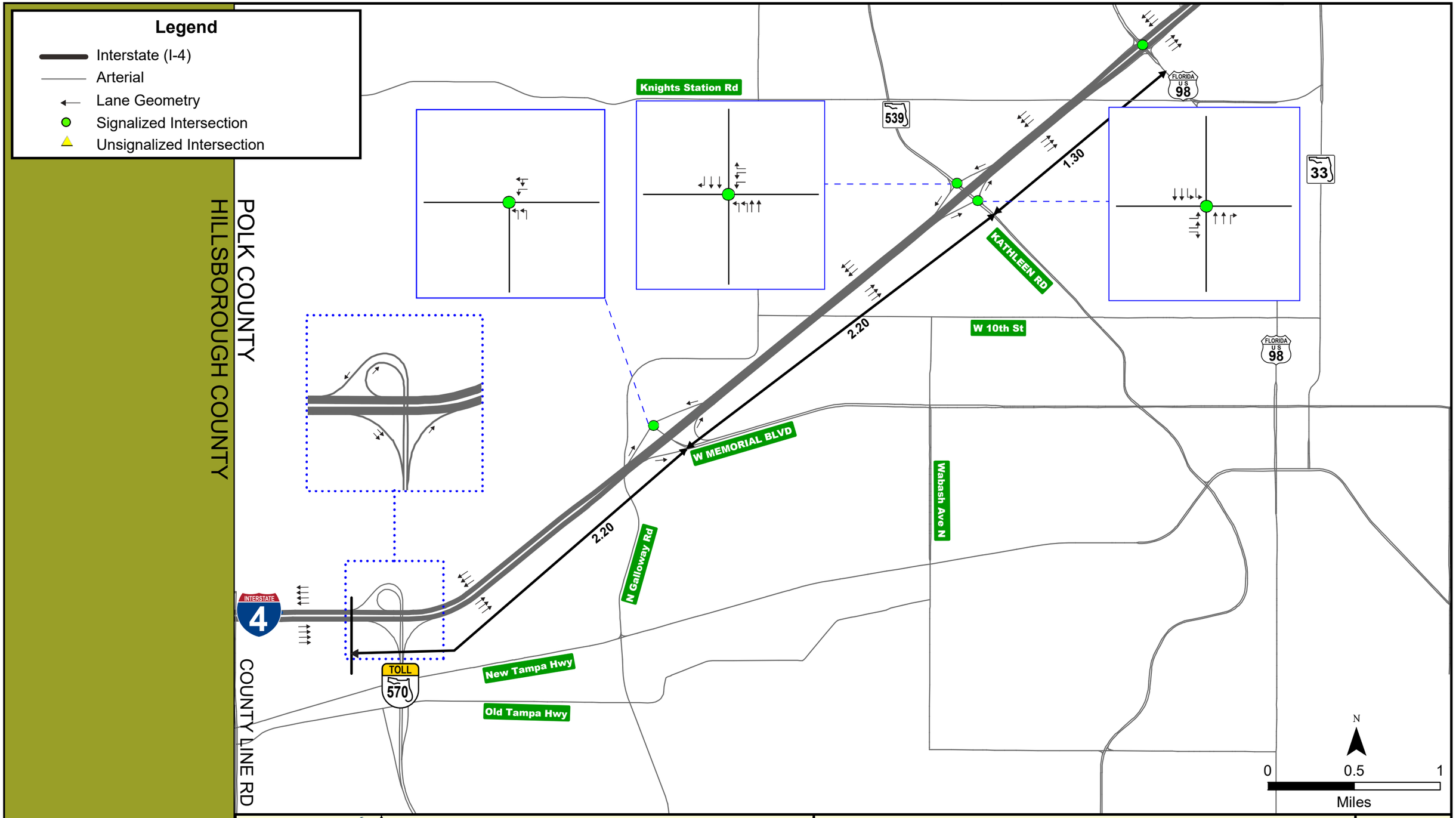
The results of the operation analysis show that most of the segments along I-4 operate at an unacceptable LOS during both the AM and PM peak hours. Capacity deficiencies are present under the existing condition and are expected to increase in the future.

The No-Build Design Year 2045 signalized intersections analysis output summary for AM and PM peak hours are presented in **Table 24**. The signalized intersection operations were optimized for signal splits/offsets. Committed improvements at the SR 33 and SR 557 interchanges (roundabouts) were also coded in the Synchro files and also analyzed using SIDRA (See **Table 25**). SR 559 and I-4 interchange both ramp terminals have been analyzed as signalized intersections. The Synchro, SIDRA and HCS output sheets are included in **Appendix G**. Following intersections are anticipated to operate LOS E or LOS F by No-Build Design Year 2045:

- US 98 and I-4 ramp terminal

- North Socrum Loop Road (CR 582) and I-4 westbound ramp terminal
- Lakeland Hills Boulevard and I-4 eastbound ramp terminal
- SR 559 and I-4 westbound ramp terminal
- SR 557 and I-4 both ramp terminals (roundabout)

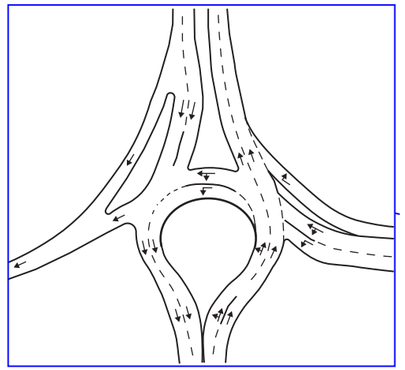
The analysis shows with traffic increasing, levels of service at the intersections above will continue to deteriorate and operate at unacceptable LOS in year 2045.

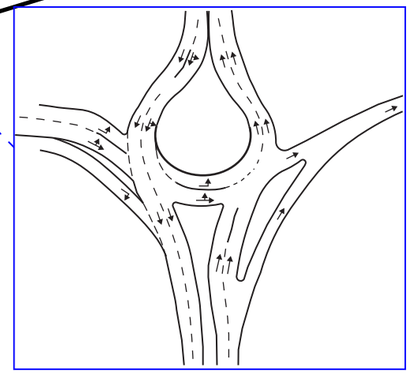


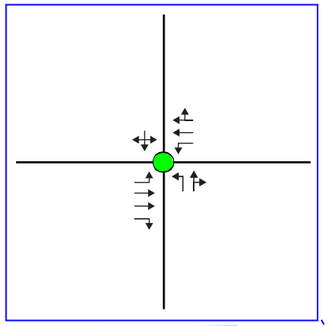
SOUTHWEST 4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	**Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2045 (No-Build) Lane Geometry**	**Figure 14 Page 1 of 3**

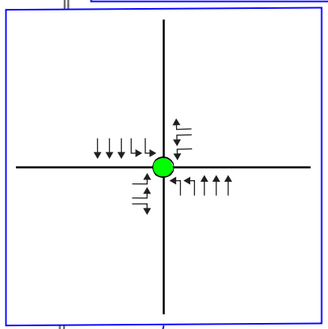
Legend

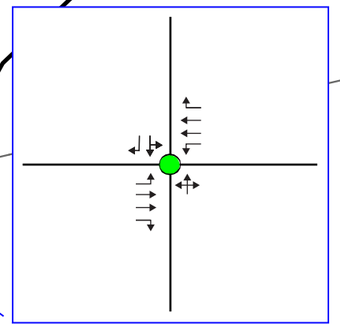
- Interstate (I-4)
- Arterial
- Lane Geometry
- Signalized Intersection
- Unsignalized Intersection
- Roundabout











Marcum Rd

SOCRUM LOOP RD

Lakeland Hills Blvd

INTERSTATE 4

33

33

TOLL 570

659

FLORIDA US 98

3.90

3.20

2.00

N

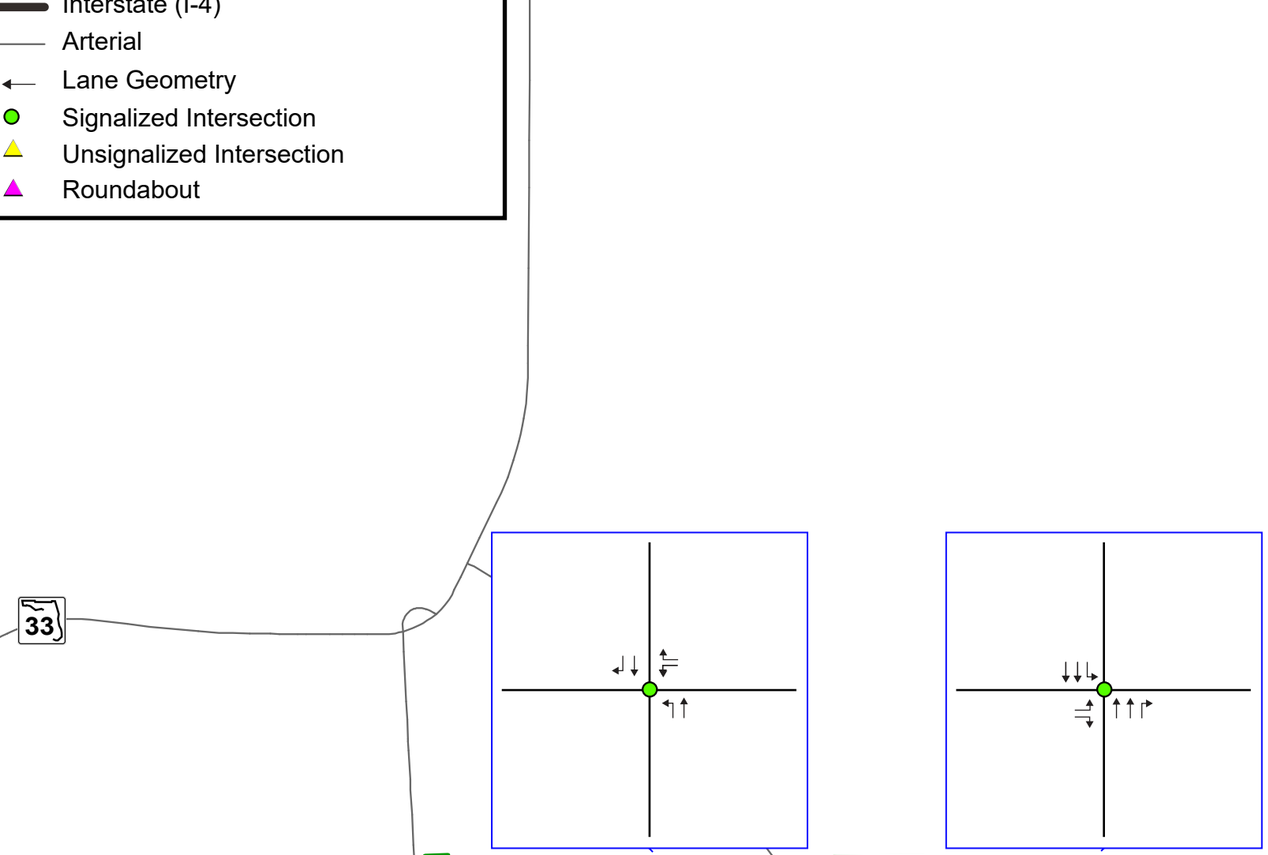
0 0.5 1

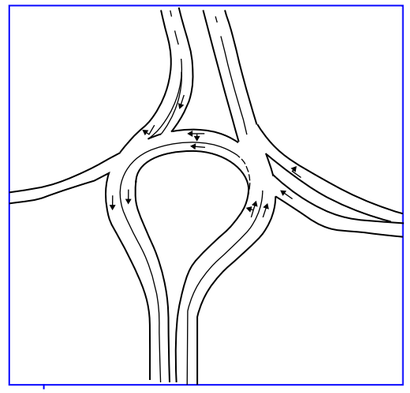
Miles

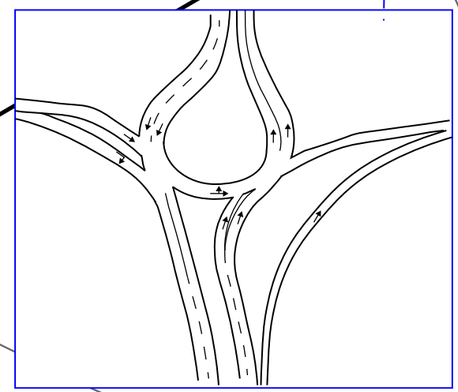
SOUTHWEST I-4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	**Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2045 (No-Build) Lane Geometry**	**Figure 14 Page 2 of 3**

Legend

- Interstate (I-4)
- Arterial
- Lane Geometry
- Signalized Intersection
- Unsignalized Intersection
- Roundabout







33

557

CR-557A

Berkley Rd

INTERSTATE 4

4.00

2.90

559

CR-557A

Old Polk City Rd

TOLL 570

N

0 0.5 1

Miles

SOUTHWEST I-4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT

Project Development and Environment (PD&E) Study
I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)

2045 (No-Build)
Lane Geometry

Figure 14
Page 3 of 3

Table **22**: No-Build Year 2045 HCS Level of Service and Density for I-4 Eastbound Segments

No.	Segment	Segment Type	Number of Lanes	AM Peak Hour								PM Peak Hour							
				Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)	Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)
1	West of Polk Parkway off-ramp	Basic	4	8,520	72.3	-	F	1.0	-	26.1	-	9,200	72.7	-	F	1.1	-	25.9	-
2	Polk Parkway off-ramp	Diverge	4	8,520	73.8	26.8	F	1.0	0.4	25.0	60.8	9,200	74.2	33.4	F	1.1	0.4	24.8	61.0
3	Polk Parkway off-ramp to on-ramp	Basic	3	7,090	71.3	-	F	1.2	-	26.4	-	7,800	71.1	-	F	1.3	-	26.5	-
4	Polk Parkway on-ramp	Merge	3	7,840	36.1	34.0	F	0.9	0.4	60.0	56.9	8,540	36.1	34.0	F	0.9	0.4	60.0	56.9
5	Polk Parkway on-ramp to West Memorial Boulevard off-ramp	Basic	3	7,840	38.3	-	F	1.3	-	56.5	-	8,540	38.3	-	F	1.4	-	56.5	-
6	West Memorial Boulevard off-ramp	Diverge	3	7,840	33.0	37.5	F	0.9	0.7	65.6	61.3	8,540	33.0	37.5	F	0.9	0.7	65.6	61.3
7	West Memorial Boulevard off-ramp to on-ramp	Basic	3	6,540	24.8	-	F	1.1	-	67.6	-	7,260	25.0	-	F	1.2	-	67.4	-
8	West Memorial Boulevard on-ramp	Merge	3	6,990	29.4	29.2	F	0.8	0.3	62.8	60.3	7,700	29.4	29.2	F	0.8	0.3	62.8	60.3
9	West Memorial Boulevard on-ramp to SR 539 off-ramp	Basic	3	6,990	28.6	-	F	1.1	-	64.4	-	7,700	28.7	-	F	1.2	-	64.3	-
10	SR 539 off-ramp	Diverge	3	6,990	27.4	28.5	F	0.8	0.4	67.2	63.0	7,700	27.5	28.6	F	0.8	0.4	67.1	62.9
11	SR 539 off-ramp to on-ramp	Basic	3	6,250	22.6	-	F	1.0	-	69.2	-	6,920	22.4	-	F	1.1	-	69.4	-
12	SR 539 on-ramp	Merge	3	6,960	29.2	30.2	F	0.8	0.4	62.7	60.2	7,750	30.0	31.1	F	0.8	0.5	62.2	59.6
13	SR 539 on-ramp to US 98 off-ramp	Basic	3	6,960	28.3	-	F	1.1	-	64.7	-	7,750	29.2	-	F	1.3	-	63.9	-
14	US 98 off-ramp	Diverge	3	6,960	27.7	33.0	F	0.8	0.6	66.1	61.8	7,750	28.2	33.5	F	0.8	0.7	66.1	61.7
15	US 98 off-ramp to on-ramp	Basic	3	5,820	19.8	-	C	0.9	-	71.1	-	6,580	20.1	-	F	1.1	-	70.9	-
16	US 98 on-ramp	Merge	3	6,600	26.6	27.4	F	0.7	0.4	63.8	61.6	7,410	27.4	28.1	F	0.8	0.5	63.5	61.2
17	US 98 on-ramp to Lakeland Hills Boulevard off-ramp	Basic	3	6,600	25.3	-	F	1.1	-	67.2	-	7,410	26.2	-	F	1.2	-	66.5	-
18	Lakeland Hills Boulevard off-ramp	Diverge	3	6,600	28.1	28.6	F	0.7	0.6	60.4	54.5	7,410	29.1	29.6	F	0.8	0.7	59.8	53.9
19	Lakeland Hills Boulevard off-ramp to on-ramp	Basic	3	5,680	18.9	-	C	0.9	-	69.0	-	6,300	18.4	-	F	1.0	-	68.8	-
20	Lakeland Hills Boulevard on-ramp	Merge	3	6,390	25.5	26.3	F	0.7	0.4	63.6	61.2	6,990	24.7	25.7	F	0.7	0.4	63.9	61.5
21	Lakeland Hills Boulevard on-ramp to SR 33 off-ramp	Basic	3	6,390	23.6	-	F	1.0	-	68.5	-	6,990	22.9	-	F	1.1	-	69.0	-
22	SR 33 off-ramp	Diverge	3	6,390	24.1	29.9	F	0.7	0.4	67.3	63.1	6,990	26.3	30.0	F	0.7	0.6	60.2	54.4
23	SR 33 off-ramp to on-ramp	Basic	3	5,660	18.8	-	C	0.9	-	71.7	-	6,020	16.8	-	B	1.0	-	70.9	-
24	SR 33 on-ramp	Merge	3	6,260	24.2	24.6	F	0.7	0.3	64.8	62.7	6,590	21.9	22.6	F	0.6	0.3	65.3	63.3
25	SR 33 on-ramp to SR 570 off-ramp	Basic	3	6,260	22.7	-	F	1.0	-	69.2	-	6,590	20.2	-	F	1.1	-	70.9	-
26	SR 570 off-ramp	Diverge	3	6,260	22.8	29.3	F	0.7	0.3	69.0	65.3	6,590	20.7	27.4	F	0.6	0.3	69.1	65.3
27	SR 570 off-ramp to on-ramp	Basic	3	5,630	18.6	-	C	0.9	-	71.8	-	5,960	16.4	-	B	1.0	-	72.6	-
28	SR 570 on-ramp	Merge	3	6,710	27.3	26.1	F	0.8	0.6	63.7	61.6	7,040	24.8	24.2	F	0.7	0.6	64.6	62.7
29	SR 570 on-ramp to SR 559 off-ramp	Basic	3	6,710	26.2	-	F	1.1	-	66.5	-	7,040	23.3	-	F	1.1	-	68.7	-
30	SR 559 off-ramp	Diverge	3	6,710	25.9	31.7	F	0.8	0.4	67.2	63.0	7,040	23.7	29.8	F	0.7	0.4	67.5	63.3
31	SR 559 off-ramp to on-ramp	Basic	3	5,950	20.6	-	C	1.0	-	70.6	-	6,370	18.8	-	F	1.0	-	71.7	-
32	SR 559 on-ramp	Merge	3	6,680	27.1	27.5	F	0.7	0.4	63.7	61.5	7,080	25.1	25.9	F	0.7	0.4	64.3	62.2
33	SR 559 on-ramp to SR 557 off-ramp	Basic	3	6,680	25.9	-	F	1.1	-	66.7	-	7,080	23.6	-	F	1.1	-	68.5	-
34	SR 557 off-ramp	Diverge	3	6,680	25.7	31.3	F	0.7	0.4	67.2	63.0	7,080	26.4	29.8	F	0.7	0.4	61.2	55.3
35	SR 557 off-ramp to on-ramp	Basic	3	5,940	20.5	-	C	1.0	-	70.4	-	6,400	19.0	-	F	1.0	-	67.6	-
36	SR 557 on-ramp	Merge	3	7,050	29.8	29.6	F	0.8	0.6	62.6	60.2	7,400	27.2	27.4	F	0.8	0.6	63.7	61.5
37	East of SR 557 on-ramp	Basic	3	7,050	29.2	-	F	1.1	-	63.9	-	7,400	26.1	-	F	1.2	-	66.5	-

