



## Florida Department of Transportation Interchange Access Request

Polk Parkway (S.R. 570) and Braddock Road  
Proposed Interchange  
Polk County, Florida  
FPN: 438018-1

### Interchange Justification Report

**DRAFT**



July 2017

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### Appendices (Provided Electronically)

- Appendix A Methodology Letter of Understanding (MLOU)
- Appendix B 2010 to 2014 Crash Data
- Appendix C 2016 (Existing) Conditions Analysis
  - Appendix C1 Traffic Counts and Signal Timing Data
  - Appendix C2 Intersections: Synchro and HCS
- Appendix D Future Conditions Analysis
  - Appendix D1 HCS Mainline
  - Appendix D2 Intersections: Synchro and HCS
  - Appendix D3 VISSIM Microsimulation
- Appendix E Conceptual Signing Plan

The design and construction of the Florida Department of Transportation (FDOT) SunTrax test facility, to be located east of Polk Parkway and north of Braddock Road in Polk County, are underway (FPID: 437300-1). The test facility is being sponsored by Florida's Turnpike Enterprise (FTE), at a cost of \$56.2 million, and is planned to test new transportation technologies and support research by students at the nearby Florida Polytechnic University. New SunPass data collection equipment and techniques will also be tested at the facility. Equally important is the need for research and development of new technologies to support the rapidly growing autonomous and connected vehicle industry, which will be conducted at the test facility.

A new interchange has been proposed at Braddock Road and Polk Parkway at Milepost (MP) 21 to support the SunTrax test facility and the expected land use development in the vicinity of the interchange within the City of Auburndale, such as the proposed Regional Activity Center (RAC), Commerce Center Development of Regional Impact (DRI), and the recently established Florida Polytechnic University. A Project Development and Environment (PD&E) study is underway to evaluate the proposed interchange and widening of Braddock Road from Polk Parkway to Berkley Road (FPID: 438018-1). The PD&E study is being conducted concurrently with the Design-Build project for widening the two-lane section of Polk Parkway to four lanes, from MP 18 to MP 22. This Interchange Justification Report (IJR) has been developed to support the PD&E study and the need for the proposed interchange. The Methodology Letter of Understanding (MLOU) for the IJR was approved by the requestor, FTE, and the FDOT Systems Planning Office (SPO) in August 2016. The proposed interchange is supported by the City of Auburndale and is included in the *Lakeland Area Draft 2040 Cost-Feasible Highway Network* as a 2019-2040 unfunded need by the Polk Transportation Planning Organization. The proposed interchange is included in the Turnpike Five-Year Work Program and Master Plan with an anticipated opening year of 2021.

The IJR provides traffic forecasts, lane requirement evaluations, traffic operations analysis, and safety evaluations within the Area of Influence (AOI) of the proposed interchange. Lane requirement analysis shows that two lanes in each direction of Polk Parkway and single-lane interchange ramps will be required through the 2041 design year within the study limits, with or without the proposed interchange and the planned RAC. The widened Polk Parkway and the ramps are expected to be largely under-saturated in the future. The effect on safety within the study area due to the proposed interchange is expected to be negligible.

The analysis evaluated both signalized intersections and roundabout intersections at the proposed interchange ramp terminals and at the SunTrax test facility access road to determine the required lane geometry for the design year, considering traffic from the planned RAC. The analysis showed that the proposed lane geometry would provide acceptable operations during the design year: the projected demand would be processed, while the delays and queues would be within acceptable levels. The proposed lane geometry at the Braddock Road interchange ramp terminals would be the same with or without the traffic from the planned RAC, for both the signalized and the roundabout alternatives. From a safety perspective, the single-lane roundabouts at the interchange ramp terminal intersections are recommended over the signalized intersections. It is expected that



the single-lane roundabouts would result in 30 percent fewer crashes than the signalized intersections.

At the SunTrax access road intersection with Braddock Road, additional lane geometry would be required with the planned RAC traffic in the design year, such as an exclusive southbound left-turn lane for the signalized intersection and a second circulatory lane for the roundabout. The signalized intersection is recommended at this location over the roundabout due to the right-of-way requirements and safety concerns associated with multi-lane roundabouts.

The analysis showed that the unsignalized intersection of Braddock Road and Berkley Road would operate at an unacceptable LOS F in the design year, and delays would be long with the traffic from the planned RAC. Signalization of this intersection and addition of turn lanes should be considered in the future as traffic demand increases. Traffic data can be collected to perform signal warrant analysis five to 10 years after the interchange is open and additional development has occurred in the area.

A Project Development and Environment (PD&E) study is underway to evaluate the proposed interchange at Braddock Road and Polk Parkway (S.R. 570) at Milepost (MP) 21, and widening of Braddock Road from Polk Parkway to Berkley Road (FPID: 438018-1). The PD&E study is being conducted concurrently with the Design-Build project for widening the two-lane section of Polk Parkway to four lanes, from MP 18 to MP 22. The proposed interchange and widening of Braddock Road will be implemented as part of the Polk Parkway widening project. The design and construction of the proposed Florida Department of Transportation (FDOT) SunTrax test facility, to be located east of Polk Parkway and north of Braddock Road, is also in progress (FPID: 437300-1). The test facility is being sponsored by Florida's Turnpike Enterprise (FTE).

The proposed Braddock Road and Polk Parkway interchange will provide access to the SunTrax test facility, as well as other existing and planned developments around the area. This Interchange Justification Report (IJR) has been developed to support the PD&E study and the need for the proposed interchange. The IJR documents traffic operations analysis and safety evaluations for the proposed interchange. The IJR has been developed in accordance with the review/approval process as set forth in FDOT's *Policy No. 000-525-015-g, Approval of New or Modified Access to Limited Access Highways on the Strategic Intermodal System (SIS)*; *FDOT Procedure No. 525-030-160-k, New or Modified Interchanges*; *FDOT Procedure No. 525-030-120-i, Project Traffic Forecasting*; the *FDOT Interchange Access Request User's Guide (IARUG)*; and the *Project Traffic Forecasting Handbook*.

The Methodology Letter of Understanding (MLOU) for the IJR was approved by the requestor, FTE, and the FDOT Systems Planning Office (SPO) in August 2016. A copy of the signed MLOU is provided in **Appendix A**. Per the MLOU, the analysis years for the IJR are: existing (2016), opening (2021), and design (2041).

## **1.1 PROJECT PURPOSE AND NEED**

The proposed interchange at Polk Parkway and Braddock Road will support the new \$56.2 million FDOT SunTrax test facility and the expected land use development in the vicinity of the interchange within the City of Auburndale, such as the proposed Regional Activity Center (RAC), Commerce Center Development of Regional Impact (DRI), and the recently established Florida Polytechnic University. The proposed interchange will accommodate traffic generated by local development and the FDOT SunTrax test facility to be located at the northeast quadrant of Polk Parkway and Braddock Road. This area was recently annexed into the City of Auburndale. The FDOT SunTrax test facility is planned to test new transportation technologies and support research by students at the nearby Florida Polytechnic University. New SunPass data collection equipment and techniques will also be tested at the facility. Equally important is the need for research and development of new technologies to support the rapidly growing autonomous and connected vehicle industry, which will be conducted at the test facility. This is essential in order for FDOT facilities to maintain technological relevance in the future. Foreseeing a need of a permanent site

for testing these new technologies, FDOT, led by FTE, is designing the new facility, which is expected to break ground in spring 2017.

Local governments and economic development agencies have designated the land adjacent to the proposed interchange location for future development as the Florida Polytechnic University campus continues to grow, spurring future spinoff development in the area. The City of Auburndale will be assigning a future land use designation of RAC for the property, according to the City planners. In addition, a Commerce Center DRI was approved in year 2000, which has resulted in a mixed-use development featuring professional office space, along with related development such as retail, single-family and multi-family dwellings, and other uses. The Commerce Center DRI is bounded to the north by I-4, to the east by the Teco Auburndale Trail, to the south by Old Dixie Highway, and to the west by Polk Parkway.

Further, Polk Parkway is a designated emergency evacuation route per the Florida Division of Emergency Management. This facility is a critical link in evacuating residents of the central portions of Polk County. The proposed Braddock Road interchange will enhance connectivity to evacuation routes, increase the amount of traffic that can be evacuated during an emergency event, and provide improved access for emergency responders and other key local and state personnel.

## **1.2 PROJECT LOCATION AND AREA OF INFLUENCE**

Polk Parkway is an expansion project of FTE. It is a 24-mile limited-access toll facility, forming a semicircle that mainly serves as a beltway around Lakeland, which along with Interstate 4 (I-4) circumscribes most of the city limits of Lakeland. The parkway begins at I-4 (MP 27) near the Hillsborough-Polk County line west of Lakeland and ends at I-4 at MP 41. It provides easier access to I-4 from Polk County cities such as Winter Haven, Bartow, and Auburndale, and the south side of Lakeland. **Figure 1.1** shows the project location.