Density – passenger cars/mile/lane; Highlighted – LOS E/LOS F
The results are based on the HCS 7.9

Table **23**: No-Build Year 2045 HCS Level of Service and Density for I-4 Westbound Segments

No.	Segment	Segment Type	Number of Lanes	AM Peak Hour								PM Peak Hour							
				Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)	Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)
1	East of SR 557 off-ramp	Basic	3	7,400	49.3	-	F	1.2	-	43.9	-	7,050	49.3	-	F	1.1	-	43.9	-
2	SR 557 off-ramp	Diverge	3	7,400	32.6	37.3	F	0.9	0.6	66.3	62.2	7,050	32.7	37.5	F	0.9	0.6	66.1	61.9
3	SR 557 off-ramp to on-ramp	Basic	3	6,400	27.3	-	F	1.0	-	65.5	-	5,940	26.3	-	D	1.0	-	66.3	-
4	SR 557 on-ramp	Merge	3	7,080	33.3	32.0	F	0.9	0.4	61.4	58.7	6,680	32.9	31.9	F	0.9	0.4	61.5	58.8
5	SR 557 on-ramp to SR 559 off-ramp	Basic	3	7,080	34.2	-	F	1.1	-	59.8	-	6,680	33.6	-	F	1.1	-	60.3	-
6	SR 559 off-ramp	Diverge	3	7,080	30.5	34.6	F	0.9	0.4	67.1	63.1	6,680	30.2	34.4	F	0.9	0.4	67.1	63.1
7	SR 559 off-ramp to on-ramp	Basic	3	6,370	27.0	-	F	1.0	-	65.8	-	5,950	26.4	-	D	1.0	-	66.3	-
8	SR 559 on-ramp	Merge	3	7,040	33.0	32.2	F	0.9	0.4	61.4	58.7	6,710	33.3	32.6	F	0.9	0.4	61.2	58.4
9	SR 559 on-ramp to SR 570 off-ramp	Basic	3	7,040	33.7	-	F	1.1	-	60.2	-	6,710	33.9	-	F	1.1	-	60.0	-
10	SR 570 off-ramp	Diverge	3	7,040	30.6	35.6	F	0.9	0.6	66.3	62.0	6,710	30.7	35.6	F	0.9	0.6	66.3	62.0
11	SR 570 off-ramp to on-ramp	Basic	3	5,960	23.7	-	C	1.0	-	68.4	-	5,630	23.9	-	C	0.9	-	68.3	-
12	SR 570 on-ramp	Merge	3	6,590	29.6	29.4	F	0.8	0.4	62.9	60.5	6,260	29.7	29.5	F	0.8	0.4	62.9	60.5
13	SR 570 on-ramp to SR 33 off-ramp	Basic	3	6,590	29.0	-	F	1.1	-	64.1	-	6,260	29.2	-	F	1.0	-	63.9	-
14	SR 33 off-ramp	Diverge	3	6,590	27.5	32.8	F	0.8	0.3	67.6	63.6	6,260	27.6	33.0	F	0.8	0.3	67.6	63.5
15	SR 33 off-ramp to on-ramp	Basic	3	6,020	24.2	-	C	1.0	-	68.1	-	5,660	24.1	-	C	0.9	-	68.1	-
16	SR 33 on-ramp	Merge	3	6,990	33.0	33.2	F	0.9	0.5	60.8	57.9	6,390	30.8	31.2	F	0.8	0.4	62.1	59.5
17	SR 33 on-ramp to CR 582 (North Socrum Loop Road) off-ramp	Basic	3	6,990	33.1	-	F	1.1	-	60.7	-	6,390	30.5	-	F	1.0	-	62.9	-
18	CR 582 (North Socrum Loop Road) off-ramp	Diverge	3	6,990	32.7	23.4	F	0.9	0.4	61.4	55.3	6,390	31.3	22.3	F	0.8	0.4	61.3	55.2
19	CR 582 (North Socrum Loop Road) off-ramp to on-ramp	Basic	3	6,300	26.4	-	F	1.0	-	66.3	-	5,680	24.3	-	C	0.9	-	68.0	-
20	CR 582 (North Socrum Loop Road) on-ramp	Merge	3	7,410	37.2	31.7	F	0.9	0.7	58.2	54.8	6,600	32.6	28.7	F	0.9	0.6	61.2	58.4
21	CR 582 (North Socrum Loop Road) on-ramp to US 98 off-ramp	Basic	3	7,410	38.4	-	F	1.2	-	56.4	-	6,600	32.7	-	F	1.1	-	61.0	-
22	US 98 off-ramp	Diverge	3	7,410	32.5	37.1	F	0.9	0.5	66.7	62.7	6,600	29.8	35.0	F	0.9	0.4	67.0	62.9
23	US 98 off-ramp to on-ramp	Basic	3	6,580	56.3	-	F	1.1	-	32.0	-	5,820	25.4	-	C	0.9	-	67.1	-
24	US 98 on-ramp	Merge	3	7,750	36.9	35.4	F	0.9	0.7	58.6	55.2	6,960	36.0	34.9	F	0.9	0.6	59.1	55.8
25	US 98 on-ramp to SR 539 off-ramp	Basic	3	7,750	38.3	-	F	1.3	-	56.5	-	6,960	37.0	-	F	1.1	-	57.5	-
26	SR 539 off-ramp	Diverge	3	7,750	32.4	36.8	F	0.9	0.5	66.7	62.7	6,960	31.8	36.2	F	0.9	0.4	67.0	63.1
27	SR 539 off-ramp to on-ramp	Basic	3	6,920	28.8	-	F	1.1	-	64.3	-	6,250	29.1	-	F	1.0	-	64.0	-
28	SR 539 on-ramp	Merge	3	7,700	35.6	33.2	F	0.9	0.4	60.3	57.3	6,990	35.4	33.0	F	0.9	0.4	60.4	57.5
29	SR 539 on-ramp to West Memorial Boulevard off-ramp	Basic	3	7,700	37.6	-	F	1.2	-	57.1	-	6,990	37.4	-	F	1.1	-	57.2	-
30	West Memorial Boulevard off-ramp	Diverge	3	7,700	31.7	35.9	F	0.9	0.2	67.7	64.0	6,990	31.6	35.9	F	0.9	0.3	67.7	64.0
31	West Memorial Boulevard off-ramp to on-ramp	Basic	3	7,260	32.2	-	F	1.2	-	61.4	-	6,540	32.0	-	F	1.1	-	61.6	-
32	Memorial Boulevard on-ramp to Polk Parkway off-ramp	Weaving	4	8,540	46.2	-	F	1.0	-	39.6	-	7,840	28.3	-	D	0.8	-	64.7	-
33	Polk Parkway off-ramp to on-ramp	Basic	3	7,800	38.3	-	F	1.3	-	56.5	-	7,090	38.3	-	F	1.2	-	56.5	-
34	Polk Parkway on-ramp	Merge	4	9,200	32.8	32.8	F	0.9	0.8	61.5	61.5	8,520	33.0	33.0	F	0.9	0.8	61.3	61.3
35	West of Polk Parkway on-ramp	Basic	4	9,200	33.3	-	F	1.1	-	60.5	-	8,520	33.6	-	F	1.0	-	60.3	-

Density – passenger cars/mile/lane; Highlighted – LOS E/LOS F
The results are based on the HCS 7.9

Table 24: 2045 No-Build I-4 Signalized Intersection Analysis

AM Peak

Interstate	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			AM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
I-4	West Memorial Boulevard & I-4 Westbound	Volume					440			1280						B (18.5)
		LOS (Delay)	Movement				C (27.4)			B (15.4)						
			Approach				C (27.4)			B (15.4)						
		Queue Length 95th (ft)	Movement				152			304						
	Kathleen Road (SR 539) & I-4 Westbound	Volume					580		250	210	1800			1220	570	C (29.7)
		LOS (Delay)	Movement				**F (93.9)**		D (42.1)	**F (193.5)**	A (4.7)			B (17.9)	A (2.5)	
			Approach				**E (78.3)**			C (24.4)			B (13.0)			
		Queue Length 95th (ft)	Movement				#400		#230	m#166	217			407	46	
	Kathleen Road (SR 539) & I-4 Eastbound	Volume		400		340					1610	510	200	1600		C (27.5)
		LOS (Delay)	Movement	D (49.5)		C (31.3)					C (29.4)	A (2.7)	**F (128.8)**	B (14.5)		
			Approach	D (41.2)						C (23)			C (27.2)			
		Queue Length 95th (ft)	Movement	212		243					771	52	m#158	m535		
	US-98 & I-4	Volume		500			300			680	1640		350	1960		**F (86.1)**
		LOS (Delay)	Movement	**F (338.5)**			**F (173.9)**			**F (209.9)**	C (21.9)		**E (67.5)**	C (22.4)		
			Approach	**F (338.5)**			**F (173.9)**			D (45.4)			**F (86.7)**			
		Queue Length 95th (ft)	Movement	#500			#293			#596	432		236	537		
	North Socrum Loop Road (CR 582) & I-4 Westbound	Volume			930	410	700	1380		460		230	5			**F (99.9)**
		LOS (Delay)	Movement		**F (230.8)**	A (9.2)	**F (185.2)**	C (24.2)		**E (65.4)**	A (0.6)			A (0.2)		
			Approach		**F (162.9)**			**E (78.4)**			D (43.8)			A (0.2)		
		Queue Length 95th (ft)	Movement		#668	94	#919	527		#695	0			0		
	Lakeland Hills Boulevard & Lakeland Harbor Boulevard/I-4 Eastbound	Volume		360	870	40	40	1310	0	70	20	80	580	20	320	**F (129.5)**
		LOS (Delay)	Movement	**F (274.6)**	C (34.1)	A (0.1)	B (18.5)	**F (146.6)**		**F (88.4)**	A (5.6)			**F (244.6)**	B (17.4)	
			Approach	**F (101.2)**			**F (142.8)**			D (39.9)			**F (165.6)**			
		Queue Length 95th (ft)	Movement	#562	400	0	36	#832		#135	5			#892	170	
	SR 559 & I-4 Westbound	Volume					420		290	490	460			490	180	**E (58.0)**
		LOS (Delay)	Movement				**F (101.4)**		A (7.2)	**F (104.3)**	B (11.0)			**E (67.9)**	A (5.8)	
			Approach				**E (62.9)**			**E (59.1)**			D (51.2)			
		Queue Length 95th (ft)	Movement				#576		73	#673	228			#605	53	
	SR 559 & I-4 Eastbound	Volume		320		440					630	480	250	660		C (28.1)
		LOS (Delay)	Movement	**E (57.4)**		D (37.0)					C (29.7)	A (5.3)	D (50.5)	B (14.7)		
			Approach	D (45.6)						B (19.2)			C (24.5)			
		Queue Length 95th (ft)	Movement	322		298					305	88	m222	m187		

PM Peak

Interstate	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			PM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
I-4	West Memorial Boulevard & I-4 Westbound	Volume					450			1300						B (19.3)
		LOS (Delay)	Movement				C (26.4)			B (16.8)						
			Approach				C (26.4)			B (16.8)						
		Queue Length 95th (ft)	Movement				147			345						
	Kathleen Road (SR 539) & I-4 Westbound	Volume					510		200	340	1800			1290	400	C (33.8)
		LOS (Delay)	Movement				**E (71.0)**		D (39.0)	**E (78.7)**	C (21.6)			C (33.0)	A (3.1)	
			Approach				**E (62.0)**			C (30.7)			C (25.9)			
		Queue Length 95th (ft)	Movement				340		205	244	748			701	57	
	Kathleen Road (SR 539) & I-4 Eastbound	Volume		570		210					1570	580	250	1550		C (28.8)
		LOS (Delay)	Movement	**E (65.5)**		B (11.6)					C (34.8)	A (3.3)	**E (71.1)**	B (14.2)		
			Approach	D (51.0)						C (26.3)			C (22.1)			
		Queue Length 95th (ft)	Movement	#343		88					763	56	#167	462		
	US-98 & I-4	Volume		480			460			870	1960		280	1640		**E (66.1)**
		LOS (Delay)	Movement	**F (103.0)**			**E (72.9)**			**F (85.5)**	**E (64.2)**		D (44.7)	D (49.1)		
			Approach	**F (103.0)**			**E (72.9)**			**E (65.9)**			**E (61.3)**			
		Queue Length 95th (ft)	Movement	#380			#315			#617	#858		162	639		
	North Socrum Loop Road (CR 582) & I-4 Westbound	Volume		5	1380	330	590	930	5	370		340				**F (106.4)**
		LOS (Delay)	Movement	**E (56.8)**	**F (196.7)**	A (5.7)	**F (186.2)**	B (16.9)		**E (55.1)**	A (0.6)					
			Approach	**F (159.6)**			**F (82.4)**			C (29.4)						
		Queue Length 95th (ft)	Movement	18	#913	69	#816	346		#437	0		0	0	0	
	Lakeland Hills Boulevard & Lakeland Harbor Boulevard/I-4 Eastbound	Volume		450	1310	70	80	870		40	20	40	690	20	400	**F (124.4)**
		LOS (Delay)	Movement	**F (260.8)**	**F (98.1)**	A (0.3)	C (28.2)	**F (83.3)**		**E (65.2)**	A (2.3)			**F (233.6)**	B (18.0)	
			Approach	**F (134.3)**			**E (78.6)**			C (27.5)			**F (155.9)**			
		Queue Length 95th (ft)	Movement	#682	#857	0	68	#543		70	0			#1030	219	
	SR 559 & I-4 Westbound	Volume					480		250	440	350			340	320	D (46.2)
		LOS (Delay)	Movement				**E (72.2)**		A (6.4)	**F (86.6)**	B (13.0)			**E (57.1)**	A (7.3)	
			Approach				D (49.7)			D (54.0)			C (32.9)			
		Queue Length 95th (ft)	Movement				#595		67	#576	180			#420	77	
	SR 559 & I-4 Eastbound	Volume		180		490					610	420	290	530		C (26.9)
		LOS (Delay)	Movement	D (43.9)		D (38.2)					C (30.2)	A (5.4)	D (46.6)	B (13.2)		
			Approach	D (39.7)						C (20.1)			C (25.0)			
		Queue Length 95th (ft)	Movement	174		289					309	87	m290	m202		

Synchro Version 11 Build 168.

LOS notes:

Delay is in sec/veh units

:Level Of Service (LOS) E reflecting at capacity operations

:Level Of Service (LOS) F reflecting over capacity operations

Queue notes:

~: Volume exceeds capacity, queue is theoretically infinite

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table **25**: 2045 No-Build I-4 Roundabout Intersection Analysis

AM Peak

Interstate	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection AM LOS (Delay)
				Eastbound			Westbound			Northbound			Southbound			
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
	**SR 557 & I-4 Westbound (Roundabout)	Volume					860		140	590	750			320	90	F (110.4)
		LOS (Delay)	Movement				F (295.5)		F (292.5)	A (0)	A (0)			C (21.3)	C (19.8)	
			Approach				F (295.1)				A (0.1)			C (21.0)		
		V/C	Movement				1.56		1.56	0.41	0.41			0.53	0.53	
			Approach				1.56				0.41			0.53		
		Queue Length 95th (ft)	Movement				1907		1907	0	0			64.4	64.4	
	**SR 557 & I-4 Eastbound (Roundabout)	Volume		260		480					1080	1000	110	1070		C (15.8)
		LOS (Delay)	Movement	D (25.2)		F (87.7)					B (13.5)	A (0)	A (0)	A (0)		
			Approach	F (65.8)							A (7.2)			A (0.1)		
		V/C	Movement	0.64		1.06					0.63	0.67	0.35	0.35		
			Approach	1.06							0.67			0.35		
		Queue Length 95th (ft)	Movement	90		607					165	0	0	0		
	**SR 33 & I-4 Westbound (Roundabout)	Volume					370		200	120	1000			880	850	A (6.2)
		LOS (Delay)	Movement				C (17.7)		B (14.0)	A (0)	A (0)			B (13.6)	A (0)	
			Approach				C (16.4)				A (0)			A (7.0)		
		V/C	Movement				0.46		0.41	0.32	0.32			0.58	0.57	
			Approach				0.46				0.32			0.58		
		Queue Length 95th (ft)	Movement				52		47	0	0			120	0	
	**SR 33 & I-4 Eastbound (Roundabout)	Volume		580		150					540	310	290	960		B (13.8)
		LOS (Delay)	Movement	E (48.5)		B (11.4)					C (16.9)	A (0)	A (0)	A (0)		
			Approach	E (40.9)							B (10.8)			A (0.1)		
		V/C	Movement	0.84		0.30					0.54	0.21	0.37	0.37		
			Approach	0.84							0.54			0.37		
		Queue Length 95th (ft)	Movement	167		29					76	0	0	0		

PM Peak

Interstate	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection PM LOS (Delay)
				Eastbound			Westbound			Northbound			Southbound			
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
	**SR 557 & I-4 Westbound (Roundabout)	Volume					1000		110	480	320			610	260	F (119.8)
		LOS (Delay)	Movement				F (66.3)		F (64.4)	A (0)	A (0)			F (299.7))	F (295.3)	
			Approach				F (66.1)				A (0.1)			F (298.4)		
		V/C	Movement				1.01		1.01	0.30	0.19			1.56	1.56	
			Approach				1.01				0.30			1.56		
		Queue Length 95th (ft)	Movement				610		610	0	0			1683	1683	
	**SR 557 & I-4 Eastbound (Roundabout)	Volume		90		590					710	860	140	1470		F (70.3)
		LOS (Delay)	Movement	C (20.5)		F (448.4)					A (7.1)	A (0)	A (0)	A (0)		
			Approach	F (391.8)							A (3.4)			A (0.2)		
		V/C	Movement	0.33		1.91					0.36	0.58	0.48	0.48		
			Approach	1.91							0.58			0.48		
		Queue Length 95th (ft)	Movement	29		2673					45	0	0	0		
	**SR 33 & I-4 Westbound (Roundabout)	Volume					310		290	150	1420			560	580	B (10.1)
		LOS (Delay)	Movement				D (34.4)		F (60.9)	A (0)	A (0)			A (8.9)	A (0.3)	
			Approach				E (47.2)				A (0.1)			A (4.6)		
		V/C	Movement				0.60		0.90	0.45	0.45			0.38	0.38	
			Approach				0.90				0.45			0.38		
		Queue Length 95th (ft)	Movement				68		194	0	0			44	43	
	**SR 33 & I-4 Eastbound (Roundabout)	Volume		850		120					720	370	200	670		C (21.6)
		LOS (Delay)	Movement	E (36.2)		A (7.3)					E (43.7)	A (0)	A (0)	A (0)		
			Approach	D (32.6)							D (28.9)			A (0)		
		V/C	Movement	0.84		0.18					0.85	0.25	0.26	0.26		
			Approach	0.84							0.85			0.26		
		Queue Length 95th (ft)	Movement	227		17					209	0	0	0		

** SIDRA INTERSECTION 9

[1] LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

[2] The movements with Continuous lane control type have zero second delay time and zero feet queue length.

LOS notes:
Delay is in sec/veh units
:Level Of Service (LOS) E reflecting at capacity operations
:Level Of Service (LOS) F reflecting over capacity operations

Queue notes:
#: 95th percentile volume exceeds capacity
m: Upstream metering is in effect

V/C notes:
: V/C ratio exceeds 0.85

13.0 No-Build Year of Failure Traffic Analysis

The purpose of the Year of Failure analysis is to determine traffic operations for interchanges and I-4 mainline lane requirements within the project's study area for interim years. It is utilized to evaluate if/when (what year) study area interchanges and I-4 corridor mainline segments are projected to become deficient. The Year of Failure for mainline and ramps were determined based on interpolation between year 2021 and year 2045. The Year of Failure for ramp terminals were determined based on growth factor adjustments procedure using Synchro software which is reasonable for the intersection analysis.

Year of Failure for Ramp Terminals

For the No-Build Alternative, the annual growth rate is 1.91% along I-4 corridor from the existing conditions to the design year (2045) conditions. Traffic volumes for interim years were calculated by reducing the design year volumes by 1.91% per year. The growth/reduction factor under Synchro and SIDRA software was used to adjust traffic volumes for each interim year. In the case that traffic operations are anticipated to fail by the design year, an iterative traffic analysis was performed to determine the year when traffic starts to operate below LOS D. The summary of years of failure for ramp terminals are illustrated in **Table 26**. Following ramp terminals are anticipated to operate at an acceptable LOS D or better by Design Year 2045 under No-Build Alternative:

- I-4 and US 92/SR 546 (West Memorial Boulevard)
- I-4 and SR 539 (Kathleen Road)
- I-4 and SR 33 (roundabout)
- I-4 and SR 559 Eastbound Ramp terminal

The list of interchanges with the Year of Failure are stated below:

- I-4 and US 98/SR 35/SR 700 – ***Year 2034***
- I-4 and CR 582 (North Socrum Loop Road)/SR 33 (Lakeland Hills Boulevard) –***Year 2022***
- I-4 and SR 559 Westbound Ramp Terminal – ***Year 2044***
- I-4 and SR 557 westbound ramp terminal roundabout – ***Year 2034*** and eastbound ramp terminal roundabout – ***Year 2035***

Higher growth rates at the ramp terminals will result in lower opening interim years peak hour volumes and could result in operational deficiencies being reported later than expected (See **Appendix H**). Although ramp growth rates varied widely by interchange, ranging between 1% to 7%, it was deemed reasonable to assume a growth rate of 1.91% along the I-4 mainline corridor.

The design year forecasted traffic volumes from SR 557 at I-4 Interchange Modification Report (1/31/2019) was compared and discussed with District One during Phase 1 of the I-4 Master Plan traffic study. The difference was due to post processing and traffic balancing.

Table 26: Year of Failure Analysis - Intersection

Intersection	Existing (2022)			No-Build (2045)			Year of Failure
		Overall LOS (Delay)			Overall LOS (Delay)		
	Intersection Type	AM	PM	Intersection Type	AM	PM	
West Memorial Boulevard & I-4 Westbound	Signalized[1]	B (13.0)	B (12.7)	Signalized[1]	B (18.5)	B (19.3)	NA
Kathleen Road (SR 539) & I-4 Westbound	Signalized[1]	C (26.9)	C (22.1)	Signalized[1]	C (29.7)	C (33.8)	NA
Kathleen Road (SR 539) & I-4 Eastbound	Signalized[1]	B (18.7)	C (24.8)	Signalized[1]	C (27.5)	C (28.8)	NA
US-98 & I-4	Signalized[1]	D (51.5)	E (55.1)	Signalized[1]	F (86.1)	E (66.1)	2034
North Socrum Loop Road (CR 582) & I-4 Westbound	Signalized[1]	E (61.2)	D (43.4)	Signalized[1]	F (99.9)	F (106.4)	2035
Lakeland Hills Boulevard & I-4 Eastbound	Signalized[1]	D (40.3)	F (80.3)	Signalized[1]	F (129.5)	F (124.4)	2022
SR 33 & I-4 Westbound	Signalized[1]	C (26.3)	C (24.7)	Roundabout[3]	A (6.2)	B (10.1)	NA
SR 33 & I-4 Eastbound	Signalized[1]	C (23.5)	F (97.6)	Roundabout[3]	B (13.8)	C (21.6)	NA
SR 559 & I-4 Westbound	Non-Signalized[2]	F (>999)	F (732.5)	Signalized[1]	E (58.0)	D (46.2)	2044
SR 559 & I-4 Eastbound	Non-Signalized[2]	E (43.6)	C (22.4)	Signalized[1]	C (28.1)	C (26.9)	NA
SR 557 & I-4 Westbound	Non-Signalized[2]	F (896.3)	F (>999)	Roundabout[3]	F (110.4)	F (119.8)	2034
SR 557 & I-4 Eastbound	Non-Signalized[2]	F (198.1)	F (185.7)	Roundabout[3]	C (15.8)	F (70.3)	2035

Synchro Version 11 Build 168

LOS Notes:

Delay is in sec/veh units

:Level Of Service (LOS) E reflecting at capacity operations

:Level Of Service (LOS) F reflecting over capacity operations

Results

1 :Synchro

2 :HCS

3 :SIDRA

Note: 1. All the signal timings have been optimized for splits and offsets. The signal phase for right turn movements have been maintained based on existing signal phasing

2. Synchro does not account for queue spillover effects. Queue lengths from Synchro would not be realistic, especially for future conditions analysis to account for the spill back. Off-ramp queues based on 2045 No-Build Alternative are documented in **Appendix H**.

Mainline and Ramp Lane Requirements

Future lane requirements were evaluated to provide an estimated timeline for the onset of capacity deficiencies along the I-4 corridor. Freeway mainline level of service targets were based on the 2023 FDOT Quality/LOS Handbook and adjusted based on 7% truck. Capacity analysis for ramp roadways was based on adjusted targets from the HCM 6th Edition.

Worst-case volumes during AM or PM peak hours were considered for this planning level analysis. Also, the highest volume between on and off ramps were considered.

Freeway capacity was adjusted based on HCM 6th Edition procedure below

The capacity of the freeway was taken from HCM 6th edition document and adjusted based on HCM 6th edition as follow:

Adjusted Demand Volume $v_p = V/ (PHF \times N \times f_{HV})$ (HCM 6th Edition Equation 12-9)

$f_{HV} = 1/(1+P_T(E_T - 1)$ (HCM 6th Edition Equation 12-10)

$E_T = 2$ (HCM 6th Edition Exhibit 12-25)

Table 27

Parameters

Data	
K_{STD}	9.00%
$D^{(1)}$	52.00%
Truck % $(T_f)^{(1)}$	7.00%
$RVs^{(2)}$	0.00%
Peak Hour Factor $(PHF)^{(1)}$	0.95
Population Factor $(P_T)^{(2)}$	1.00
$Grade^{(2)}$	0.00%
$Terrain^{(2)}$	Level
Lane $Width^{(2)}$	12.00 ft

(1) Source: I-4 Master Plan - Traffic Factors

(2) Source: HCM 6th Edition default value.

Capacity of a basic freeway segment for free flow speed of 75 mph is 2,400 pc/h/ln (HCM 6th Edition Exhibit 12-4). **Table 28** showed the adjusted capacity for 6, 8 and 10 lanes. The calculation is attached in **Appendix H.**

Table 28

Freeway Capacity

Lane	Capacity of Basic Freeway Segment (pc/h/ln)	Adjusted Capacity
2	N/A	N/A
3	7200	5800
4	9600	7700
5	12000	9600

Adjusted freeway capacity (reduced 10% for FFS 75 mph LOS D)

HCM 6th Edition: Exhibit 12-4

Ramp capacity was adjusted based on HCM 6th Edition procedure below.

The parameters were considered from **Table 27** and adjustment for demand volume formulas as shown under freeway capacity adjustment. Ramp capacity was adjusted based on above procedure from the base capacity listed below (source HCM 6th Edition). The calculation is attached in **Appendix H.**

Table 29

Ramp Capacity

	Ramp Capacity (pc/hr)		Ramp Capacity (veh/hr) LOS D	
FFS (mi/hr)	1-lane	2-lane	1-lane	2-lane
>50	2200	4400	1760	3520
>40-50	2100	4200	1680	3360
>30-40	2000	4000	1600	3200
>20-30	1900	3800	1520	3040

Adjusted Ramp capacity (reduced 10% for LOS D)

HCM 6th Edition: Exhibit 12-16

Tables 30 shows the detailed color-coded future lane requirements corresponding to LOS D (maximum service volume) for No-Build for the freeway mainline:

- I-4 mainline segments at SR 570 (West Polk Parkway) is projected to operate at deficient levels of service by year 2033 and need for 10-lanes roadway improvement.
- I-4 mainline segments at West Memorial Boulevard is projected to be deficient by year 2039 and need for 10-lanes roadway improvement.
- I-4 mainline segments at US 98/SR 35/SR 700 is projected to be deficient by year 2045 and need for 10-lanes roadway improvement.
- I-4 mainline segments from CR 582 (North Socrum Loop road) to SR 557 (East Polk Parkway) are projected to be deficient and need for 10-lanes roadway beyond year 2045.
- Single lane exit and entry ramps are anticipated to operate at acceptable levels of service up to the Design Year 2045 for No-Build conditions.

Table 30: I-4 Lane Requirements by Year for No-Build Alternative (Total Demand)
Mainline Maximum Service Volume (LOS D) and Ramp Capacity (LOS D)
DDHV - Worst Case AM or PM Peak Hour

Milepost – Location	I-4 Corridor	Traffic Count	Interpolated Volumes																							Design Year
		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
		4510	4630	4750	4870	4990	5110	5230	5350	5470	5590	5710	5830	5960	6080	6200	6320	6440	6560	6680	6800	6920	7040	7160	7280	7400
		460	490	510	540	570	600	620	650	680	700	730	760	790	810	840	870	890	920	950	970	1000	1030	1060	1080	1110
SR 557		340	360	370	390	410	420	440	460	470	490	510	520	540	560	570	590	610	620	640	660	670	690	710	720	740
		4420	4530	4640	4750	4860	4970	5090	5200	5310	5420	5530	5640	5750	5860	5970	6080	6190	6300	6420	6530	6640	6750	6860	6970	7080
		510	520	530	540	550	560	570	570	580	590	600	610	620	630	640	650	660	670	680	680	690	700	710	720	730
SR 559		520	530	540	550	560	570	580	590	600	610	620	630	640	650	660	670	680	690	700	710	720	730	740	750	760
		4430	4540	4650	4760	4870	4970	5080	5190	5300	5410	5520	5630	5740	5840	5950	6060	6170	6280	6390	6500	6610	6710	6820	6930	7040
		260	290	330	360	400	430	470	500	530	570	600	640	670	700	740	770	810	840	880	910	940	980	1010	1050	1080
SR 570 (Polk Parkway)		280	290	310	320	340	350	370	380	400	410	430	440	460	470	480	500	510	530	540	560	570	590	600	620	630
		4450	4540	4630	4720	4810	4900	4990	5070	5160	5250	5340	5430	5520	5610	5700	5790	5880	5970	6060	6140	6230	6320	6410	6500	6590
		350	360	370	380	390	400	410	420	430	440	450	460	480	490	500	510	520	530	540	550	560	570	580	590	600
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)		730	740	750	760	770	780	790	800	810	820	830	840	850	860	870	880	890	900	910	920	930	940	950	960	970
		4540	4640	4740	4850	4950	5050	5150	5250	5360	5460	5560	5660	5770	5870	5970	6070	6170	6280	6380	6480	6580	6680	6790	6890	6990
		360	370	390	400	420	430	450	460	480	490	510	520	540	550	560	580	590	610	620	640	650	670	680	700	710
SR 33 (Lakeland Hills Boulevard/Commonwealth Avenue)		860	870	880	890	900	910	920	930	940	950	960	970	990	1000	1010	1020	1030	1040	1050	1060	1070	1080	1090	1100	1110
		440	450	460	470	490	500	510	520	530	540	550	560	580	590	600	610	620	630	640	650	670	680	690	700	710
CR 582 (North Socrum Loop Road)		810	820	840	850	860	870	890	900	910	920	940	950	960	970	990	1000	1010	1020	1040	1050	1060	1070	1090	1100	1110
		4910	5010	5120	5220	5330	5430	5540	5640	5740	5850	5950	6060	6160	6260	6370	6470	6580	6680	6790	6890	6990	7100	7200	7310	7410
		620	630	640	650	660	660	670	680	690	700	710	720	730	730	740	750	760	770	780	790	800	800	810	820	830
US 98/SR 35/SR 700		950	960	970	980	990	1000	1010	1010	1020	1030	1040	1050	1060	1070	1080	1090	1100	1110	1120	1120	1130	1140	1150	1160	1170
		5240	5340	5450	5550	5660	5760	5870	5970	6080	6180	6290	6390	6500	6600	6700	6810	6910	7020	7120	7230	7330	7440	7540	7650	7750
		650	660	670	670	680	690	700	700	710	720	730	730	740	750	760	760	770	780	790	790	800	810	820	820	830
SR 539 (Kathleen Road)		560	570	580	590	600	610	620	620	630	640	650	660	670	680	690	700	710	720	730	730	740	750	760	770	780
		5200	5300	5410	5510	5620	5720	5830	5930	6030	6140	6240	6350	6450	6550	6660	6760	6870	6970	7080	7180	7280	7390	7490	7600	7700
		290	300	300	310	320	320	330	340	340	350	360	360	370	380	380	390	400	400	410	420	420	430	440	440	450
West Memorial Boulevard		740	760	790	810	830	860	880	900	930	950	970	1000	1020	1040	1070	1090	1110	1140	1160	1180	1210	1230	1250	1280	1300
		5600	5720	5850	5970	6090	6210	6340	6460	6580	6700	6830	6950	7070	7190	7320	7440	7560	7680	7810	7930	8050	8170	8300	8420	8540
		480	490	500	510	530	540	550	560	570	580	590	600	620	630	640	650	660	670	680	690	710	720	730	740	750
SR 570 (Polk Parkway)		840	860	890	910	940	960	990	1010	1040	1060	1090	1110	1140	1160	1180	1210	1230	1260	1280	1310	1330	1360	1380	1410	1430
		5960	6100	6230	6370	6500	6640	6770	6910	7040	7180	7310	7450	7580	7720	7850	7990	8120	8260	8390	8530	8660	8800	8930	9070	9200

Note: MSV - Maximum Service Volumes

LOS D service volumes were adjusted for 7% Trucks

Number of Mainline Lanes by LOS D Maximum Service Volume (MSV)	
Lanes	LOS D
2	N/A
3	5,800
4	7,700
5	9,600

Source: Adjusted MSV based on HCM 6th Edition

Number of Ramp Lanes by Capacity (LOS D MSV)	
1	1,680
2	3,360

Free Flow Speed 40 mph - 50 mph

Source: Adjusted MSV based on HCM 6th Edition

Number of Ramp Lanes by Capacity (LOS D MSV)	
1	1,520
2	3,040

Free Flow Speed 21 - 30 mph

Source: Adjusted MSV based on HCM 6th Edition

14.0 Build Alternatives Traffic Operational Performance

The Highway Capacity Software (HCS7) Version 7.9 was used to identify Level of Service (LOS) along freeway segments. The HCS7 is based on the Highway Capacity Manual Sixth Edition (HCM 6th Edition) methodologies.