The anticipated Area of Influence (AOI) of the proposed interchange is shown on **Figure 1.2**. The AOI includes the following:

- Interchanges along Polk Parkway:
  - Old Dixie Highway (MP 18)
  - Pace Road (MP 23)
  - I-4 (MP 24)
- Intersections along Pace Road:
  - Research Way
  - Polk Parkway southbound/westbound ramps
  - Polk Parkway northbound/eastbound ramps
- Intersection along Braddock Road:
  - Berkley Road
- Intersections along Old Dixie Highway:

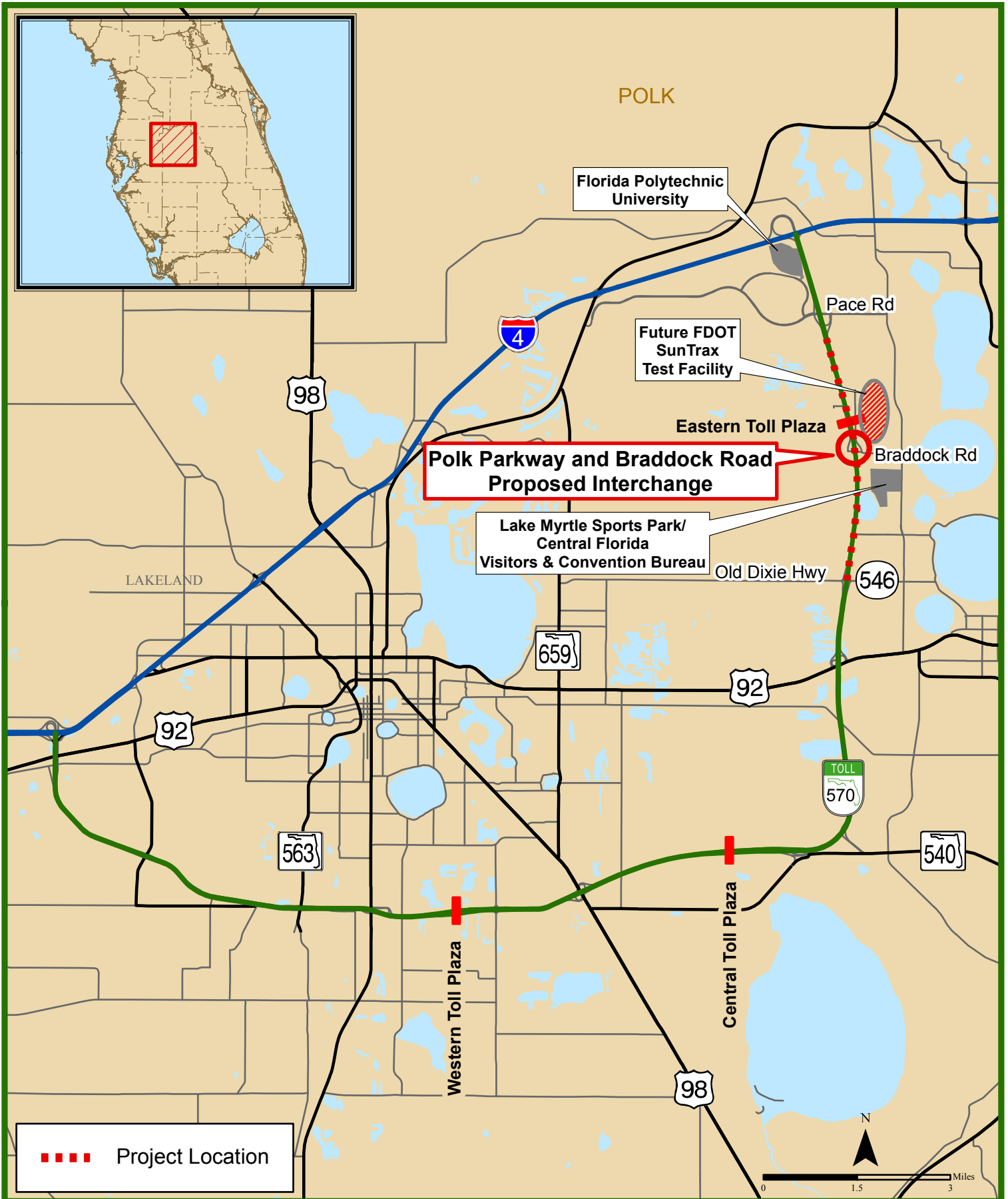
- Polk Parkway southbound/westbound ramps
- Polk Parkway northbound/eastbound ramps

**Table 1.1** shows the approximate spacing of the interchanges along Polk Parkway within the AOI.

**Table 1.1**  
**Interchange Spacing**

<b>Interchange/Intersection</b>	<b>RCI Milepost</b>	<b>Spacing from the Proposed Interchange Location (miles)</b>
MP 23 – Pace Road	23.000	1.97
MP 21 – Braddock Road	21.030	Proposed Interchange
MP 18 – Old Dixie Highway	18.624	2.406

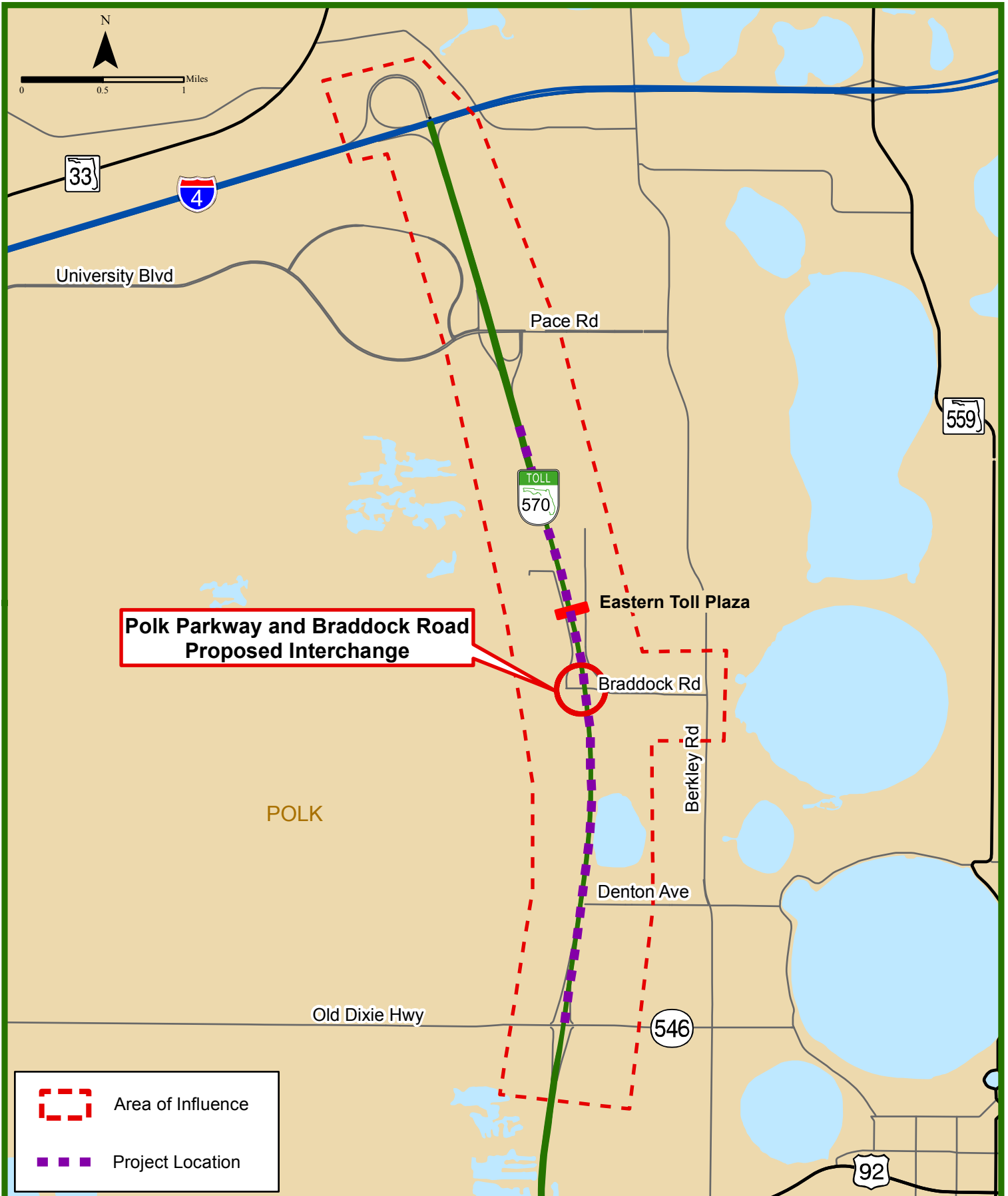
RCI = Roadway Characteristics Inventory



**Interchange Justification Report  
Polk Parkway (S.R. 570) and Braddock Road**

**Project  
Location**

**Figure  
1.1**



 Area of Influence  
 Project Location



**Interchange Justification Report  
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**Area of  
Influence**

**Figure  
1.2**

This section highlights the traffic operational analysis methodology and traffic factors used in development of the analysis contained in this document.