Capacity and speed adjustment factors were determined based on following factors:

- I-4 Free-Flow Speed (FFS) – 75 mph
- I-4 Ramps Free-Flow Speed (FFS) – Posted or Advisory Speed Limit plus 5 mph
- I-4 peak hour truck percentage – 7%
- Lane width – 12 feet
- Driver Population – Mostly Familiar
- Weather Type – Non-Severe Weather
- Incident Type – No Incident
- Demand Adjustment Factor – 1.000

Signalized intersections were evaluated using Synchro Version 11. Roundabout intersection has been analyzed using SIDRA Intersection Version 9 software. The peak hours were determined to be 7:15 AM-8:15 AM for the AM peak hour and 4:45 PM – 5:45 PM for the PM peak hour for this study as stated under the methodology.

Selection of Measures of Effectiveness (MOE)

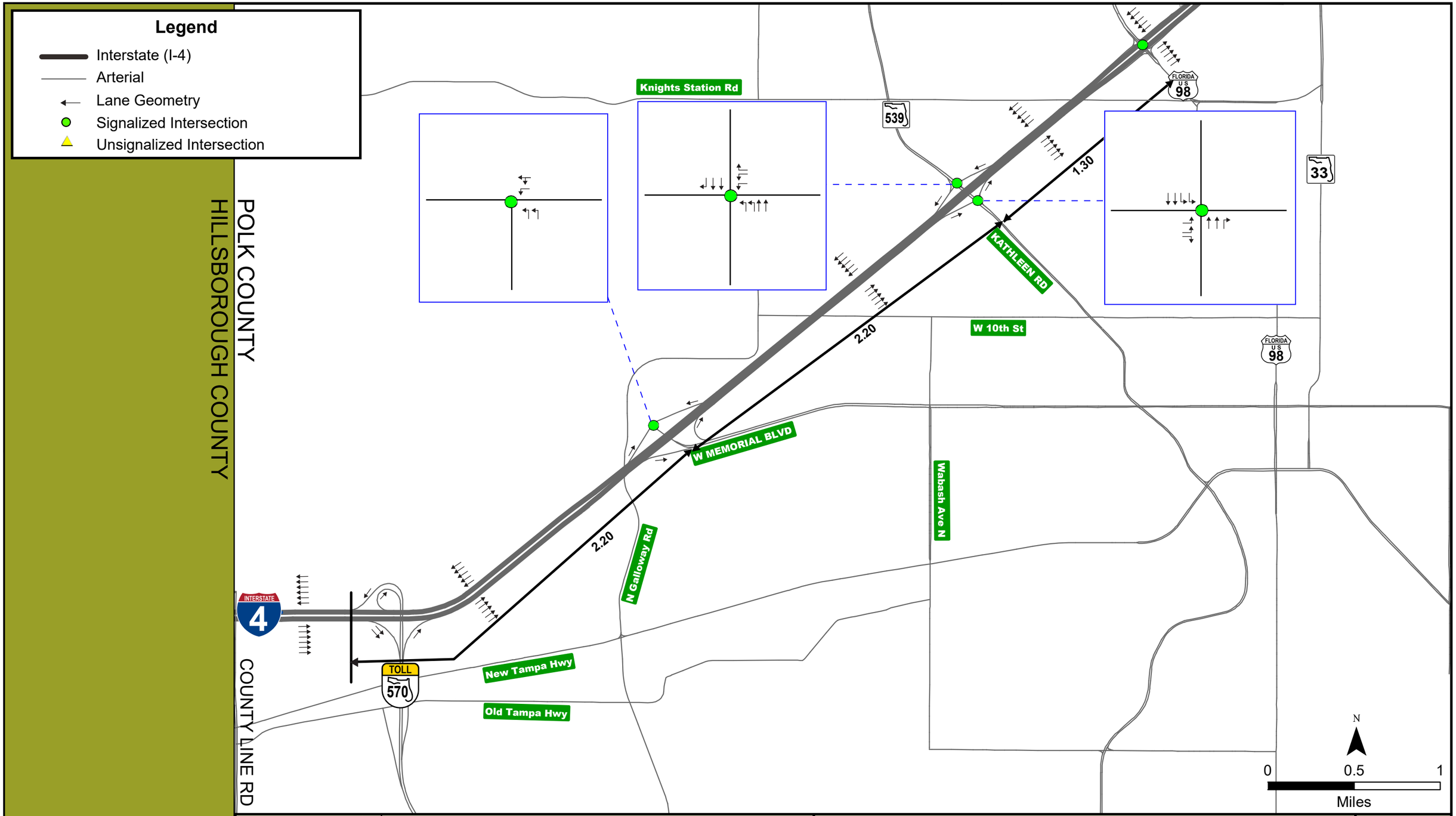
- Signalized/unsignalized Intersections – Volume, control delay, LOS, maximum queue lengths
- Freeway Segments – Volume, density, LOS; demand to capacity ratio, speed
- Ramp Merge/Diverge – Volume, density, LOS, demand to capacity ratio, speed

Build Alternatives

Traffic operations analyses for the AM and PM peak hours were conducted to document the LOS within the study area for Build Design Year (2045). Following two Build Alternatives were considered:

- Build Alternative 1 included I-4 mainline widening from six to ten lanes: addition of two General Purpose Lanes (GPLs) on each direction (See **Figure 15**).
- Build Alternative 2 included I-4 mainline widening from six to ten lanes: addition of two Express/High Occupancy Toll (HOT) lanes on each direction (See **Figure 16**). Capacity of the Express Lanes were adjusted by assuming zero percentage of heavy vehicle. All other parameters were considered based on the approved methodology.

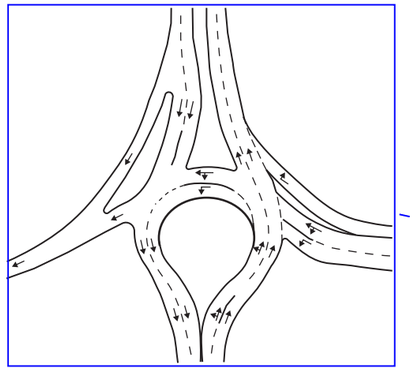
The 2045 AM and PM peak hour traffic volumes were evaluated in each direction for freeway segments: basic, weave, and merge/diverge influence areas. For the managed lane analysis, it was assumed as buffer lane separation (this may subject to change based on upcoming public meeting).

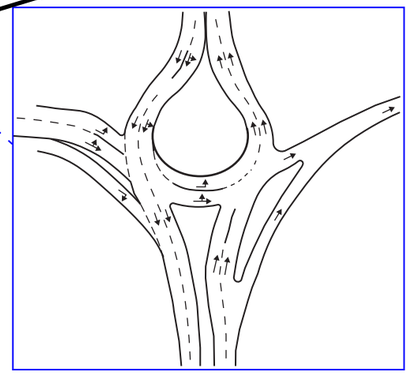


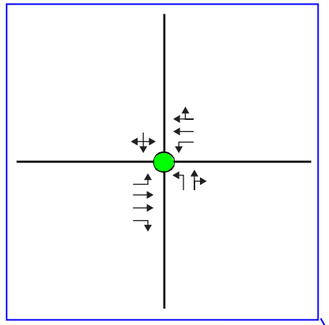
SOUTHWEST INTERSTATE 4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	**Project Development and Environment (PD&E) Study** **I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2045 (Build Alternative 1)** **Lane Geometry**	**Figure** **15** **Page 1 of 3**

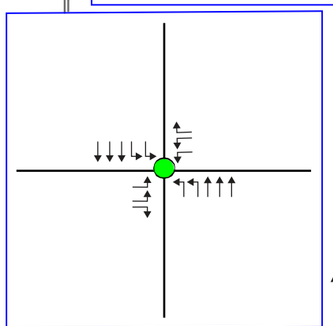
Legend

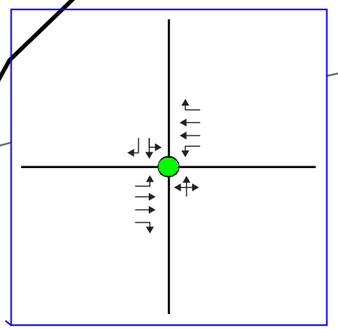
- Interstate (I-4)
- Arterial
- Lane Geometry
- Signalized Intersection
- Unsignalized Intersection
- Roundabout











Marcum Rd

SOCRUM LOOP RD

Lakeland Hills Blvd

INTERSTATE 4

33

33

659

TOLL 570

FLORIDA US 98

3.90

3.20

2.00

N

0 0.5 1

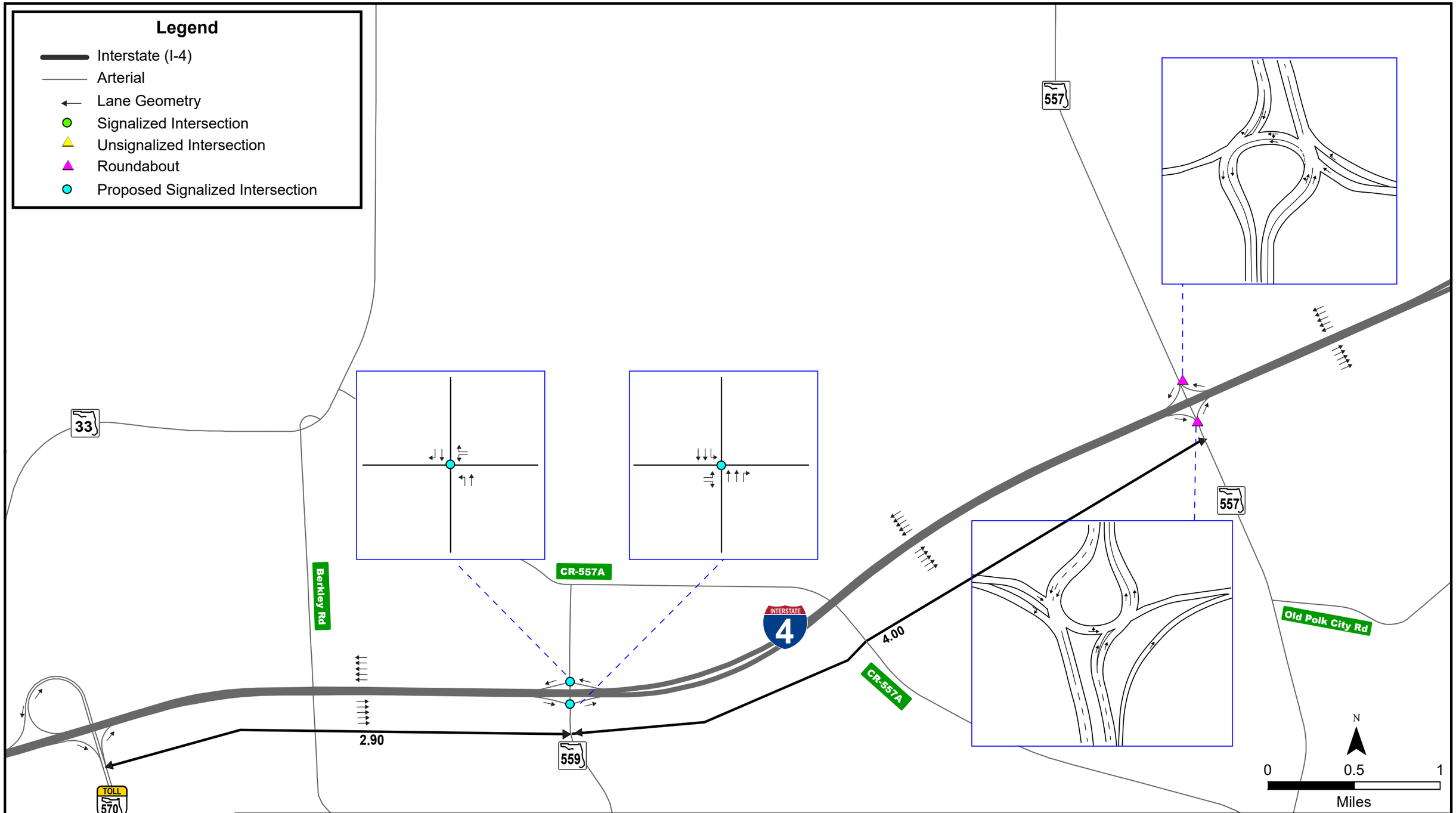
Miles

4 CONNECT SOUTHWEST INTERSTATE PROJECT FDOT DISTRICT ONE	**Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2045 (Build Alternative 1) Lane Geometry**

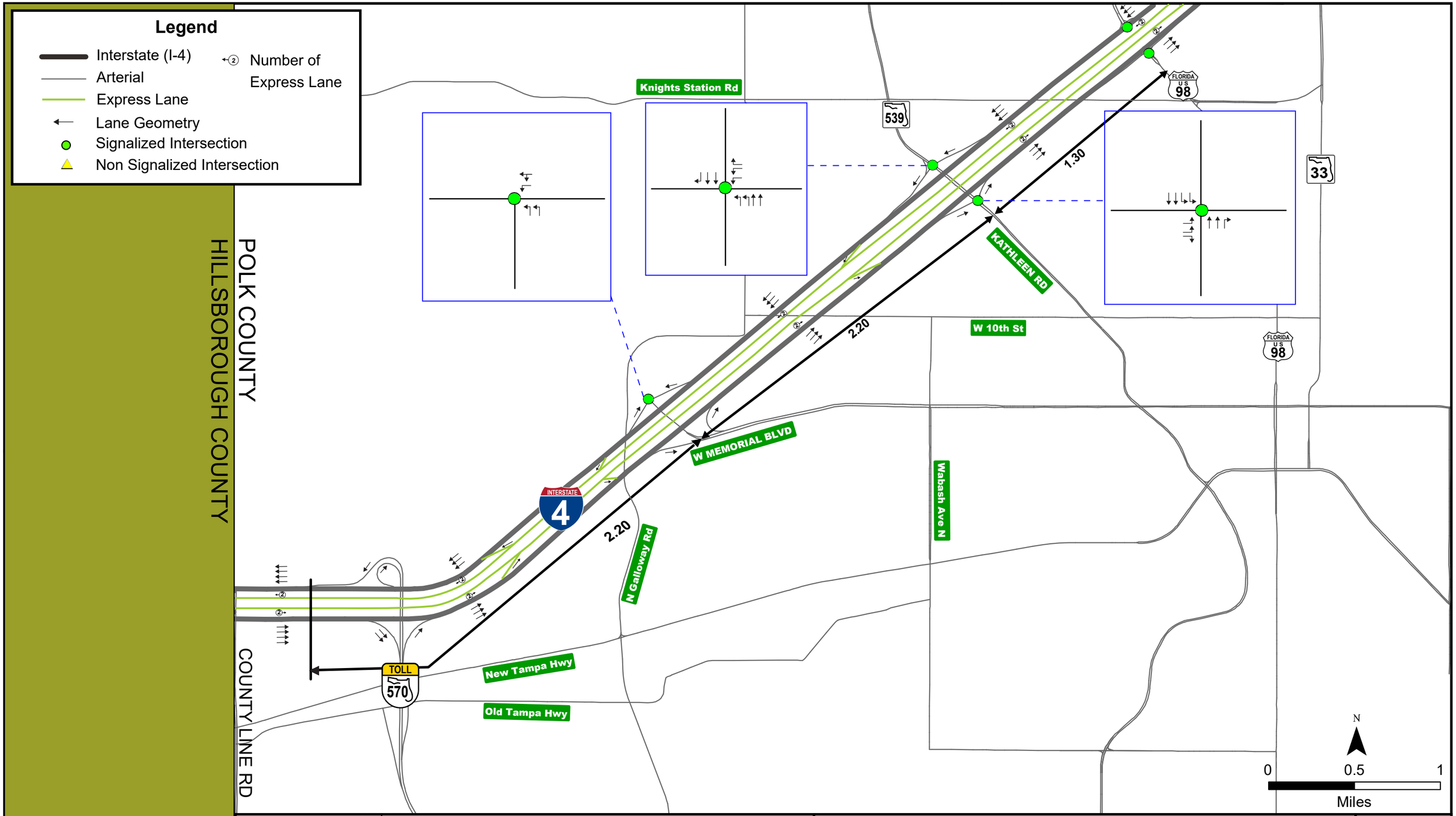
Figure 15
Page 2 of 3

Legend

- Interstate (I-4)
- Arterial
- Lane Geometry
- Signalized Intersection
- Unsignalized Intersection
- Roundabout
- Proposed Signalized Intersection



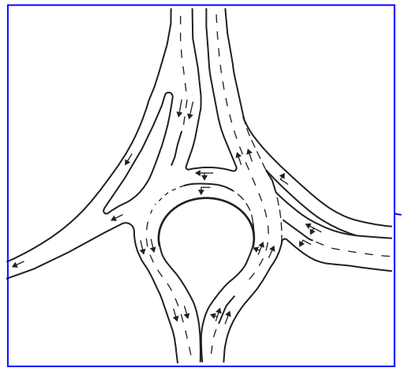
SOUTHWEST I-4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	**Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)**	**2045 (Build Alternative 1) Lane Geometry**	**Figure 15 Page 3 of 3**

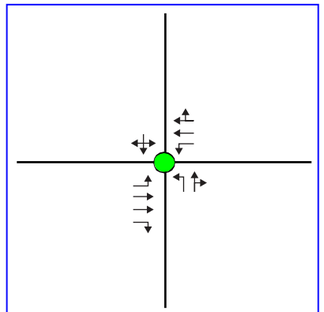


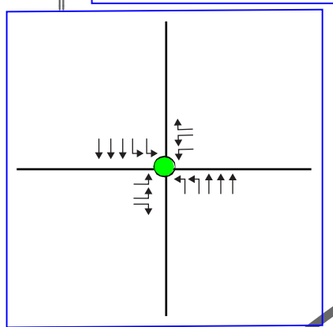
I-4 CONNECT SOUTHWEST FDOT DISTRICT ONE INTERSTATE PROJECT	Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)	2045 (Build Alternative 2) Lane Geometry	Figure 16 Page 1 of 3

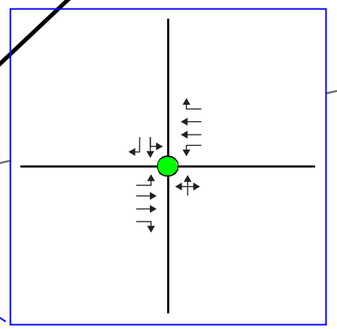
Legend

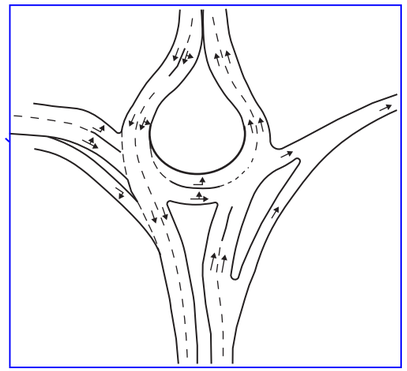
- Interstate (I-4)
- Arterial
- Express Lane
- Lane Geometry
- Signalized Intersection
- Non Signalized Intersection
- Roundabout
- Number of Express Lane











Marcum Rd

SOCRUM LOOP RD

Lakeland Hills Blvd

INTERSTATE 4

33

33

TOLL 570

659

FLORIDA US 98

3.90

3.20

2.00

N

0 0.5 1

Miles

SOUTHWEST INTERSTATE 4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)	2045 (Build Alternative 2) Lane Geometry	Figure 16 Page 2 of 3

Legend

- Interstate (I-4)
- Arterial
- Express Lane
- Lane Geometry
- Number of Express Lane
- Signalized Intersection
- Non Signalized Intersection
- Roundabout
- Proposed Signalized Intersection

33

557

CR-557A

Berkley Rd

Old Polk City Rd

4.00

2.90

559

TOLL 570

N

0 0.5 1

Miles

SOUTHWEST I-4 CONNECT FDOT DISTRICT ONE INTERSTATE PROJECT	Project Development and Environment (PD&E) Study I-4 (SR 400) From West of SR 570 (Polk Parkway) to West of US 27 Interchange (Phase 2)	2045 (Build Alternative 2) Lane Geometry	Figure 16 Page 3 of 3

HCS results are summarized in **Tables 31** and **Table 32** for the eastbound and westbound directions under Alternative 1. Majority of the freeway segments along I-4 are expected to operate LOS D or better with addition of two GPLs on each direction except following locations:

- I-4 eastbound at West Memorial Boulevard off-ramp – upstream mainline deficiency (diverge area)
- I-4 eastbound at US 98 off-ramp – upstream mainline deficiency (diverge area)

Table 33 thru **Table 35** represent the Build Alternative 2 HCS freeway analysis for the GPLs and ELs, respectively. Vehicular congestions were identified along GPLs (three lanes on each direction) under this alternative. However, ELs are anticipated to operate under capacity during peak hours. Addition of auxiliary lanes between falling segments anticipated to improve traffic operation which will be discussed during PD&E study. ***Nevertheless, the Build Alternatives are anticipated to improve traffic operations.***

Note that two-sided weaving analysis will be performed by Vissim after the locations of slip-ramps are determined in the upcoming PD&E study. Vissim is a microscopic traffic flow simulation model based on car following, lane change, and queuing logic. Vissim has the ability to model Express Lane (EL), High Occupancy Vehicle (HOV) lanes, and other transportation strategies that are being implemented within the state. Vissim models each individual vehicle within the network to identify simulated performance measures for freeways, ramps, and intersections.

Further discussion with I-4 Master Plan Teams is required to confirm if that heavy vehicles would be permitted in the inside lane of the ML facilities. Note that HCS software does not have capability to code the inside lanes of ML facilities with heavy vehicles.

Intersection Analysis

The Build Design Year 2045 intersections analysis ***based on existing and committed improvements only*** and output summary for AM and PM peak hours are presented in **Table 36 thru 39,** for Build Alternative 1 and Alternative 2, respectively. The signalized intersection operations were optimized for signal splits/offsets. Committed improvements at the SR 33 and SR 557 interchanges (roundabouts) were also analyzed using SIDRA. The Synchro, SIDRA and HCS output sheets are included in **Appendix I**.

Note that due to the relatively complex traffic operations of the 'Tear Drop' roundabout at SR 557 and SR 33, it is recommended to further analyze the ramp terminal with the microsimulation which is not part of the Phase 2 methodology.

The Facility Enhancement Element memorandum will address long-term improvements for I-4 mainline and interchange(s). Existing conditions Vissim calibration and future analysis using Vissim model for the I-4 at US 98 and I-4 at North Socrum Road/Lakeland Hills Boulevard interchanges along with adjacent arterial intersections will be submitted in a separate memo.

A planning level improvement at the interchanges are discussed here. It should be noted that the intersection improvements illustrated in the memo are for general planning and discussion purposes only and do no determine the engineering and operational acceptability (See **Appendix I**):

- I-4 Eastbound off-ramp and SR 33 -modify the eastbound off ramp right turn lane by adding a

receiving lane instead of merge lane.

- I-4 Eastbound off-ramp and SR 557 - modify the eastbound off ramp right turn lane by adding a receiving lane instead of merge lane.
- I-4 Westbound off-ramp and SR 557 – modify the westbound off ramp right turn lane by adding a receiving lane instead of merge lane.

Detailed Vissim microsimulation analysis is anticipated in the PD&E phase. **Table 40** illustrates the overall delay comparison between No-Build and Build Alternatives and upcoming actions for further traffic analysis.

The benefits of the Build alternative must be looked at from a global perspective due to the extensive nature of the improvements, as opposed to single isolated locations.

Phase 2 traffic analysis is intended for general planning purposes and will not determine the engineering and construction acceptability for the managed lanes and interchange capacity improvements. The ultimate capacity improvement of this project involves the potential construction of managed lanes in each direction of I-4 and interchange improvements which will be analyzed later in PD&E study.

Heavy vehicle restrictions in the future managed lanes (MLs) requires further discussion with the District One.

The Facility Enhancement Element memorandum will address long-term improvements for I-4 mainline and interchange(s). Existing conditions Vissim calibration and future analysis using Vissim model for the I-4 at US 98 and I-4 at North Socrum Road/Lakeland Hills Boulevard interchanges along with adjacent arterial intersections will be submitted in a separate memo.

Table 31: 2045 Build Alternative 1, HCS Level of Service and Density for I-4 Eastbound Segments, General Purpose Lane (GPL) only

No.	Segment	Segment Type	Number of Lanes	AM Peak Hour								PM Peak Hour							
				Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)	Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)
1	West of Polk Parkway off-ramp	Basic	6	8,940	24.9	-	C	0.72	-	67.5	-	9,760	28.3	-	D	0.79	-	64.7	-
2	Polk Parkway off-ramp*	Diverge	6	8,940	24.5	17.9	B	0.72	0.4	68.6	60.8	9,760	26.8	19.2	B	0.79	0.39	68.4	61
3	Polk Parkway off-ramp to on-ramp	Basic	5	7,510	25.1	-	C	0.73	-	67.3	-	8,360	29.6	-	D	0.81	-	63.6	-
4	Polk Parkway on-ramp	Merge	5	7,510	28.8	27	C	0.8	0.44	65	61.7	8,360	32.2	29.6	D	0.89	0.43	63.9	60.4
5	Polk Parkway on-ramp to West Memorial Boulevard off-ramp	Basic	5	8,300	29.2	-	D	0.8	-	63.9	-	9,140	34.6	-	D	0.89	-	59.4	-
6	West Memorial Boulevard off-ramp	Diverge	5	8,300	27.6	37.1	E	0.8	0.72	67.7	61.3	9,140	30.4	39.9	E	0.89	0.71	67.6	61.3
7	West Memorial Boulevard off-ramp to on-ramp	Basic	5	7,000	22.8	-	C	0.68	-	69.1	-	7,860	26.9	-	D	0.76	-	65.9	-
8	West Memorial Boulevard on-ramp	Merge	5	7,000	25.5	23.6	C	0.72	0.26	65.7	62.3	7,860	28.7	25.7	C	0.8	0.26	65.1	61.7
9	West Memorial Boulevard on-ramp to SR 539 off-ramp	Basic	5	7,450	24.8	-	C	0.72	-	67.5	-	8,300	29.2	-	D	0.8	-	63.9	-
10	SR 539 off-ramp	Diverge	5	7,450	24.2	27	C	0.72	0.42	69.4	63	8,300	27.1	30.4	D	0.8	0.47	69	62.7
11	SR 539 off-ramp to on-ramp	Basic	5	6,700	21.6	-	C	0.65	-	70	-	7,450	24.8	-	C	0.72	-	67.5	-
12	SR 539 on-ramp	Merge	5	6,700	25.7	25.9	C	0.72	0.43	65.5	62	7,450	28.9	28.5	D	0.8	0.47	64.6	61
13	SR 539 on-ramp to US 98 off-ramp	Basic	5	7,470	24.9	-	C	0.72	-	67.5	-	8,300	29.2	-	D	0.8	-	63.9	-
14	US 98 off-ramp	Diverge	5	7,470	24.7	33.5	D	0.72	0.68	68	61.5	8,300	27.5	36.3	E	0.8	0.68	67.9	61.5
15	US 98 off-ramp to on-ramp	Basic	5	6,240	19.8	-	C	0.6	-	71.1	-	7,070	23.1	-	C	0.69	-	68.9	-
16	US 98 on-ramp	Merge	5	6,240	24.3	24.5	C	0.69	0.48	65.9	62.7	7,070	27.2	25.9	C	0.77	0.46	65.4	62.2
17	US 98 on-ramp to Lakeland Hills Boulevard off-ramp	Basic	5	7,110	23.3	-	C	0.69	-	68.7	-	7,900	27.1	-	D	0.77	-	65.7	-
18	Lakeland Hills Boulevard off-ramp	Diverge	5	7,110	25.2	28.3	D	0.69	0.56	63.6	54.5	7,900	28.7	33.2	D	0.77	0.81	62	53.3
19	Lakeland Hills Boulevard off-ramp to on-ramp	Basic	5	6,190	19.6	-	C	0.6	-	70	-	6,580	21.1	-	C	0.64	-	69.5	-
20	Lakeland Hills Boulevard on-ramp	Merge	5	6,190	23.9	23.9	C	0.68	0.48	65.6	62	6,580	25	24.2	C	0.7	0.42	65.5	62
21	Lakeland Hills Boulevard on-ramp to SR 33 off-ramp	Basic	5	6,970	22.7	-	C	0.68	-	69.2	-	7,270	24	-	C	0.7	-	68.2	-
22	SR 33 off-ramp	Diverge	5	6,970	22.5	29.5	D	0.68	0.4	69.7	63.1	7,270	25.8	31.9	D	0.7	0.59	63.4	54.4
23	SR 33 off-ramp to on-ramp	Basic	5	6,240	19.8	-	C	0.6	-	71.1	-	6,300	20	-	C	0.61	-	71	-
24	SR 33 on-ramp	Merge	5	6,240	23.7	23	C	0.68	0.41	66.3	63.2	6,300	23.4	22	C	0.67	0.34	66.4	63.5
25	SR 33 on-ramp to SR 570 off-ramp	Basic	5	6,980	22.7	-	C	0.68	-	69.2	-	6,910	22.4	-	C	0.67	-	69.4	-
26	SR 570 off-ramp	Diverge	5	6,980	22.3	30.3	D	0.68	0.44	70.5	64.7	6,910	22	30.1	D	0.67	0.44	70.6	64.7
27	SR 570 off-ramp to on-ramp	Basic	5	6,150	19.4	-	C	0.6	-	71.3	-	6,080	19.1	-	C	0.59	-	71.5	-
28	SR 570 on-ramp	Merge	5	6,150	24.6	22.9	C	0.7	0.6	66.1	63.2	6,080	24.4	22.7	C	0.69	0.6	66.1	63.3
29	SR 570 on-ramp to SR 559 off-ramp	Basic	5	7,230	23.8	-	C	0.7	-	68.3	-	7,160	23.5	-	C	0.69	-	68.6	-
30	SR 559 off-ramp	Diverge	5	7,230	23.4	30.8	D	0.7	0.42	69.5	63	7,160	23.3	30.9	D	0.69	0.46	69.3	62.7
31	SR 559 off-ramp to on-ramp	Basic	5	6,470	20.6	-	C	0.63	-	70.6	-	6,330	20.1	-	C	0.61	-	70.9	-
32	SR 559 on-ramp	Merge	5	6,470	24.7	24.1	C	0.7	0.43	65.9	62.8	6,330	23.9	23.3	C	0.68	0.39	66.2	63.1
33	SR 559 on-ramp to SR 557 off-ramp	Basic	5	7,240	23.9	-	C	0.7	-	68.3	-	7,040	23	-	C	0.68	-	69	-
34	SR 557 off-ramp	Diverge	5	7,240	23.5	30.5	D	0.7	0.41	69.5	63	7,040	24.7	29.9	D	0.68	0.46	64.3	55.1
35	SR 557 off-ramp to on-ramp	Basic	5	6,500	20.8	-	C	0.63	-	70.5	-	6,290	19.9	-	C	0.61	-	69	-
36	SR 557 on-ramp	Merge	5	6,500	26.7	27.5	C	0.75	0.66	64.9	61.4	6,290	25	25.4	C	0.71	0.55	65.6	62.4
37	East of SR 557 on-ramp	Basic	5	7,690	26	-	C	0.75	-	66.6	-	7,290	24.1	-	C	0.71	-	68.1	-

*Density – passenger cars/mile/lane; Highlighted – LOS E/LOS F; * Lane Add/Drop or Acceleration/Deceleration Lane>1,500 feet HCM Methodology is limited to 1,500 feet*
The results are based on the HCS 7.9

Table 32: 2045 Build Alternative 1, HCS Level of Service and Density for I-4 Westbound Segments, General Purpose Lane (GPL) only (Continued)