**2.1 TRAFFIC OPERATIONAL ANALYSIS METHODOLOGY**

Detailed operational analyses were performed for existing (2016), opening (2021), and design year (2041) conditions. The section of Polk Parkway within the study limits is currently an under-saturated rural highway and was evaluated using capacity thresholds from the FDOT’s *Quality Level of Service (QLOS) Handbook* Generalized Service Volume Tables, which were adjusted for trucks. Future conditions analysis assumed Build conditions on Polk Parkway, which will transform the study section into a freeway. Freeway segments (basic, merge/diverge, and weave) analyses were based on the capacity thresholds published in the FDOT Systems Planning Office *Estimation of Capacities on Florida Freeways Report*, dated September 2014 and prepared by the Transportation Research Center, University of Florida. The FDOT thresholds were adjusted for local conditions such as speed, truck proportion, Peak Hour Factor (PHF), and driver population.

The Highway Capacity Software (HCS) Version 6.70 was used to identify Level of Service (LOS) along freeway segments. The HCS is based on 2010 Highway Capacity Manual (HCM) methodologies. The HCM estimates LOS 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). The 2010 HCM LOS and density thresholds for freeway segments are listed in **Table 2.1**.

**Table 2.1  
Freeway Segments 2010 HCM Level of Service Criteria  
(Passenger Cars per Mile per Lane)**

LOS	Basic (HCM Exhibit 11-5)	Merge and Diverge (HCM Exhibit 13-2)	Weaving (HCM Exhibit 12-10)
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
F	> 45	Demand Exceeds Capacity	Demand Exceeds Capacity

The HCS software was calibrated based on the adjusted FDOT capacities. Since the freeway segment analysis modules in HCS lack a capacity reduction factor, the Driver Population Factor was used to adjust capacity to the LOS E density threshold of 45 pcpmpl for a basic segment (see **Table 2.1**). The resulting Adjustment Factor (Driver Population Factor) was 0.85. LOS was then estimated using this factor for each segment. Other critical HCS input assumptions included:

- Polk Parkway Future Free-Flow Speed (FFS) = 70 mph
- Polk Parkway peak hour truck percentage = 8%
- Lane width = 12 feet
- Right shoulder clearance = 6 feet

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. Capacity is dependent upon FFS and number of lanes. HCM capacity thresholds for ramp roadways are shown in **Table 2.2**. Similar to freeway segments capacities, the HCM ramp roadway capacities were also adjusted for local conditions.

**Table 2.2  
Ramp Roadway Capacity 2010 HCM Level of Service Criteria**

Ramp FFS	Single-Lane Ramps	Two-Lane Ramps
<b>(HCM Exhibit 13-10)</b>		
> 50	2,200	4,400
> 40 - 50	2,100	4,200
> 30 - 40	2,000	4,000
≥ 20 - 30	1,900	3,800
< 20	1,800	3,600

Intersections were evaluated using Synchro Version 8, based on the 2010 HCM LOS and delay thresholds for signalized intersections presented in **Table 2.3**. Unlike the HCM, Synchro has additional procedures for estimating control delay, such as estimation of right turn on red and queue delay associated with starvation and spillback. Thus, Synchro is felt to yield more accurate results than HCM because of these additional refinements.

VISSIM microsimulation analysis was performed only for the proposed interchange alternatives for the 2041 design year, per the MLOU, since the study area is generally expected to be under-saturated. 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) lane, and other transportation strategies that are being implemented within the state. VISSIM models each individual vehicle within the network to determine the performance measures for freeways, ramps, and intersections. Version 9.00 of VISSIM was used in the analysis.

In VISSIM microsimulation, Measures of Effectiveness (MOEs) selected for evaluating freeway segments (basic, weave, and merge/diverge) included percentage of demand served, speed, and density in pcpmpl. Research indicates that the HCM methodology for calculating density is different from microsimulation methods. Therefore, density estimated by microsimulation tools like VISSIM cannot be accurately related to the HCM LOS criteria in **Table 2.1**. However, density output presented in this report was not directly obtained from VISSIM evaluation files. Density



from VISSIM files (vehicles per mile) was converted into pcpmpl by dividing the VISSIM density by the number of lanes and multiplying by a heavy vehicle factor, following the HCM methodology. Ramp roadways in VISSIM were evaluated based on percentage of demand served and average travel speed.

Intersections were evaluated in VISSIM based on percentage of demand served, average intersection delay, and queue lengths. Due to the incongruences between HCM and microsimulation methodologies, delay estimated by microsimulation tools like VISSIM cannot be accurately related to the HCM LOS criteria in **Table 2.3**.

**Table 2.3**  
**Signalized Intersection 2010 HCM Level of Service Criteria**

Control Delay (s/veh)	LOS by Volume-to-Capacity Ratio*	
	≤1.0	>1.0
≤ 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. Control delay and volume-to-capacity ratio are used to characterize LOS for a lane group.

**2.2 TRAFFIC FACTORS**

The traffic factors for this study are presented in **Table 2.4**. The Design Hour Factor (K) is the proportion of the Annual Average Daily Traffic (AADT) that occurs during the design hour. Consistent with other FDOT districts, FTE has developed standard K factors for use in planning and design applications. The Directional Distribution Factor (D) is the proportion of traffic traveling in the peak direction during the design hour. These factors represent the traffic demand a roadway is typically designed to accommodate.

The Truck Factor (T) represents the estimated percentage of the AADT that is composed of trucks. The Design Hour Truck (DHT) factor is the peak hour truck factor and is estimated as half of the T factor. The 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.

The traffic factors were estimated from the following data sources:

1. The Turnpike’s Standard K factor of 10.0% was used for the mainline.
2. The mainline D factor was obtained from the year 2014 Florida Transportation Information (FTI) DVD for the Portable Traffic Monitoring Station (PTMS) 97-4060 located on Polk Parkway, at Eastern Mainline Toll Plaza.

3. The ramp K and D factors were obtained from the Traffic Planning & Engineering Report.
4. Daily truck factors ( $T_{24}$ ) for the mainline and tolled ramps were estimated from monthly class data from Calendar Year (CY) 2015 Enterprise One Reports (Toll Traffic by Vehicle Class by Month). The data were averaged to estimate daily trucks (three axles and more) and adjusted to account for buses and two-axle single-unit trucks. Non-tolled ramps truck percentages were estimated from applicable adjacent truck toll data.
5. The Design Hour Truck (DHT) factor was estimated as half of the  $T_{24}$  factor rounded up to the nearest whole percent.
6. For Braddock Road, a Standard K factor of 9.0% was used and D and  $T_{24}$  factors were estimated from existing conditions traffic data.

**Table 2.4  
Traffic Factors**

Location	$K_{STD}/K_{30}$ (%)	D (%)	$T_{24}$ (%)	DHT (%)
<b>Polk Parkway Mainline</b>				
South of C.R. 546 (MP 18) to I-4 (MP 24.4)	10.0	61.0	15.0	8.0
<b>Interchange Ramps</b>				
C.R. 546 (MP 18)	13.3	73.4	10.0	5.0
Pace Road (MP 23)	9.0	54.0	8.3	4.0
I-4 (MP 24.4)	10.0	61.0	15.0	8.0
<b>Cross Streets</b>				
Braddock Road and SunTrax Test Facility Access	9.0	55.6	5.2	3.0

Existing conditions such as demographics, land use, roadway facilities, and crash data are provided in this section.

**3.1 DEMOGRAPHICS AND EXISTING LAND USE**

The proposed interchange is located within the City of Auburndale in Polk County. Polk County is one of the fastest growing counties in Florida. According to the University of Florida’s Bureau of Economic and Business Research (BEBR), between 2010 and 2016, the county population grew by 7.5 percent, while the City of Auburndale population grew at 14.2 percent. The county and city both outpaced the state’s growth rate of 7.2 percent during the same time span. The population projections by year 2040 for the county and city are shown in **Table 3.1**.

**Table 3.1  
Population Projections**

Area	Population			2000 to 2010 % Change	2010 to 2040 % Change
	2000	2010	2040		
Polk County	483,924	602,095	896,400	24	49
City of Auburndale	11,032	13,507	15,450	22	14

Source: 2000 and 2010 Census and Bureau of Economic and Business Research (BEBR)

**3.2 ROADWAY FACILITIES**

***Polk Parkway***

Polk Parkway is a four-lane, divided freeway, except for the section between MP 18 at Old Dixie Highway and MP 22 south of Pace Road, which is a two-lane, undivided, rural highway. Within the vicinity of the proposed interchange (MP 21), Polk Parkway has a single 12-foot lane in each direction, with 4-foot inside and outside paved shoulders. The posted speed is 55 mph.

***Old Dixie Highway***

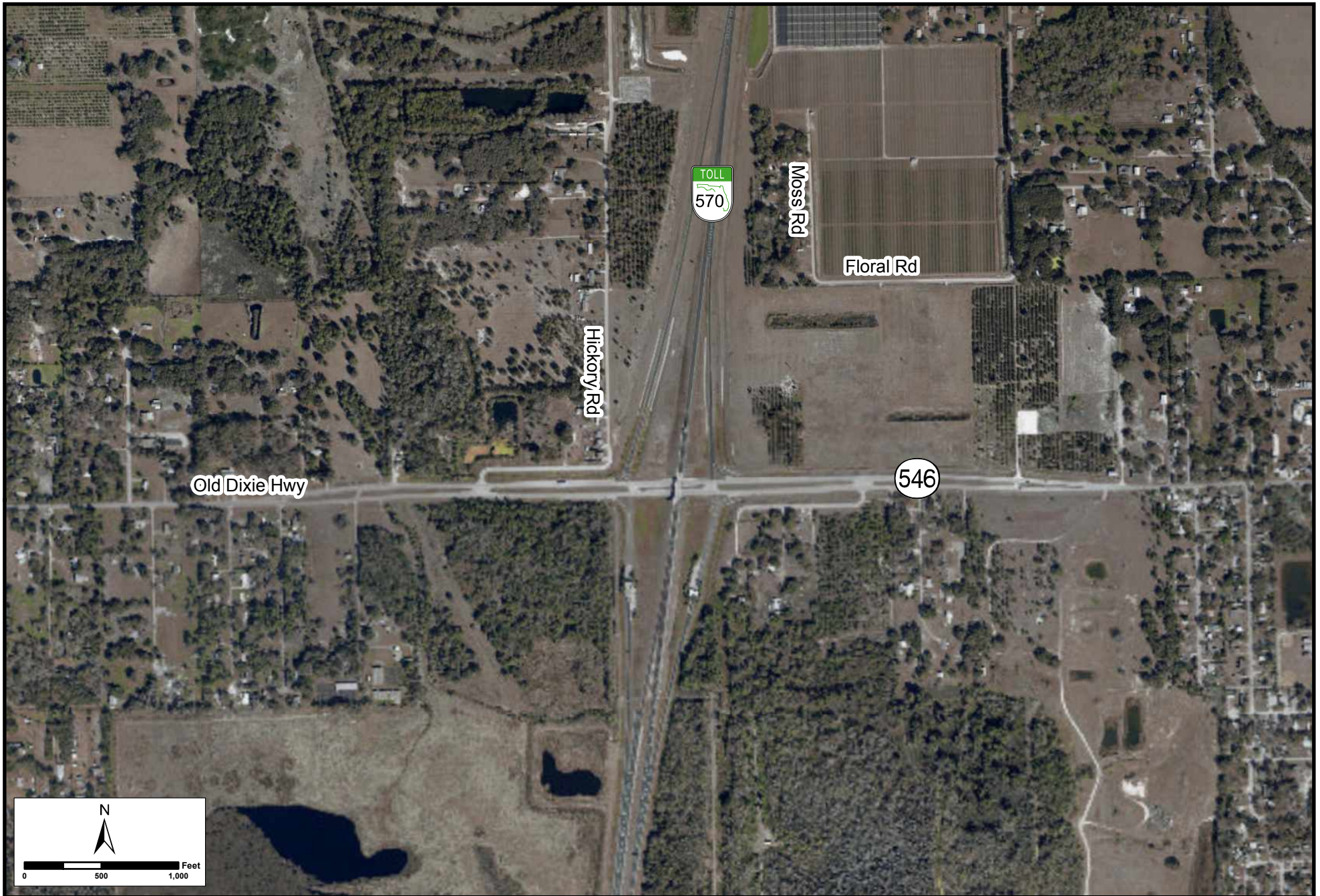
Old Dixie Highway (C.R. 546) is a two-lane, undivided, rural principal arterial that forms a diamond interchange with Polk Parkway. It has a four-lane divided cross section within the vicinity of the interchange and the posted speed is 45 mph. Ramps to and from the south are tolled. An aerial photograph of the interchange is presented on **Figure 3.1**.

***Braddock Road***

Braddock Road is a two-lane, undivided, east/west minor collector. It passes over Polk Parkway and connects a treatment plant to the west with Berkley Road to the east. **Figure 3.2** is an aerial photograph of Braddock Road within the vicinity of Polk Parkway.

***Pace Road***

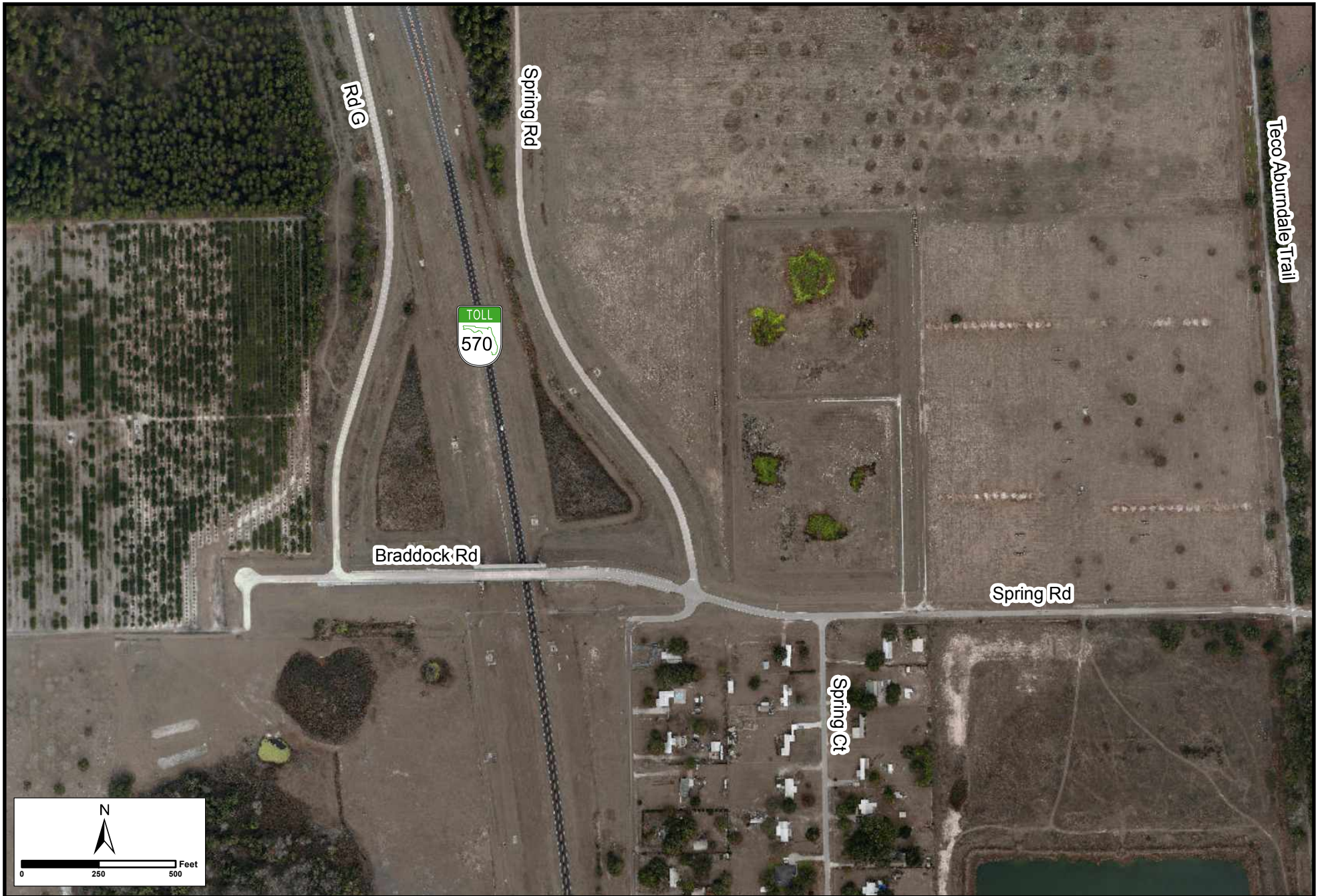
Pace Road is a four-lane east/west, divided, minor arterial that forms a partial cloverleaf interchange with Polk Parkway. The posted speed within the interchange is 45 mph. Ramps to and from the north are tolled. An aerial photograph of the interchange is presented on **Figure 3.3**.