No.	Segment	Segment Type	Number of Lanes	AM Peak Hour								PM Peak Hour							
				Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)	Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)
1	East of SR 557 off-ramp	Basic	5	7,290	24.1	-	C	0.71	-	68.1	-	7,690	26	-	C	0.75	-	66.6	-
2	SR 557 off-ramp	Diverge	5	7,290	23.9	32.5	D	0.71	0.55	68.7	62.2	7,690	25.4	34.9	D	0.75	0.66	68.1	61.6
3	SR 557 off-ramp to on-ramp	Basic	5	6,290	19.9	-	C	0.61	-	70.6	-	6,500	20.8	-	C	0.63	-	70.3	-
4	SR 557 on-ramp	Merge	5	6,290	24	23.8	C	0.68	0.42	66	62.9	6,500	24.7	24.3	C	0.7	0.41	65.9	62.7
5	SR 557 on-ramp to SR 559 off-ramp	Basic	5	7,040	23	-	C	0.68	-	69	-	7,240	23.9	-	C	0.7	-	68.3	-
6	SR 559 off-ramp	Diverge	5	7,040	22.7	29.2	D	0.68	0.39	69.7	63.1	7,240	23.5	30.2	D	0.7	0.43	69.4	62.9
7	SR 559 off-ramp to on-ramp	Basic	5	6,330	20.1	-	C	0.61	-	70.9	-	6,470	20.6	-	C	0.63	-	70.6	-
8	SR 559 on-ramp	Merge	5	6,330	24.5	25	C	0.69	0.46	65.7	62.4	6,470	24.7	24.8	C	0.7	0.42	65.8	62.5
9	SR 559 on-ramp to SR 570 off-ramp	Basic	5	7,160	23.5	-	C	0.69	-	68.6	-	7,230	23.8	-	C	0.7	-	68.3	-
10	SR 570 off-ramp	Diverge	5	7,160	23.5	32.1	D	0.69	0.6	68.5	62	7,230	23.8	32.3	D	0.7	0.6	68.5	62
11	SR 570 off-ramp to on-ramp	Basic	5	6,080	19.1	-	C	0.59	-	71.5	-	6,150	19.4	-	C	0.6	-	71.3	-
12	SR 570 on-ramp	Merge	5	6,080	23.6	24.1	C	0.67	0.46	66	62.7	6,150	23.8	24.3	C	0.68	0.46	65.9	62.7
13	SR 570 on-ramp to SR 33 off-ramp	Basic	5	6,910	22.4	-	C	0.67	-	69.4	-	6,980	22.7	-	C	0.68	-	69.2	-
14	SR 33 off-ramp	Diverge	5	6,910	22.2	28.9	D	0.67	0.34	70	63.5	6,980	22.6	29.8	D	0.68	0.41	69.6	63
15	SR 33 off-ramp to on-ramp	Basic	5	6,300	20	-	C	0.61	-	71	-	6,240	19.8	-	C	0.6	-	71.1	-
16	SR 33 on-ramp	Merge	5	6,300	25.1	26.6	C	0.7	0.54	65.3	61.8	6,240	23.8	24.4	C	0.68	0.4	65.9	62.5
17	SR 33 on-ramp to CR 582 (North Socrum Loop Road) off-ramp	Basic	5	7,270	24	-	C	0.7	-	68.2	-	6,970	22.7	-	C	0.68	-	69.2	-
18	CR 582 (North Socrum Loop Road) off-ramp	Diverge	5	7,270	25.3	19.1	B	0.7	0.42	64.6	55.3	6,970	24.4	18.5	B	0.68	0.48	64.2	55
19	CR 582 (North Socrum Loop Road) off-ramp to on-ramp	Basic	5	6,580	21.1	-	C	0.64	-	70.3	-	6,190	19.6	-	C	0.6	-	71.3	-
20	CR 582 (North Socrum Loop Road) on-ramp	Merge	5	6,580	27.6	25.2	C	0.77	0.81	64.4	60.8	6,190	24.3	20.9	C	0.69	0.56	66	62.9
21	CR 582 (North Socrum Loop Road) on-ramp to US 98 off-ramp	Basic	5	7,900	27.1	-	D	0.77	-	65.7	-	7,110	23.3	-	C	0.69	-	68.7	-
22	US 98 off-ramp	Diverge	5	7,900	25.7	33.7	D	0.77	0.46	69.1	62.7	7,110	23.1	31.2	D	0.69	0.48	69.2	62.6
23	US 98 off-ramp to on-ramp	Basic	5	7,070	23.1	-	C	0.69	-	68.9	-	6,240	19.8	-	C	0.6	-	71.1	-
24	US 98 on-ramp	Merge	5	7,070	29.2	29.7	D	0.8	0.68	64.1	60.2	6,240	26	27.9	C	0.72	0.68	64.8	61.2
25	US 98 on-ramp to SR 539 off-ramp	Basic	5	8,300	29.2	-	D	0.8	-	63.9	-	7,470	24.9	-	C	0.72	-	67.5	-
26	SR 539 off-ramp	Diverge	5	8,300	27.1	34.9	D	0.8	0.47	69	62.7	7,470	24.2	31.7	D	0.72	0.43	69.4	62.9
27	SR 539 off-ramp to on-ramp	Basic	5	7,450	24.8	-	C	0.72	-	67.5	-	6,700	21.6	-	C	0.65	-	70	-
28	SR 539 on-ramp	Merge	5	7,450	28.7	26.6	C	0.8	0.47	65.1	61.9	6,700	25.4	23.9	C	0.72	0.42	66	63
29	SR 539 on-ramp to West Memorial Boulevard off-ramp	Basic	5	8,300	29.2	-	D	0.8	-	63.9	-	7,450	24.8	-	C	0.72	-	67.5	-
30	West Memorial Boulevard off-ramp	Diverge	5	8,300	26.7	32.7	D	0.8	0.24	70	64	7,450	23.9	29.8	D	0.72	0.25	70.3	64
31	West Memorial Boulevard off-ramp to on-ramp	Basic	5	7,860	26.9	-	D	0.76	-	65.9	-	7,000	22.8	-	C	0.68	-	69.1	-
32	Memorial Boulevard on-ramp to Polk Parkway off-ramp	Weaving	6	7,860	25.6	-	C	0.74	-	66.9	-	7,000	22.4	-	C	0.67	-	69.4	-
33	Polk Parkway off-ramp to on-ramp	Basic	5	8,360	29.6	-	D	0.81	-	63.6	-	7,510	25.1	-	C	0.73	-	67.3	-
34	Polk Parkway on-ramp*	Merge	6	8,360	28.3	28.3	D	0.79	0.81	64.7	64.7	7,510	24.9	24.9	C	0.72	0.83	67.5	67.5
35	West of Polk Parkway on-ramp	Basic	6	9,760	28.3	-	D	0.79	-	64.7	-	8,940	24.9	-	C	0.72	-	67.5	-

*Density – passenger cars/mile/lane; Highlighted – LOS E/LOS F; * Lane Add/Drop or Acceleration/Deceleration Lane>1,500 feet HCM Methodology is limited to 1,500 feet*
The results are based on the HCS 7.9

Table **33**: 2045 Build Alternative 2, HCS Level of Service and Density for I-4 Eastbound Segments, General Purpose Lane (GPL) only

No.	Segment	Segment Type	Number of Lanes	AM Peak Hour								PM Peak Hour							
				Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)	Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)
1	West of Polk Parkway off-ramp	Basic	4	7,560	71.8	-	F	0.92	-	26.4	-	7,370	70.9	-	F	0.89	-	26.7	-
2	Polk Parkway off-ramp*	Diverge	4	7,560	68.6	20	F	0.92	0.4	26.8	60.8	7,370	66.4	19.3	F	0.89	0.39	27.7	61
3	Polk Parkway off-ramp to on-ramp	Basic	3	6,130	72	-	F	0.99	-	25.9	-	5,970	71.1	-	F	0.96	-	26.3	-
4	Polk Parkway on-ramp	Merge	3	6,130	36.2	34.2	F	0.93	0.44	59.8	56.7	5,970	36.1	34.1	F	0.93	0.43	59.9	56.8
5	Polk Parkway on-ramp to West Memorial Boulevard off-ramp	Basic	3	6,920	38.3	-	F	1.12	-	56.5	-	6,750	38.3	-	F	1.09	-	56.5	-
6	West Memorial Boulevard off-ramp	Diverge	3	7,060	33	37.5	F	0.93	0.72	65.6	61.3	6,870	33	37.5	F	0.93	0.71	65.6	61.3
7	West Memorial Boulevard off-ramp to on-ramp	Basic	3	5,760	24.8	-	C	0.93	-	67.6	-	5,590	25	-	C	0.9	-	67.4	-
8	West Memorial Boulevard on-ramp	Merge	3	5,760	29.4	29.2	D	0.79	0.26	62.8	60.3	5,590	29.4	29.2	D	0.8	0.26	62.8	60.3
9	West Memorial Boulevard on-ramp to SR 539 off-ramp	Basic	3	6,210	28.6	-	F	1	-	64.4	-	6,030	28.7	-	D	0.97	-	64.3	-
10	SR 539 off-ramp	Diverge	3	6,770	27.4	28.5	F	0.79	0.42	67.2	63	6,760	27.6	28.7	F	0.8	0.47	66.9	62.7
11	SR 539 off-ramp to on-ramp	Basic	3	6,020	22.6	-	C	0.97	-	69.3	-	5,910	21.9	-	C	0.95	-	69.7	-
12	SR 539 on-ramp	Merge	3	6,020	29.6	30.7	F	0.8	0.43	62.5	59.9	5,910	29.6	30.9	F	0.8	0.47	62.4	59.8
13	SR 539 on-ramp to US 98 off-ramp	Basic	3	6,790	28.8	-	F	1.1	-	64.3	-	6,760	28.7	-	F	1.09	-	64.3	-
14	US 98 off-ramp	Diverge	3	6,790	28.5	34.1	F	0.8	0.83	65	60.6	6,760	28.4	34.2	F	0.8	0.85	65	60.5
15	US 98 off-ramp to on-ramp	Basic	3	5,290	17.9	-	B	0.85	-	72.1	-	5,230	17.6	-	B	0.84	-	72.2	-
16	US 98 on-ramp	Merge	3	5,290	26.5	28	F	0.72	0.58	63.5	61.2	5,230	26.6	28.2	F	0.73	0.61	63.4	61.1
17	US 98 on-ramp to Lakeland Hills Boulevard off-ramp	Basic	3	6,340	25	-	F	1.02	-	67.4	-	6,330	25	-	F	1.02	-	67.4	-
18	Lakeland Hills Boulevard off-ramp	Diverge	3	6,340	27.4	27.9	F	0.72	0.4	61.4	55.4	6,330	27.7	28.2	F	0.73	0.47	61	55
19	Lakeland Hills Boulevard off-ramp to on-ramp	Basic	3	5,690	20.3	-	C	0.92	-	69.3	-	5,560	19.6	-	C	0.9	-	69.2	-
20	Lakeland Hills Boulevard on-ramp	Merge	3	5,690	25.6	25.9	C	0.7	0.31	63.8	61.4	5,560	24.4	24.8	C	0.67	0.28	64.2	61.8
21	Lakeland Hills Boulevard on-ramp to SR 33 off-ramp	Basic	3	6,200	23.9	-	F	1	-	68.3	-	6,010	22.6	-	C	0.97	-	69.2	-
22	SR 33 off-ramp	Diverge	3	6,260	26.7	30.1	F	0.7	0.45	61.1	55.2	6,140	26	29.8	D	0.67	0.59	60.2	54.4
23	SR 33 off-ramp to on-ramp	Basic	3	5,530	18.9	-	C	0.89	-	71	-	5,170	16.6	-	B	0.84	-	70.9	-
24	SR 33 on-ramp	Merge	3	5,530	25.4	25.9	F	0.7	0.41	64.3	62.2	5,170	21.9	22.7	C	0.62	0.34	65.3	63.3
25	SR 33 on-ramp to SR 570 off-ramp	Basic	3	6,270	24	-	F	1.01	-	68.2	-	5,780	20.2	-	C	0.93	-	70.9	-
26	SR 570 off-ramp	Diverge	3	6,170	23.9	30.5	D	0.7	0.44	68.5	64.7	5,630	20.9	27.9	C	0.62	0.44	68.5	64.7
27	SR 570 off-ramp to on-ramp	Basic	3	5,340	18.4	-	C	0.86	-	71.9	-	4,800	15.4	-	B	0.78	-	72.5	-
28	SR 570 on-ramp	Merge	3	5,340	27.1	26	F	0.74	0.6	63.8	61.7	4,800	23.5	23.1	C	0.66	0.6	65	63.1
29	SR 570 on-ramp to SR 559 off-ramp	Basic	3	6,420	25.9	-	F	1.04	-	66.7	-	5,880	21.9	-	C	0.95	-	69.8	-
30	SR 559 off-ramp	Diverge	3	6,080	25.7	31.6	D	0.74	0.42	67.2	63	5,430	22.8	29.2	D	0.66	0.46	67	62.7
31	SR 559 off-ramp to on-ramp	Basic	3	5,320	20.4	-	C	0.86	-	70.8	-	4,600	16.7	-	B	0.74	-	72.1	-
32	SR 559 on-ramp	Merge	3	5,320	27.2	27.7	C	0.75	0.43	63.6	61.4	4,600	22.8	24	C	0.64	0.39	65	62.9
33	SR 559 on-ramp to SR 557 off-ramp	Basic	3	6,090	26	-	D	0.98	-	66.6	-	5,310	21.1	-	C	0.86	-	70.3	-
34	SR 557 off-ramp	Diverge	3	5,730	25.8	31.4	D	0.75	0.41	67.2	63	4,950	22	28.1	D	0.64	0.42	67.2	63
35	SR 557 off-ramp to on-ramp	Basic	3	4,990	20.6	-	C	0.81	-	70.4	-	4,200	16.5	-	B	0.68	-	70.4	-
36	SR 557 on-ramp	Merge	3	4,990	30.6	30.3	D	0.82	0.66	62.2	59.7	4,200	24.4	25.3	C	0.68	0.55	64.5	62.4
37	East of SR 557 on-ramp	Basic	3	6,180	30.1	-	D	1	-	63.2	-	5,200	22.8	-	C	0.84	-	69.1	-

Density – passenger cars/mile/lane; Highlighted – LOS E/LOS F;
The results are based on the HCS 7.9

Table 34: 2045 Build Alternative 2, HCS Level of Service and Density for I-4 Westbound Segments, General Purpose Lane (GPL) only (Continued)

No.	Segment	Segment Type	Number of Lanes	AM Peak Hour								PM Peak Hour							
				Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)	Demand (veh/h)	Density Freeway (pc/mi/ln)	Density Ramp (pc/mi/ln)	LOS	Freeway Demand to Capacity Ratio	Ramp Demand to Capacity Ratio	Speed Freeway (mph)	Speed Ramp (mph)
1	East of SR 557 off-ramp	Basic	3	5,050	29.9	-	D	0.82	-	63.3	-	5,220	31.6	-	D	0.84	-	61.9	-
2	SR 557 off-ramp	Diverge	3	5,580	28.5	34.3	D	0.82	0.55	66.5	62.2	5,900	29.7	35.5	E	0.84	0.66	66	61.6
3	SR 557 off-ramp to on-ramp	Basic	3	4,580	21.8	-	C	0.74	-	69.4	-	4,710	21.6	-	C	0.76	-	69.1	-
4	SR 557 on-ramp	Merge	3	4,580	28.5	28.9	D	0.78	0.42	63.2	60.8	4,710	28.3	28.7	D	0.77	0.41	63.2	60.9
5	SR 557 on-ramp to SR 559 off-ramp	Basic	3	5,330	27.6	-	D	0.86	-	65.3	-	5,450	27.3	-	D	0.88	-	65.5	-
6	SR 559 off-ramp	Diverge	3	5,680	26.8	31.7	D	0.78	0.39	67.3	63.1	5,790	26.7	31.7	D	0.77	0.43	67.1	62.9
7	SR 559 off-ramp to on-ramp	Basic	3	4,970	22	-	C	0.8	-	69.7	-	5,020	21.4	-	C	0.81	-	70.1	-
8	SR 559 on-ramp	Merge	3	4,970	29.5	30.1	D	0.79	0.46	62.6	60.1	5,020	28.3	29.1	D	0.77	0.42	63.1	60.7
9	SR 559 on-ramp to SR 570 off-ramp	Basic	3	5,800	28.7	-	D	0.94	-	64.4	-	5,780	27.2	-	D	0.93	-	65.6	-
10	SR 570 off-ramp	Diverge	3	6,120	27.8	33.5	D	0.79	0.6	66.3	62	6,080	26.9	32.8	D	0.77	0.6	66.3	62
11	SR 570 off-ramp to on-ramp	Basic	3	5,040	20.3	-	C	0.81	-	70.8	-	5,000	19.3	-	C	0.81	-	71.4	-
12	SR 570 on-ramp	Merge	3	5,040	27.7	28.5	D	0.75	0.46	63.3	61	5,000	26.6	27.7	C	0.73	0.46	63.7	61.4
13	SR 570 on-ramp to SR 33 off-ramp	Basic	3	5,870	26.5	-	D	0.95	-	66.2	-	5,830	25.1	-	C	0.94	-	67.3	-
14	SR 33 off-ramp	Diverge	3	6,030	25.9	31.6	D	0.75	0.34	67.6	63.5	5,970	25.2	31.1	D	0.73	0.41	67.2	63
15	SR 33 off-ramp to on-ramp	Basic	3	5,420	21.8	-	C	0.88	-	69.8	-	5,230	19.9	-	C	0.84	-	71	-
16	SR 33 on-ramp	Merge	3	5,420	30.5	31.5	F	0.81	0.54	61.9	59.2	5,230	26.6	28	C	0.73	0.4	63.6	61.2
17	SR 33 on-ramp to CR 582 (North Socrum Loop Road) off-ramp	Basic	3	6,390	29.7	-	F	1.03	-	63.5	-	5,960	25.1	-	C	0.96	-	67.3	-
18	CR 582 (North Socrum Loop Road) off-ramp	Diverge	3	6,360	30.4	21.5	F	0.81	0.28	62	56	5,920	27.3	19.1	B	0.73	0.31	61.8	55.8
19	CR 582 (North Socrum Loop Road) off-ramp to on-ramp	Basic	3	5,910	25.7	-	C	0.95	-	66.8	-	5,410	21.4	-	C	0.87	-	70.1	-
20	CR 582 (North Socrum Loop Road) on-ramp	Merge	3	5,910	32.7	28.4	F	0.86	0.47	61.3	58.6	5,410	27.3	24.3	C	0.75	0.4	63.7	61.5
21	CR 582 (North Socrum Loop Road) on-ramp to US 98 off-ramp	Basic	3	6,680	33.1	-	F	1.08	-	60.7	-	6,060	26.2	-	D	0.98	-	66.4	-
22	US 98 off-ramp	Diverge	3	6,680	30.3	35.8	F	0.86	0.61	66.2	61.9	6,060	26.2	32.6	D	0.75	0.58	66.4	62.1
23	US 98 off-ramp to on-ramp	Basic	3	5,580	23.2	-	C	0.9	-	68.8	-	5,010	18.8	-	C	0.81	-	71.7	-
24	US 98 on-ramp	Merge	3	5,580	38	36.6	F	0.93	0.85	57	53.3	5,010	31.6	32.9	F	0.82	0.83	60.5	57.7
25	US 98 on-ramp to SR 539 off-ramp	Basic	3	7,110	38.4	-	F	1.15	-	56.4	-	6,510	30.3	-	F	1.05	-	63	-
26	SR 539 off-ramp	Diverge	3	7,110	32.5	36.8	F	0.93	0.47	66.7	62.7	6,510	28.5	33.8	F	0.82	0.43	67.1	62.9
27	SR 539 off-ramp to on-ramp	Basic	3	6,260	28.8	-	F	1.01	-	64.3	-	5,740	23.7	-	C	0.93	-	68.4	-
28	SR 539 on-ramp	Merge	3	6,260	36.3	33.7	F	0.93	0.47	59.8	56.7	5,740	30.4	29.7	F	0.82	0.42	62.6	60.2
29	SR 539 on-ramp to West Memorial Boulevard off-ramp	Basic	3	7,110	38.4	-	F	1.15	-	56.4	-	6,490	30.1	-	F	1.05	-	63.2	-
30	West Memorial Boulevard off-ramp	Diverge	3	6,480	32.1	36.2	F	0.93	0.24	67.6	64	5,850	28	33.2	D	0.82	0.25	67.9	64
31	West Memorial Boulevard off-ramp to on-ramp	Basic	3	6,040	32.9	-	D	0.98	-	60.8	-	5,400	26	-	D	0.87	-	66.6	-
32	Memorial Boulevard on-ramp to Polk Parkway off-ramp	Weaving	4	6,040	29.1	-	D	0.8	-	64	-	5,400	24.6	-	C	0.72	-	67.7	-
33	Polk Parkway off-ramp to on-ramp	Basic	3	6,280	39.3	-	F	1.01	-	55.7	-	5,680	30.7	-	D	0.92	-	62.7	-
34	Polk Parkway on-ramp*	Merge	4	6,280	33.2	33.2	D	0.88	0.81	61.3	61.3	5,680	29.4	29.4	D	0.79	0.83	62.8	62.8
35	West of Polk Parkway on-ramp	Basic	4	7,680	34	-	D	0.93	-	59.9	-	7,110	28.7	-	D	0.86	-	64.4	-