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**C.R. 546 Interchange  
Aerial Photograph**

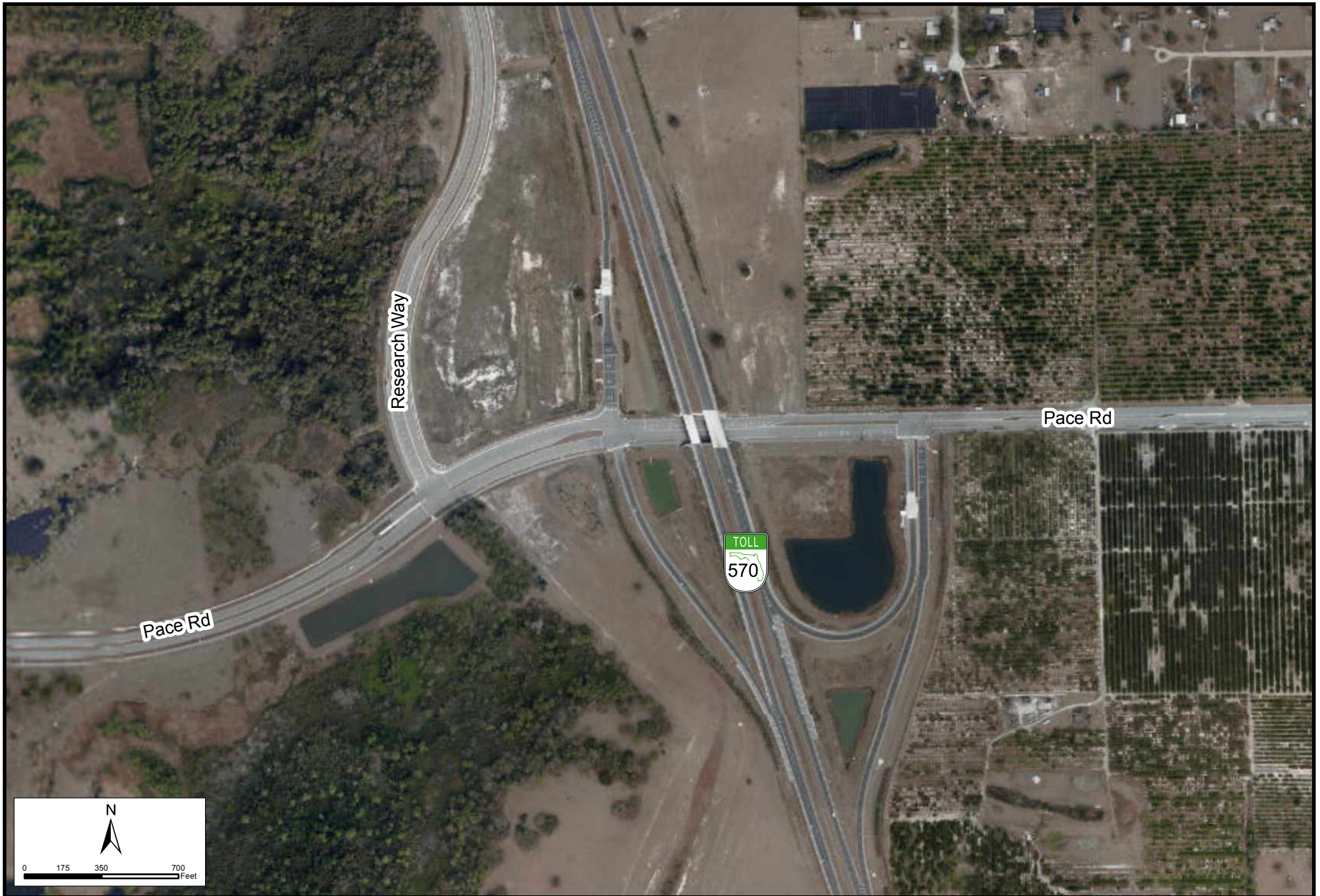
**Figure 3.1**



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Polk Parkway (S.R. 570) and Braddock Road**

**Braddock Road  
Aerial Photograph**

**Figure 3.2**



**Interchange Justification Report  
Polk Parkway (S.R. 570) and Braddock Road**

**Pace Road Interchange  
Aerial Photograph**

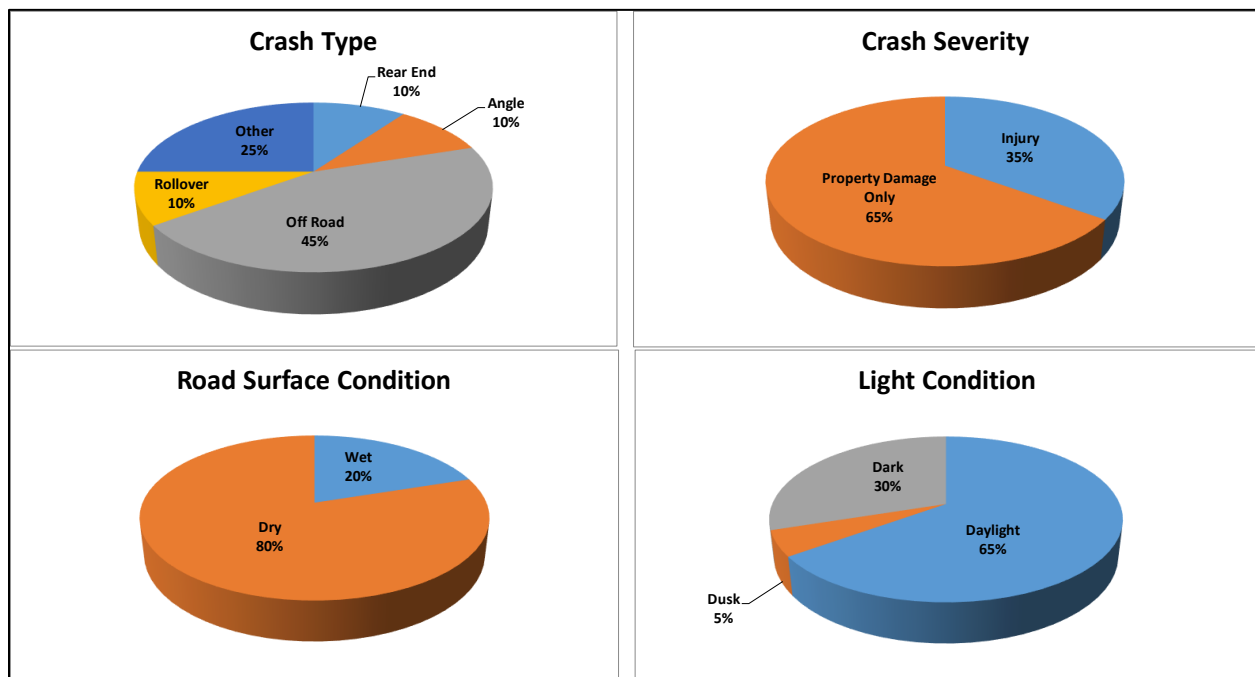
**Figure 3.3**

**3.3 EXISTING CRASH DATA**

Crash data for the Polk Parkway mainline and ramps within the vicinity of the proposed interchange were processed using the most recent five-year data from the state’s Crash Analysis Reporting (CAR) system, from 2010 through 2014. Crash data for the Braddock Road and Berkley Road intersection were obtained for the same time period from the Signal Four Analytics tool, since the intersection is not within the state’s roadway system. This is the only adjacent intersection to the proposed interchange. The Signal Four Analytics tool has been developed by the GeoPlan Center at the University of Florida, and funded by the State of Florida through the Traffic Records Coordinating Committee (TRCC). A total of 20 crashes were reported on the Polk Parkway mainline, 12 at the I-4 ramps, 2 at the Braddock Road and Berkley Road intersection, and none at the Pace Road and Old Dixie Highway ramps, during the five-year study period. Crash occurrences were fairly evenly spread through the days of the week and were mostly reported during the morning and evening commutes.

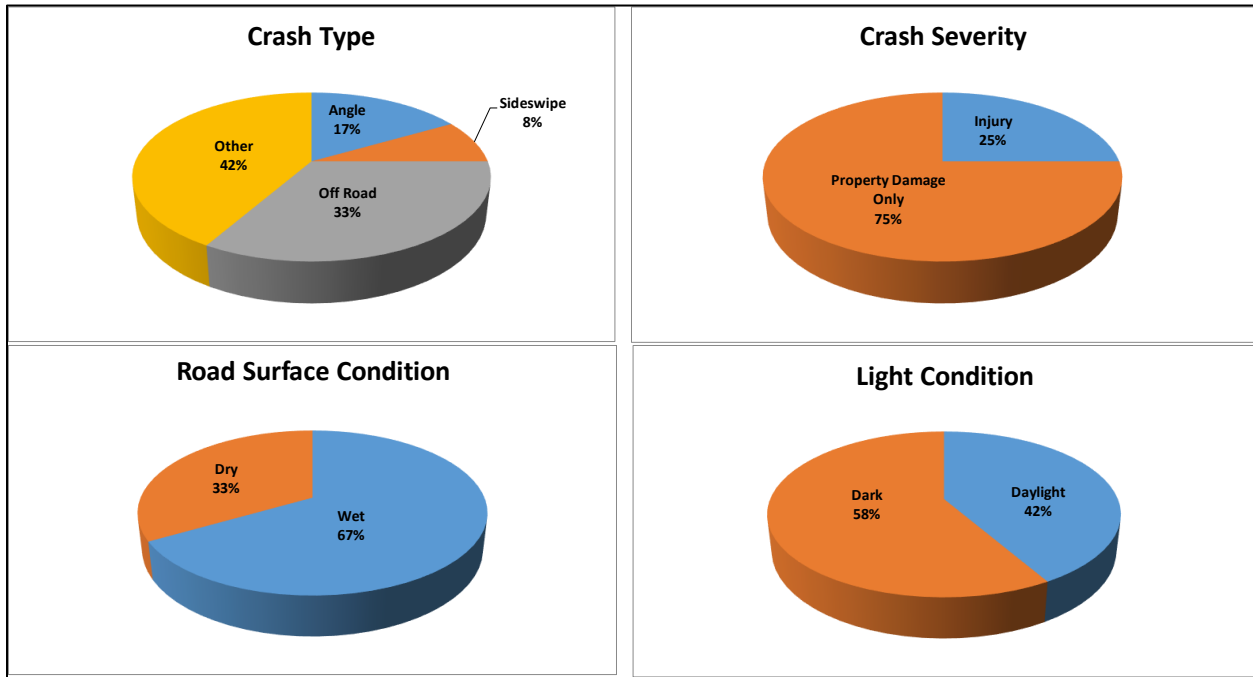
Crash data summaries are provided on **Figures 3.4** through **3.6**. Detailed crash data tables are provided in **Appendix B**. Crashes on the Polk Parkway mainline within the study limits were mainly off-road, as illustrated on **Figure 3.4**. Most of the crashes resulted in property damage only and occurred under dry pavement conditions during the day.

**Figure 3.4**  
**Polk Parkway MP 17.3 to 24.4 Crash Data Summary for 2010 through 2014**

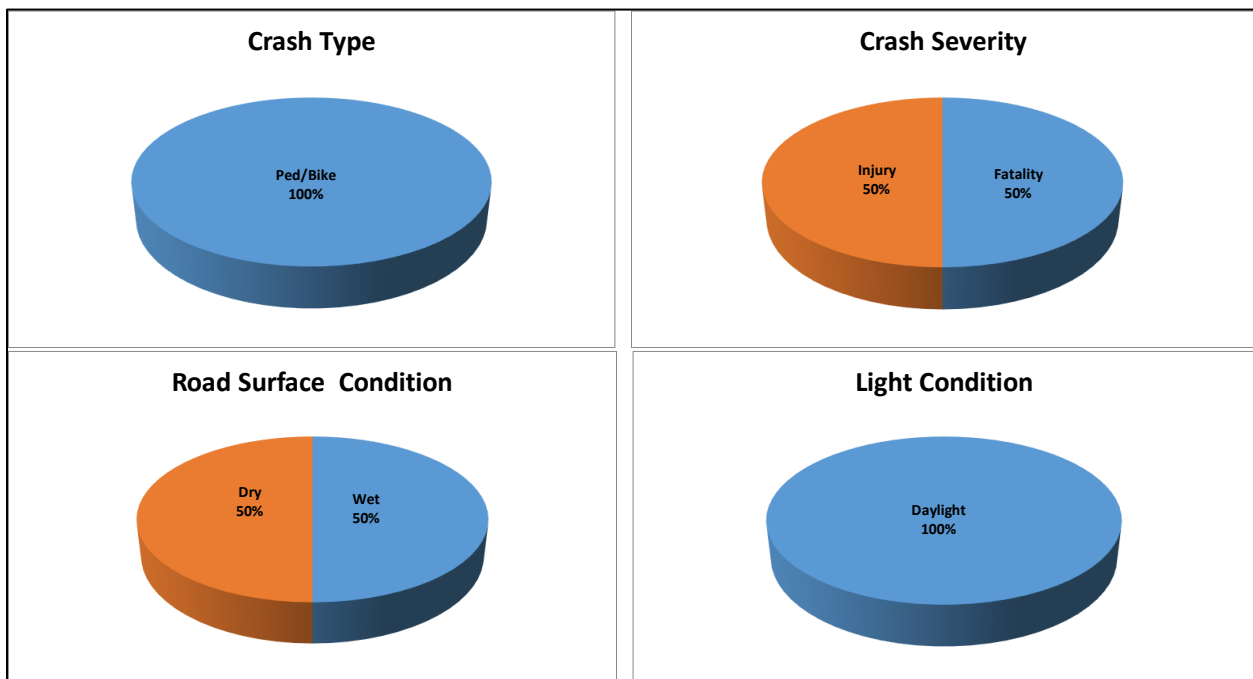




**Figure 3.5**  
**I-4 Ramps to/from Polk Parkway Crash Data Summary for 2010 through 2014**



**Figure 3.6**  
**Braddock Road and Berkley Road Intersection Crash Data Summary for 2010 through 2014**



Most of the known crash types at the I-4 ramps were off-road, as **Figure 3.5** shows, but a few were not recorded. Property damage only was the most common severity type at the ramps and mainly occurred under wet pavement conditions during the night.

The two crashes that occurred during the study period at the Braddock Road and Berkley Road intersection were pedestrian and bicycle related, as depicted on **Figure 3.6**. One was a fatality that occurred under dry pavement conditions and the other resulted in injury but occurred when the road surface was wet. Both crashes occurred during the day.

Actual crash rates were computed and compared with average crash rates for similar facilities within Polk County to assess the safety condition within the study area. Critical crash rates and safety ratios were also estimated. Crash rates for the Polk Parkway mainline and ramps were estimated as crashes per Million Vehicle Miles Travelled (MVMT) and for the intersections as crashes per Million Entering Vehicles (MEV). The critical crash rate is based on the average crash rate for a similar facility adjusted by vehicle exposure and a probability constant. The safety ratio represents the actual crash rate divided by the critical crash rate. If a segment has an actual crash rate higher than the critical crash rate (i.e., safety ratio > 1.0), it may have a safety deficiency. The crash rates are listed in **Table 3.2**. The analysis shows that the Polk Parkway mainline, ramps, and intersections within the study area currently have actual crash rates smaller than the critical crash rates. The highest safety ratio is 0.39, indicating that this is a low crash location.

**Table 3.2  
Crash Rates and Safety Ratios for 2010 through 2014**

Description	Total Crashes	Actual Crash Rate	Average Crash Rate*	Critical Crash Rate	Safety Ratio
<b>Polk Parkway</b>					
Mainline	20	0.20	0.24	0.51	0.39
I-4 Ramps	12	0.13	0.24	0.53	0.25
Pace Road Ramps	0	0.00	0.24	0.45	0.00
Old Dixie Highway Ramps	0	0.00	0.24	0.42	0.00
<b>Intersection</b>					
Braddock Road & Berkley Road	2	0.13	0.26	1.11	0.12

\* FDOT CAR Polk County, 5-year Average Crash Rate  
 Polk Parkway Mainline: Toll Road Rural  
 Crash rate not available, used rate for "Toll Road Urban"  
 Polk Parkway Ramps: Ramp Rural  
 Crash rate not available, used rate for mainline  
 Intersection: Suburban 2-3Ln

Crash Rate:  
 Highway/Ramps: Crashes per Million Vehicle Miles Travelled (MVMT)  
 Intersections: Crashes per Million Entering Vehicles (MEV)

Existing traffic data, geometry, and traffic operational analyses are provided in this section.