*Density – passenger cars/mile/lane; Highlighted – LOS E/LOS F; * Lane Add/Drop or Acceleration/Deceleration Lane>1,500 feet HCM Methodology is limited to 1,500 feet*
The results are based on the HCS 7.9

Table 35: 2045 Build Alternative 2, HCS Level of Service and Density for Express Lane (EL) only

Segment	Segment Type	Number of Express Lanes	AM Peak Hour					PM Peak Hour				
			Demand (veh/h)	Density EL (pc/mi/ln)	LOS	EL Demand to Capacity Ratio	Speed EL (mph)	Demand (veh/h)	Density EL (pc/mi/ln)	LOS	EL Demand to Capacity Ratio	Speed EL (mph)
Eastbound Direction												
Polk Parkway	Basic	2	1,180	8.6	A	0.35	72.6	2,060	16.7	B	0.61	65
Polk Parkway on-ramp to West Memorial Boulevard off-ramp	Basic	2	1,180	8.5	A	0.36	72.7	2,060	16.4	B	0.63	65.9
Memorial Boulevard	Basic	2	1,040	7.5	A	0.31	73	1,940	15.4	B	0.58	66.5
West Memorial Boulevard on-ramp to SR 539 off-ramp	Basic	2	1,040	7.5	A	0.32	73	1,940	15.1	B	0.59	67.4
SR 539 (Kathleen Road)	Basic	2	480	3.5	A	0.14	73.1	1,210	8.8	A	0.36	72.5
US 98	Basic	2	480	3.5	A	0.14	73.1	1,210	8.8	A	0.36	72.5
Lakeland Hills Boulevard	Basic	2	480	3.5	A	0.14	73.1	1,210	8.9	A	0.36	72.4
Lakeland Hills Boulevard on-ramp to SR 33 off-ramp	Basic	2	480	3.5	A	0.15	73.1	1,210	8.8	A	0.37	72.7
SR 33	Basic	2	420	3	A	0.12	73.1	1,080	7.8	A	0.32	72.9
SR 33 on-ramp to SR 570 off-ramp	Basic	2	420	3	A	0.13	73.1	1,080	7.8	A	0.33	73
SR 570	Basic	2	520	3.7	A	0.15	73.1	1,230	8.9	A	0.37	72.4
SR 570 on-ramp to SR 559 off-ramp	Basic	2	520	3.7	A	0.16	73.1	1,230	8.9	A	0.38	72.6
SR 559	Basic	2	860	6.2	A	0.26	73.1	1,680	12.8	B	0.5	69.3
SR 559 on-ramp to SR 557 off-ramp	Basic	2	860	6.2	A	0.26	73.1	1,680	12.3	B	0.51	72.1
SR 557	Basic	2	1,220	8.9	A	0.36	72.4	2,040	16.4	B	0.61	65.3
East of SR 557 on-ramp	Basic	2	1,220	8.8	A	0.36	72.4	2,040	15.2	B	0.62	70.6
Westbound Direction												
East of SR 557 off-ramp	Basic	2	2,190	16.5	B	0.67	69.7	2,180	16.5	B	0.67	69.7
SR 557	Basic	2	1,660	12.6	B	0.49	69.5	1,500	11.2	B	0.45	70.8
SR 557 on-ramp to SR 559 off-ramp	Basic	2	1,660	12.1	B	0.51	72.2	1,500	10.9	A	0.46	72.6
SR 559	Basic	2	1,310	9.6	A	0.39	72	1,160	8.4	A	0.34	72.7
SR 559 on-ramp to SR 570 off-ramp	Basic	2	1,310	9.5	A	0.4	72.3	1,160	8.4	A	0.35	72.8
SR 570	Basic	2	990	7.1	A	0.29	73.1	860	6.2	A	0.26	73.1
SR 570 on-ramp to SR 33 off-ramp	Basic	2	990	7.1	A	0.3	73.1	860	6.2	A	0.26	73.1
SR 33	Basic	2	830	6	A	0.25	73.1	720	5.2	A	0.21	73.1
SR 33 on-ramp to CR 582 (North Socrum Loop Road) off-ramp	Basic	2	830	6	A	0.25	73.1	720	5.2	A	0.22	73.1
CR 582 (North Socrum Loop Road)	Basic	2	860	6.2	A	0.26	73.1	760	5.5	A	0.23	73.1
US 98	Basic	2	860	6.2	A	0.26	73.1	760	5.5	A	0.23	73.1
SR 539 (Kathleen Road)	Basic	2	860	6.2	A	0.26	73.1	760	5.5	A	0.23	73.1
SR 539 on-ramp to West Memorial Boulevard off-ramp	Basic	2	860	6.2	A	0.26	73.1	760	5.5	A	0.23	73.1
West Memorial Boulevard	Basic	2	1,490	11.1	B	0.44	70.9	1,400	10.3	A	0.42	71.5
Memorial Boulevard on-ramp to Polk Parkway off-ramp	Weaving	2	1,490	10.8	A	0.45	72.6	1,400	10.1	A	0.43	72.8
Polk Parkway	Basic	2	1,750	13.4	B	0.52	68.6	1,630	12.3	B	0.48	69.8

Density – passenger cars/mile/lane; Highlighted – LOS E/LOS F
The results are based on the HCS 7.9

Table 36: 2045 Build Alt 1 I-4 Signalized Intersection Analysis

AM Peak

Interstate	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			AM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
I-4	West Memorial Boulevard & I-4 Westbound	Volume					440			1280						B (18.5)
		LOS (Delay)	Movement				C (27.4)			B (15.4)						
			Approach				C (27.4)			B (15.4)						
		Queue Length 95th (ft)	Movement				152			304						
	Kathleen Road (SR 539) & I-4 Westbound	Volume					580		270	210	1800			1620	640	C (26.4)
		LOS (Delay)	Movement				**E (62.7)**		D (38.8)	**F (82.6)**	A (6.0)			D (35.7)	A (3.4)	
			Approach				**E (55.1)**			B (14.0)				C (26.6)		
		Queue Length 95th (ft)	Movement				#343		244	m126	226			790	56	
	Kathleen Road (SR 539) & I-4 Eastbound	Volume		400		350					1610	550	220	1980		C (24.5)
		LOS (Delay)	Movement	**E (56.8)**		**E (62.0)**					C (26.7)	A (2.8)	**E (74.6)**	B (10.0)		
			Approach	**E (59.2)**							C (20.6)			B (16.5)		
		Queue Length 95th (ft)	Movement	219		#342					761	55	m#121	312		
	US-98 & I-4	Volume		590			300			770	1660		350	1960		**E (57.6)**
		LOS (Delay)	Movement	**F (83.8)**			**F (90.2)**			**E (75.7)**	D (54.6)		D (48.4)	D (41.6)		
			Approach	**F (338.5)**			**F (173.9)**			**E (60.1)**			D (51.4)			
		Queue Length 95th (ft)	Movement	#426			#242			#525	#688		206	732		
	North Socrum Loop Road (CR 582) & I-4 Westbound	Volume			1050	490	830	1380		460		230	5		5	**F (111.4)**
		LOS (Delay)	Movement		**F (167.5)**	A (7.8)	**F (294.4)**	C (20.4)		**F (94.5)**	A (0.7)			A (0.2)		
			Approach	**F (116.6)**			**F (123.3)**			**E (63.3)**			A (0.2)			
		Queue Length 95th (ft)	Movement		#702	96	#1156	482		#742	0			0		
	Lakeland Hills Boulevard & Lakeland Harbor Boulevard/I-4 Eastbound	Volume		400	900	50	110	1310	0	70	20	80	580	20	320	**F (126.1)**
		LOS (Delay)	Movement	**F (277.3)**	D (35.6)	A (0.2)	C (22.6)	**F (124.6)**		**E (70.0)**	A (5.9)			**F (278.0)**	B (18.0)	
			Approach	**F (105.9)**			**F (116.7)**			C (32.4)			**F (187.6)**			
		Queue Length 95th (ft)	Movement	#615	412	0	79	#814		107	12			#913	170	
	SR 559 & I-4 Westbound	Volume					420		290	650	460			490	180	**F (81.5)**
		LOS (Delay)	Movement				**F (141.4)**		A (9.0)	**F (134.0)**	A (9.1)			**F (99.0)**	A (6.6)	
			Approach				**F (87.3)**			**F (82.2)**			**E (74.2)**			
		Queue Length 95th (ft)	Movement				#610		85	#888	224			#653	56	
	SR 559 & I-4 Eastbound	Volume		320		440					790	520	250	660		C (28.2)
		LOS (Delay)	Movement	**E (60.7)**		D (35.3)					C (31.0)	A (5.2)	D (45.3)	B (16.0)		
			Approach	D (46.0)							C (20.8)			C (24.0)		
		Queue Length 95th (ft)	Movement	334		296					380	87	m198	m172		

PM Peak

Interstate	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			PM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
I-4	West Memorial Boulevard & I-4 Westbound	Volume					450			1300						B (18.8)
		LOS (Delay)	Movement				C (28.2)			B (15.5)						
			Approach				C (28.2)			B (15.5)						
		Queue Length 95th (ft)	Movement				156			311						
	Kathleen Road (SR 539) & I-4 Westbound	Volume					550		220	350	1840			1330	400	D (47.3)
		LOS (Delay)	Movement				**F (123.1)**		D (41.4)	**E (58.1)**	D (41.2)			D (35.7)	A (3.2)	
			Approach				**F (99.8)**			D (43.9)				C (28.2)		
		Queue Length 95th (ft)	Movement				367		232	m221	880			746	57	
	Kathleen Road (SR 539) & I-4 Eastbound	Volume		640		210					1550	580	270	1610		D (54.3)
		LOS (Delay)	Movement	**E (74.2)**		C (22.9)					D (42.2)	A (5.0)	**F (94.2)**	**E (73.2)**		
			Approach	**E (61.6)**							C (32.1)			**E (76.2)**		
		Queue Length 95th (ft)	Movement	428		157					897	120	m#211	935		
	US-98 & I-4	Volume		480			460			930	2030		280	1640		**E (75.7)**
		LOS (Delay)	Movement	**F (119.1)**			**F (86.3)**			**F (95.9)**	**E (74.1)**		D (50.9)	D (54.7)		
			Approach	**F (103.0)**			**E (72.9)**			**E (76.4)**			**E (69.3)**			
		Queue Length 95th (ft)	Movement	#447			#374			#767	#1051		186	742		
	North Socrum Loop Road (CR 582) & I-4 Westbound	Volume		5	1380	330	590	930	5	410		370				**F (99.5)**
		LOS (Delay)	Movement	**E (67.4)**	**F (164.2)**	A (5.5)	**F (212.4)**	B (18.4)		**E (66.5)**	A (3.9)					
			Approach	**F (133.4)**			**F (93.5)**			D (36.9)						
		Queue Length 95th (ft)	Movement	20	#1012	70	#935	380		#563	37		0	0	0	
	Lakeland Hills Boulevard & Lakeland Harbor Boulevard/I-4 Eastbound	Volume		450	1310	70	90	950		40	20	40	820	20	480	**F (143.0)**
		LOS (Delay)	Movement	**F (261.2)**	**F (119.9)**	A (0.6)	D (38.1)	**F (112.3)**		**E (72.7)**	A (1.8)			**F (253.9)**	C (26.2)	
			Approach	**F (150.1)**			**F (105.9)**			C (30.2)			**F (171.1)**			
		Queue Length 95th (ft)	Movement	#776	#952	2	92	#697		78	0			#1374	364	
	SR 559 & I-4 Westbound	Volume					520		250	440	350			340	320	D (50.8)
		LOS (Delay)	Movement				**E (72.6)**		A (7.0)	**F (96.0)**	B (18.2)			**E (65.1)**	A (7.8)	
			Approach				D (51.3)			**E (61.5)**			D (37.3)			
		Queue Length 95th (ft)	Movement				#646		75	#588	207			#432	78	
	SR 559 & I-4 Eastbound	Volume		180		650					610	420	290	570		D (37.6)
		LOS (Delay)	Movement	C (26.4)		D (50.0)					D (46.8)	A (7.6)	**E (64.0)**	C (26.0)		
			Approach	D (44.9)							C (30.8)			D (38.8)		
		Queue Length 95th (ft)	Movement	153		#626					#342	93	m274	m212		

Synchro Version 11 Build 168.

LOS notes:

Delay is in sec/veh units

:Level Of Service (LOS) E reflecting at capacity operations

:Level Of Service (LOS) F reflecting over capacity operations

Queue notes:

~: Volume exceeds capacity, queue is theoretically infinite

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 37: 2045 Build Alt 1 I-4 Roundabout Intersection Analysis

AM Peak

Interstate	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection AM LOS (Delay)
				Eastbound			Westbound			Northbound			Southbound			
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
	**SR 557 & I-4 Westbound (Roundabout)	Volume					860		140	660	750			570	90	F (164.6)
		LOS (Delay)	Movement				F (460.4)		F (458.6)	A (0.2)	A (0.1)			F (68.5)	F (66.3)	
			Approach				F (460.1)				A (0.2)			F (68.2)		
		V/C	Movement				1.93		1.93	0.43	0.43			0.95	0.95	
			Approach				1.93				0.43			0.95		
		Queue Length 95th (ft)	Movement				2303		2303	0	0			241	241	
	**SR 557 & I-4 Eastbound (Roundabout)	Volume		260		480					1150	1080	110	1320		E (44.7)
		LOS (Delay)	Movement	F (79.7)		F (326.8)					C (15.8)	A (0.5)	A (0.1)	A (0.1)		
			Approach	F (240.0)							A (8.4)			A (0.1)		
		V/C	Movement	0.96		1.64					0.69	0.73	0.43	0.43		
			Approach	1.64							0.73			0.43		
		Queue Length 95th (ft)	Movement	206		1727					209	0	0	0		
	**SR 33 & I-4 Westbound (Roundabout)	Volume					410		200	120	1220			1190	850	C (15.4)
		LOS (Delay)	Movement				E (44.2)		D (28.2)	A (0.1)	A (0.1)			D (31.5)	A (0.1)	
			Approach				E (38.9)				A (0.1)			C (18.4)		
		V/C	Movement				0.75		0.61	0.38	0.38			0.87	0.57	
			Approach				0.75				0.38			0.87		
		Queue Length 95th (ft)	Movement				94		67	0	0			348	0	
	**SR 33 & I-4 Eastbound (Roundabout)	Volume		580		150					760	410	330	1270		E (41.2)
		LOS (Delay)	Movement	F (205.3)		C (24.4)					D (28.1)	A (0)	A (0.1)	A (0.1)		
			Approach	F (168.1)							C (18.2)			A (0.1)		
		V/C	Movement	1.31		0.50					0.75	0.28	0.47	0.47		
			Approach	1.31							0.75			0.47		
		Queue Length 95th (ft)	Movement	760		46					148	0	0	0		

PM Peak

Interstate	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection PM LOS (Delay)
				Eastbound			Westbound			Northbound			Southbound			
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
	**SR 557 & I-4 Westbound (Roundabout)	Volume					1080		110	480	380			670	260	F (179.7)
		LOS (Delay)	Movement				F (158.7)		F (157.3)	A (0.1)	A (0.1)			F (373.3)	F (371.1)	
			Approach				F (158.6)				A (0.1)			F (372.7)		
		V/C	Movement				1.27		1.27	0.30	0.23			1.73	1.73	
			Approach				1.27				0.30			1.73		
		Queue Length 95th (ft)	Movement				1373		1373	0	0			1895	1895	
	**SR 557 & I-4 Eastbound (Roundabout)	Volume		90		660					770	860	140	1610		F (135.2)
		LOS (Delay)	Movement	D (34.6)		F (831.6)					A (7.7)	A (0.3)	A (0.2)	A (0.2)		
			Approach	F (735.9)							A (3.8)			A (0.2)		
		V/C	Movement	0.47		2.77					0.40	0.58	0.52	0.52		
			Approach	2.77							0.58			0.52		
		Queue Length 95th (ft)	Movement	35		3731					52	0	0	0		
	**SR 33 & I-4 Westbound (Roundabout)	Volume					410		330	150	1590			760	580	D (33.6)
		LOS (Delay)	Movement				F (109.1)		F (220.2)	A (0.1)	A (0.1)			B (14.2)	A (0.1)	
			Approach				F (158.6)				A (0.1)			A (8.1)		
		V/C	Movement				1.01		1.36	0.50	0.50			0.57	0.39	
			Approach				1.36				0.50			0.57		
		Queue Length 95th (ft)	Movement				236		878	0	0			97	0	
	**SR 33 & I-4 Eastbound (Roundabout)	Volume		850		120					890	410	200	970		F (63.8)
		LOS (Delay)	Movement	F (192.7)		B (12.4)					F (60.7)	A (0)	A (0)	A (0)		
			Approach	F (170.4)							E (41.6)			A (0)		
		V/C	Movement	1.32		0.28					0.97	0.28	0.34	0.34		
			Approach	1.32							0.97			0.34		
		Queue Length 95th (ft)	Movement	1096		23					345	0	0	0		

** SIDRA INTERSECTION 9.1

[1] LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

[2] The movements with Continuous lane control type have zero second delay time and zero feet queue length.