#### **4.1 EXISTING TRAFFIC DATA AND GEOMETRY**

Traffic volumes for the Polk Parkway mainline were obtained from the eastern mainline plaza toll data. Daily hose and intersection movement counts were collected in April/May 2016 at the following locations:

##### **Daily Hose Counts**

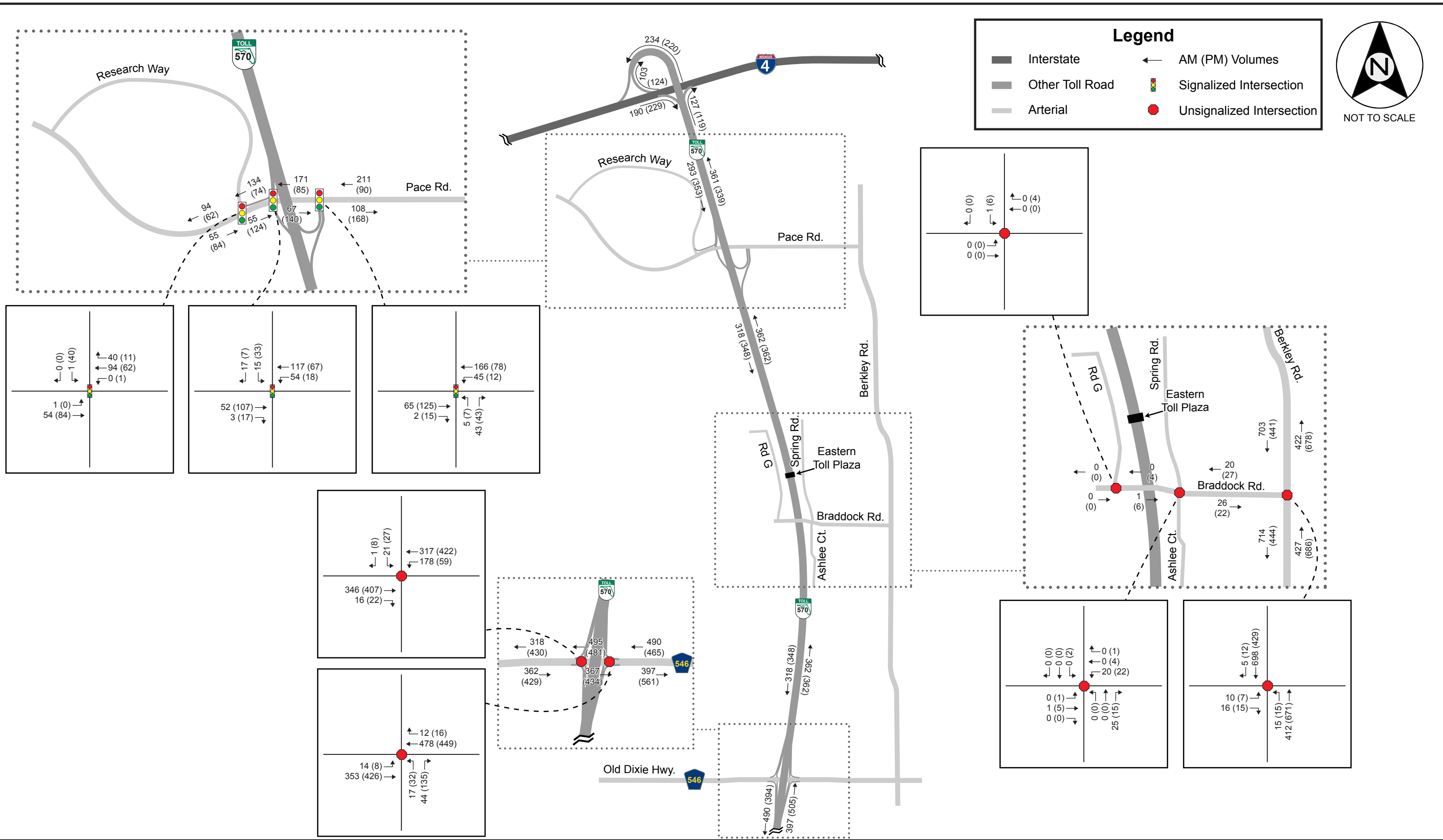
- Polk Parkway southbound on-ramp from Pace Road
- Polk Parkway northbound off-ramp to Pace Road
- Pace Road between Polk Parkway southbound ramps and northbound ramps
- Braddock Road west of Berkley Road
- Polk Parkway northbound on-ramp from Old Dixie Highway
- Polk Parkway southbound off-ramp to Old Dixie Highway
- Old Dixie Highway between Polk Parkway southbound ramps and northbound ramps

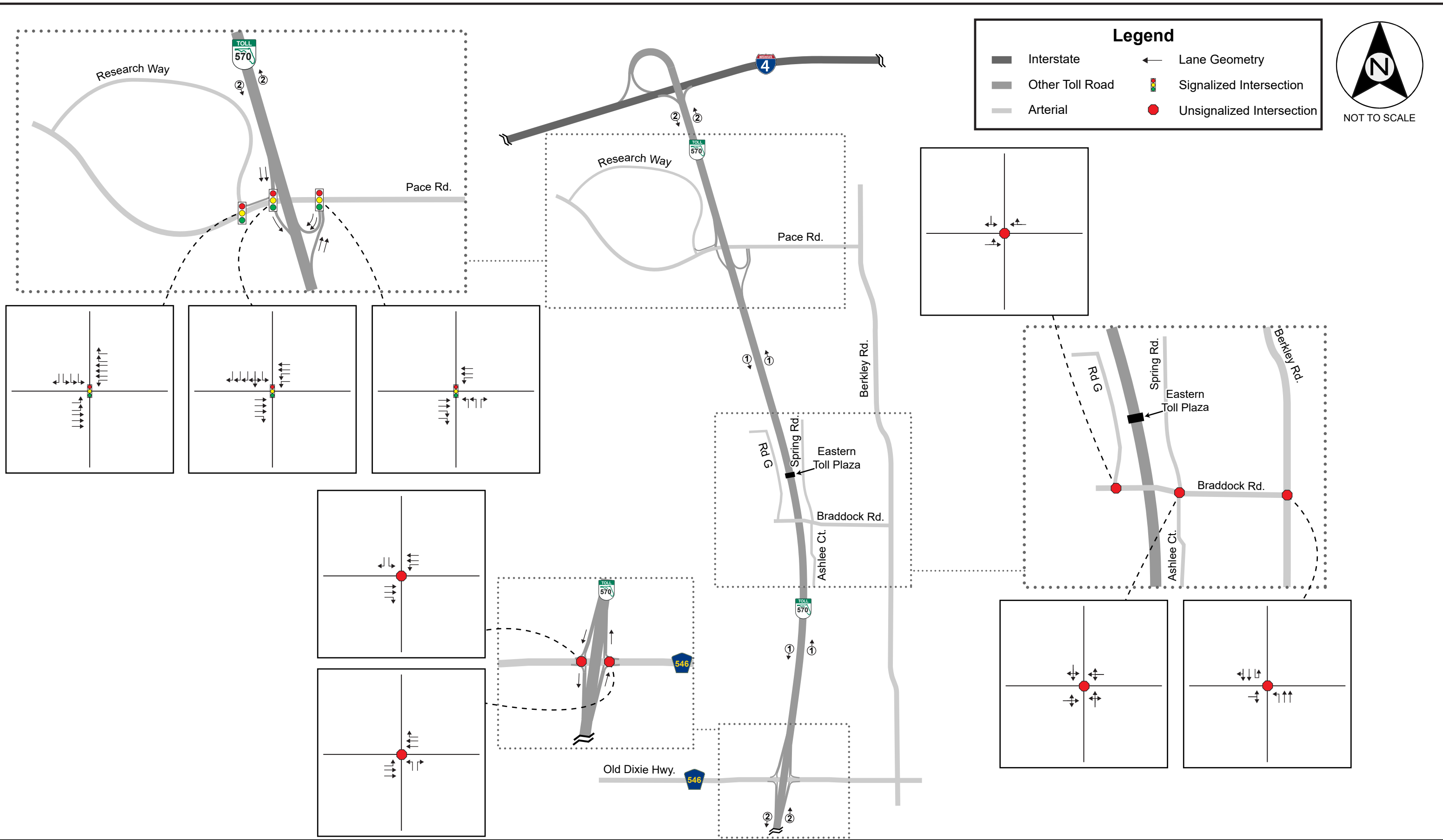
##### **Intersection Movement Counts**

- Pace Road and Research Way
- Pace Road and Polk Parkway southbound ramps
- Pace Road and Berkley Road
- Braddock Road at Road G and Ashlee Court
- Braddock Road and Berkley Road
- Lake Myrtle Park Road and Berkley Road
- Old Dixie Highway and Polk Parkway southbound ramps
- Old Dixie Highway and Polk Parkway northbound ramps
- Old Dixie Highway and Berkley Road

The data collection was conducted in accordance with the procedures from the latest edition of the FDOT's *Manual on Uniform Traffic Studies* (MUTS), FDOT Manual Number 750-020-007. Seasonal and axle adjustment factors were applied to the data where necessary. The data were then aggregated and balanced to ensure continuity and consistency. **Figure 4.1** summarizes the final 2016 AM and PM peak hour volumes.