LOS notes:
Delay is in sec/veh units
:Level Of Service (LOS) E reflecting at capacity operations
:Level Of Service (LOS) F reflecting over capacity operations

Queue notes:
#: 95th percentile volume exceeds capacity
m: Upstream metering is in effect

V/C notes:
: V/C ratio exceeds 0.85

Table 38: 2045 Build Alt 2 I-4 Signalized Intersection Analysis

AM Peak

Arterial	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			AM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
I-4	W Memorial Blvd & I-4 Westbound	LOS (Delay)	Movement				C (27.4)			B (15.4)						B (18.5)
			Approach				C (27.4)			B (15.4)						
		Queue Length 95th (ft)	Movement				152			304						
	Kathleen Rd (SR 539) & I-4 Westbound	LOS (Delay)	Movement				**E (66.1)**		D (40.0)	**E (78.6)**	A (5.7)			D (35.8)	A (3.4)	C (26.6)
			Approach				**E (57.8)**			B (13.3)				C (26.6)		
		Queue Length 95th (ft)	Movement				#354		247	m124	224			790	56	
	Kathleen Rd (SR 539) & I-4 Eastbound	LOS (Delay)	Movement	**E (56.8)**		**E (62.0)**					C (26.7)	A (2.8)	**E (74.1)**	B (10.0)		C (24.5)
			Approach	**E (59.2)**						C (20.6)			B (16.5)			
		Queue Length 95th (ft)	Movement	219		#342					761	55	m#118	312		
	US-98 & I-4	LOS (Delay)	Movement	**F (115.8)**			**F (105.5)**			**F (98.0)**	**E (74.6)**		D (47.8)	D (52.6)		**E (75.8)**
			Approach	**F (338.5)**			**F (173.9)**			**F (80.4)**			**E (69.4)**			
		Queue Length 95th (ft)	Movement	#550			#314			#681	#755		264	#794		
	N Sorcrum Loop (CR 582) & I-4 Westbound	LOS (Delay)	Movement		**E (72.5)**	A (5.6)	**F (105.2)**	B (19.3)		D (50.5)	A (0.5)			A (0.2)		D (46.5)
			Approach	**E (58.0)**			D (41.4)			C (33.9)			A (0.2)			
		Queue Length 95th (ft)	Movement		#615	64	#595	472		#453	0			0		
	Lakeland Hills Blvd & Lakeland Harbor Blvd/I-4 Eastbound	LOS (Delay)	Movement	**F (157.7)**	C (34.4)	A (0.2)	C (21.1)	**E (73.6)**		**E (70.0)**	A (5.9)			**F (117.1)**	A (8.5)	**E (65.6)**
			Approach	**E (58.6)**			**E (69.5)**			C (32.4)			**E (78.7)**			
		Queue Length 95th (ft)	Movement	#374	406	0	77	#752		107	12			#593	74	
	SR 559 & I-4 Westbound	LOS (Delay)	Movement				**F (141.4)**		A (9.0)	**F (134.0)**	A (9.1)			**F (99.0)**	A (6.6)	**F (81.5)**
			Approach				**F (87.3)**			**F (82.2)**			**E (74.2)**			
		Queue Length 95th (ft)	Movement				#610		85	#888	224			#653	56	
	SR 559 & I-4 Eastbound	LOS (Delay)	Movement	**E (60.7)**		D (35.3)					C (31.0)	A (5.2)	D (45.3)	B (16.0)		C (28.2)
			Approach	D (46.0)						C (20.8)			C (24.0)			
		Queue Length 95th (ft)	Movement	334		296					380	87	m198	m172		

PM Peak

Arterial	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection
				Eastbound			Westbound			Northbound			Southbound			PM LOS (Delay)
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
I-4	W Memorial Blvd & I-4 Westbound	LOS (Delay)	Movement				C (28.2)			B (15.5)						B (18.8)
			Approach				C (28.2)			B (15.5)						
		Queue Length 95th (ft)	Movement				156			311						
	Kathleen Rd (SR 539) & I-4 Westbound	LOS (Delay)	Movement				**F (123.1)**		D (41.4)	**E (58.1)**	D (41.2)			D (35.7)	A (3.2)	D (47.3)
			Approach				**F (99.8)**			D (43.9)				C (28.2)		
		Queue Length 95th (ft)	Movement				367		232	m221	880			746	57	
	Kathleen Rd (SR 539) & I-4 Eastbound	LOS (Delay)	Movement	**E (74.2)**		C (22.9)					D (42.2)	A (5.0)	**F (94.2)**	**E (73.2)**		D (54.3)
			Approach	**E (61.6)**						C (32.1)			**E (76.2)**			
		Queue Length 95th (ft)	Movement	428		157					897	120	m#211	935		
	US-98 & I-4	LOS (Delay)	Movement	**F (158.7)**			**F (102.5)**			**F (141.5)**	**F (117.9)**		D (48.9)	**E (64.3)**		**F (107.4)**
			Approach	**F (103.0)**			**E (72.9)**			**F (114.6)**			**F (90.8)**			
		Queue Length 95th (ft)	Movement	#621			#488			#1013	#1152		218	785		
	N Sorcrum Loop (CR 582) & I-4 Westbound	LOS (Delay)	Movement	**E (67.4)**	**E (69.0)**	A (4.1)	**F (116.6)**	B (14.9)		**E (55.4)**	A (2.5)					D (49.8)
			Approach	**E (59.4)**			D (45.9)			C (29.5)						
		Queue Length 95th (ft)	Movement	20	#873	54	#611	344		327	6					
	Lakeland Hills Blvd & Lakeland Harbor Blvd/I-4 Eastbound	LOS (Delay)	Movement	**E (76.4)**	**E (57.9)**	A (0.4)	D (36.2)	**E (56.0)**		**E (72.5)**	A (1.8)			**F (99.8)**	B (13.7)	**E (58.7)**
			Approach	**E (58.7)**			D (54.3)			C (30.1)			**E (68.5)**			
		Queue Length 95th (ft)	Movement	#421	#838	2	90	#584		78	0			#751	138	
	SR 559 & I-4 Westbound	LOS (Delay)	Movement				**E (72.6)**		A (7.0)	**F (96.0)**	B (18.2)			**E (65.1)**	A (7.8)	D (50.8)
			Approach				D (51.3)			**E (61.5)**			D (37.3)			
		Queue Length 95th (ft)	Movement				#646		75	#588	207			#432	78	
	SR 559 & I-4 Eastbound	LOS (Delay)	Movement	C (26.4)		D (50.0)					D (46.8)	A (7.6)	**E (64.0)**	C (26.0)		D (37.6)
			Approach	D (44.9)						C (30.8)			D (38.8)			
		Queue Length 95th (ft)	Movement	153		#626					#342	93	m274	m212		

Synchro Version 11 Build 168. *HCM6 output used for unsignalized intersections due to limitations in Synchro.

LOS notes:

Delay is in sec/veh units

:Level Of Service (LOS) E reflecting at capacity operations

:Level Of Service (LOS) F reflecting over capacity operations

Queue notes:

~: Volume exceeds capacity, queue is theoretically infinite

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 39: 2045 Build Alt 2 I-4 Roundabout Intersection Analysis

AM Peak

Interstate	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection AM LOS (Delay)
				Eastbound			Westbound			Northbound			Southbound			
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
	**SR 557 & I-4 Westbound (Roundabout)	Volume					860		140	660	750			570	90	F (164.6)
		LOS (Delay)	Movement				F (460.4)		F (458.6)	A (0.2)	A (0.1)			F (68.5)	F (66.3)	
			Approach				F (460.1)				A (0.2)			F (68.2)		
		V/C	Movement				1.93		1.93	0.43	0.43			0.95	0.95	
			Approach				1.93				0.43			0.95		
		Queue Length 95th (ft)	Movement				2303		2303	0	0			241	241	
	**SR 557 & I-4 Eastbound (Roundabout)	Volume		260		480					1150	1080	110	1320		E (44.7)
		LOS (Delay)	Movement	F (79.7)		F (326.8)					C (15.8)	A (0.5)	A (0.1)	A (0.1)		
			Approach	F (240.0)							A (8.4)			A (0.1)		
		V/C	Movement	0.96		1.64					0.69	0.73	0.43	0.43		
			Approach	1.64							0.73			0.43		
		Queue Length 95th (ft)	Movement	206		1727					209	0	0	0		
	**SR 33 & I-4 Westbound (Roundabout)	Volume					410		200	120	1220			1190	850	C (15.4)
		LOS (Delay)	Movement				E (44.2)		D (28.2)	A (0.1)	A (0.1)			D (31.5)	A (0.1)	
			Approach				E (38.9)				A (0.1)			C (18.4)		
		V/C	Movement				0.75		0.61	0.38	0.38			0.87	0.57	
			Approach				0.75				0.38			0.87		
		Queue Length 95th (ft)	Movement				94		67	0	0			348	0	
	**SR 33 & I-4 Eastbound (Roundabout)	Volume		580		150					760	410	330	1270		E (41.2)
		LOS (Delay)	Movement	F (205.3)		C (24.4)					D (28.1)	A (0)	A (0.1)	A (0.1)		
			Approach	F (168.1)							C (18.2)			A (0.1)		
		V/C	Movement	1.31		0.50					0.75	0.28	0.47	0.47		
			Approach	1.31							0.75			0.47		
		Queue Length 95th (ft)	Movement	760		46					148	0	0	0		

PM Peak

Interstate	Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection PM LOS (Delay)
				Eastbound			Westbound			Northbound			Southbound			
				Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
	**SR 557 & I-4 Westbound (Roundabout)	Volume					1080		110	480	380			670	260	F (179.7)
		LOS (Delay)	Movement				F (158.7)		F (157.3)	A (0.1)	A (0.1)			F (373.3)	F (371.1)	
			Approach				F (158.6)				A (0.1)			F (372.7)		
		V/C	Movement				1.27		1.27	0.30	0.23			1.73	1.73	
			Approach				1.27				0.30			1.73		
		Queue Length 95th (ft)	Movement				1373		1373	0	0			1895	1895	
	**SR 557 & I-4 Eastbound (Roundabout)	Volume		90		660					770	860	140	1610		F (135.2)
		LOS (Delay)	Movement	D (34.6)		F (831.6)					A (7.7)	A (0.3)	A (0.2)	A (0.2)		
			Approach	F (735.9)							A (3.8)			A (0.2)		
		V/C	Movement	0.47		2.77					0.40	0.58	0.52	0.52		
			Approach	2.77							0.58			0.52		
		Queue Length 95th (ft)	Movement	35		3731					52	0	0	0		
	**SR 33 & I-4 Westbound (Roundabout)	Volume					410		330	150	1590			760	580	D (33.6)
		LOS (Delay)	Movement				F (109.1)		F (220.2)	A (0.1)	A (0.1)			B (14.2)	A (0.1)	
			Approach				F (158.6)				A (0.1)			A (8.1)		
		V/C	Movement				1.01		1.36	0.50	0.50			0.57	0.39	
			Approach				1.36				0.50			0.57		
		Queue Length 95th (ft)	Movement				236		878	0	0			97	0	
	**SR 33 & I-4 Eastbound (Roundabout)	Volume		850		120					890	410	200	970		F (63.8)
		LOS (Delay)	Movement	F (192.7)		B (12.4)					F (60.7)	A (0)	A (0)	A (0)		
			Approach	F (170.4)							E (41.6)			A (0)		
		V/C	Movement	1.32		0.28					0.97	0.28	0.34	0.34		
			Approach	1.32							0.97			0.34		
		Queue Length 95th (ft)	Movement	1096		23					345	0	0	0		

** SIDRA INTERSECTION 9.1

[1] LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

[2] The movements with Continuous lane control type have zero second delay time and zero feet queue length.

LOS notes:
Delay is in sec/veh units
:Level Of Service (LOS) E reflecting at capacity operations
:Level Of Service (LOS) F reflecting over capacity operations

Queue notes:
#: 95th percentile volume exceeds capacity
m: Upstream metering is in effect

V/C notes:
: V/C ratio exceeds 0.85

Table 37: Comparison of LOS and Delay

Interstate	Intersections	AM Peak				PM Peak			
		No-Build	Build Alt 1	Build Alt 2	Notes	No-Build	Build Alt 1	Build Alt 2	Notes
I-4	West Memorial Boulevard & I-4 Westbound	B (18.5)	B (18.5)	B (18.5)	Operating at an acceptable LOS	B (19.3)	B (18.8)	B (18.8)	Operating at an acceptable LOS
	Kathleen Road (SR 539) & I-4 Westbound	C (29.7)	C (26.4)	C (26.6)	Operating at an acceptable LOS	C (33.8)	D (47.3)	D (47.3)	Operating at an acceptable LOS
	Kathleen Road (SR 539) & I-4 Eastbound	C (27.5)	C (24.5)	C (24.5)	Operating at an acceptable LOS	C (28.8)	D (54.3)	D (54.3)	Operating at an acceptable LOS
	US-98 & I-4	F (86.1)	E (57.6)	E (75.8)	This interchange will be evaluated using Vissim with improvement(s)	E (66.1)	E (75.7)	F (107.4)	This interchange will be evaluated using Vissim with improvement(s)
	North Socrum Loop Road (CR 582) & I-4 Westbound	F (99.9)	F (111.4)	D (46.5)	This interchange will be evaluated using Vissim with improvement(s)	F (106.4)	F (99.5)	D (49.8)	This interchange will be evaluated using Vissim with improvement(s)
	Lakeland Hills Boulevard & Lakeland Harbor Boulevard/I-4 Eastbound	F (129.5)	F (126.1)	E (65.6)	This interchange will be evaluated using Vissim with improvement(s)	F (124.4)	F (143.0)	E (58.7)	This interchange will be evaluated using Vissim with improvement(s)
	*SR 33 & I-4 Westbound	A (6.2)	C (15.4)	C (15.4)	Operating at an acceptable LOS	B (10.1)	D (33.6)	D (33.6)	Operating at an acceptable LOS
	*SR 33 & I-4 Eastbound	B (13.8)	E (41.2)	E (41.2)	Volumes increased under Build Alternatives. Interchange will be evaluated using improvement(s) in upcoming traffic memo	C (21.6)	F (63.8)	F (63.8)	Volumes increased under Build Alternatives. Modify the eastbound off ramp right turn lane by adding a receiving lane instead of merge lane. See Appendix I
	SR 559 & I-4 Westbound	E (58.0)	F (81.5)	F (81.5)	Volumes increased under Build Alternatives. Interchange will be evaluated using improvement(s) in upcoming traffic memo	D (46.2)	D (50.8)	D (50.8)	Operating at an acceptable LOS
	SR 559 & I-4 Eastbound	C (28.1)	C (28.2)	C (28.2)	Operating at an acceptable LOS	C (26.9)	D (37.6)	D (37.6)	Operating at an acceptable LOS
	*SR 557 & I-4 Westbound	F (110.4)	F (164.6)	F (164.6)	Volumes increased under Build Alternatives. Interchange will be evaluated using improvement(s) in upcoming traffic memo	F (119.8)	F (179.7)	F (179.7)	Volumes increased under Build Alternatives. Modify the westbound off ramp right turn lane by adding a receiving lane instead of merge lane. See Appendix I
	*SR 557 & I-4 Eastbound	C (15.8)	E (44.7)	E (44.7)	Volumes increased under Build Alternatives. Interchange will be evaluated using improvement(s) in upcoming traffic memo	F (70.3)	F (135.2)	F (135.2)	Volumes increased under Build Alternatives. Modify the eastbound off ramp right turn lane by adding a receiving lane instead of merge lane. See Appendix I

Synchro Version 11 Build 168. *:Roundabout

LOS notes:

Delay is in sec/veh units

:Level Of Service (LOS) E reflecting at capacity operations

:Level Of Service (LOS) F reflecting over capacity operations

14.0 I-4 Master Plan – Qualitative Measures

A.` Els provide improved travel time reliability

1. Transit - Express buses using ELs offer faster, more reliable service than buses in GULs

2. Emergency vehicles - Improved and more predictable response times in ELs vs. GUL

B. ELs provide users with travel options

1. No one is required to use/pay toll for ELs

2. Users have the option to use ELs for time-sensitive trips and can choose ELs when they believe the value of their time savings exceeds the toll cost

C. ELs address driver expectancy and consistency with adjacent I-4 BTU and TBNext EL systems

1. ELs provide more systemwide continuity for regional trips between Tampa and Orlando and ensure regional travel time reliability

D. ELs reduce fuel consumption and air pollution

1. Stop-and-go conditions in GULs produce more emissions and increase wear and tear on vehicles

2. ELs encourage carpooling (shared tolls, HOT lanes), further reducing congestion and emissions

E. Consistent vehicle speeds in ELs may reduce crashes vs. variable speeds in congested GULs

F. ELs provide revenue to support future maintenance, roadside services, enforcement

Build Alternative 2 is proposed as the recommend mainline strategy because of improvements to traffic operations, safety, regional travel time reliability, user options, systemwide continuity and environmental benefits with small ROW impacts combined