Signal timing data were provided by Polk County. Field observations and high resolution aerial maps were used to verify geometry. The existing lane geometry is depicted on **Figure 4.2**.





**4.2 EXISTING OPERATIONAL PERFORMANCE**

This section provides a summary of traffic performance results for existing conditions. Detailed output reports and analysis files are provided in **Appendix C**.

**4.2.1 Polk Parkway Mainline Segment Analysis**

The section of Polk Parkway within the study limits was evaluated using capacity thresholds from the FDOT’s QLOS Handbook Generalized Service Volume Tables, which were adjusted for trucks. As shown in **Table 4.1**, the segments currently operate at an acceptable LOS A or B.

**4.2.2 Ramp Capacity Analysis**

Capacity for ramp roadways was assessed by comparing it with existing demand. The ramp Volume-to-Capacity (V/C) analysis is summarized in **Table 4.2**. Results show that the highest V/C is 0.2, indicating that the ramps have a considerable amount of unused capacity.

**4.2.3 Intersection Analysis**

Signalized intersections were analyzed using Synchro Version 8.0. Unsignalized intersections were analyzed using the HCS software Version 6.7. The analysis output summary is presented in **Table 4.3**. All the intersections within the study area currently operate at an acceptable LOS C or better.

**Table 4.1  
Existing (2016) Peak Hour Mainline Segment Level of Service**

Segment	Lanes	AADT	Peak Volume (vph)		LOS		
			AM	PM	Daily	AM	PM
I-4 to Pace Road	4	7,600	361	353	A	A	A
Pace Road to Old Dixie Highway	2	7,300	362	362	B	B	B

**Table 4.2  
Existing (2016) Peak Hour Ramp Capacity Analysis**

Polk Parkway Interchange	Ramp	Lanes	Volume (vph)		Capacity (vph)	V/C	
			AM	PM		AM	PM
I-4	Westbound off-ramp	1	103	124	1,390	0.1	0.1
	Eastbound on-ramp	1	127	119	1,410	0.1	0.1
	Westbound on-ramp	1	234	220	1,410	0.2	0.2
	Eastbound off-ramp	1	190	229	1,410	0.1	0.2
Pace Road	Westbound off-ramp	2	32	40	1,410	0.0	0.0
	Eastbound on-ramp	2	47	27	1,390	0.0	0.0
	Westbound on-ramp	1	57	35	1,410	0.0	0.0
	Eastbound off-ramp	1	48	50	1,410	0.0	0.0
Old Dixie Highway	Westbound off-ramp	1	22	35	1,410	0.0	0.0
	Eastbound on-ramp	1	26	24	1,410	0.0	0.0
	Westbound on-ramp	1	194	81	1,410	0.1	0.1
	Eastbound off-ramp	1	61	167	1,410	0.0	0.1

**Table 4.3  
Existing (2016) Peak Hour Intersection Level of Service/Delay (s/veh)**

Intersection	Eastbound			Westbound			Northbound			Southbound			Overall
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
<b>AM</b>													
<b>Pace Road</b>													
Research Way	C/21	A	-	A	A	A	-	-	-	C/21	-	A	A
Polk Parkway Westbound Ramps	-	A	A	B/17	A	-	-	-	-	B/18	-	A	A
Polk Parkway Eastbound Ramps	-	B/12	A	C/25	A	-	C/20	-	A	-	-	-	A
<b>Braddock Road</b>													
Road G*	A	A	-	-	A	A	-	-	-	A	-	A	A
Spring Road*	A	A	A	A	A	A	A	A	A	A	A	A	A
Berkley Road*	B/14	-	B/14	-	-	-	A	A	-	B/10	A	A	B/14
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	A	A	-	-	-	-	C/17	-	A	C/17
Polk Parkway Eastbound Ramps*	A	A	-	-	A	A	B/14	-	A	-	-	-	B/14
<b>PM</b>													
<b>Pace Road</b>													
Research Way	A	A	-	B/18	A	A	-	-	-	B/18	-	A	A
Polk Parkway Westbound Ramps	-	A	A	B/16	A	-	-	-	-	B/16	-	A	A
Polk Parkway Eastbound Ramps	-	A	A	C/21	A	-	B/17	-	A	-	-	-	A
<b>Braddock Road</b>													
Road G*	A	A	-	-	A	A	-	-	-	A	-	A	A
Spring Road*	A	A	A	A	A	A	A	A	A	A	A	A	A
Berkley Road*	B/12	-	B/12	-	-	-	A	A	-	B/13	A	A	B/13
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	A	A	-	-	-	-	C/15	-	A	C/15
Polk Parkway Eastbound Ramps*	A	A	-	-	A	A	B/14	-	B/11	-	-	-	B/14

- Not Applicable    \*Unsignalized

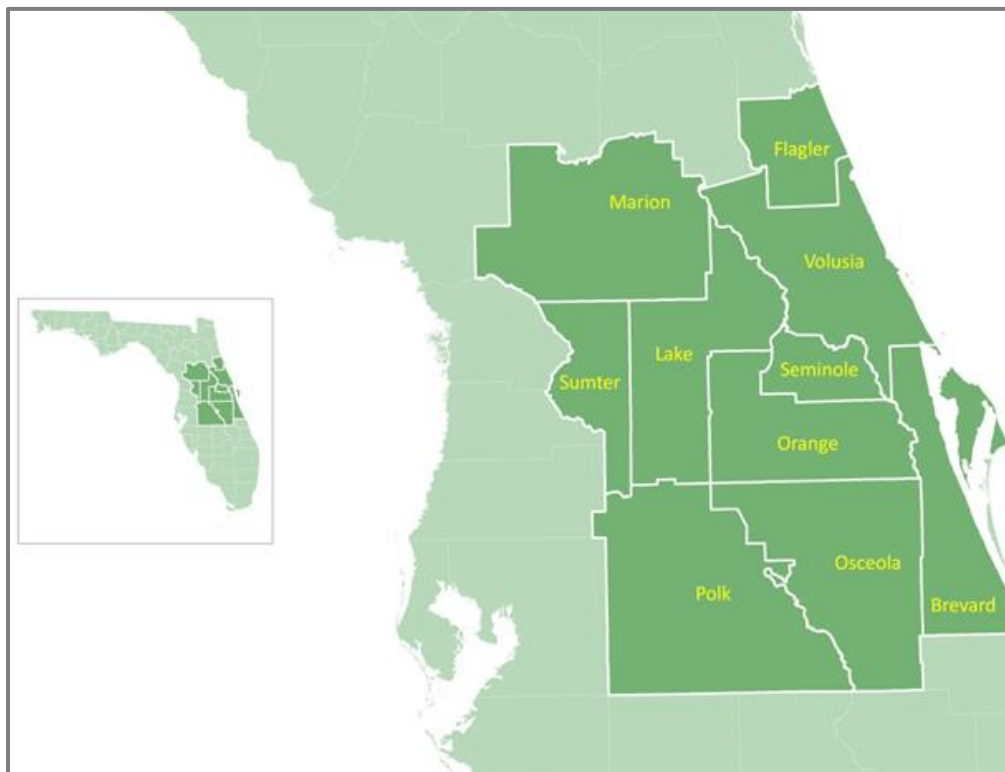
This section provides information on the development of future traffic daily forecasts, design hour volumes, and future lane requirements.

### 5.1 TRAVEL DEMAND MODEL

Traffic forecasts were prepared using the Turnpike Central Florida Model (TCFM). This daily travel demand model was developed to forecast toll traffic in a 10-county area of Central Florida including Orange, Lake, Seminole, Volusia, Osceola, Polk, Brevard, Sumter, Marion, and Flagler Counties, as illustrated on **Figure 5.1**.

The TCFM is an AADT modeling tool developed specifically to forecast toll traffic. It is a standard Florida model designed to simulate regional travel preferences and patterns, and works acceptably for that purpose. However, to more precisely simulate drivers' decisions to use toll roads, a number of improvements are incorporated into the TCFM beyond those typical adjustments incorporated for the standard Florida Metropolitan Planning Organization (MPO) model. Full documentation for this model is included in the report *Turnpike Central Florida Model (TCFM)*, published by the Turnpike in May 2009.

**Figure 5.1**  
**Turnpike Central Florida Model Regional Area**





### **5.1.1 Model Validation**

The TCFM was developed to contain several other features that were innovative departures from traditional modeling practice, established under the auspices of the Florida Standard Urban Transportation Model Structure (FSUTMS), and regularly employed by Florida's MPOs and district offices of the FDOT. The innovative features include the integration of a land use model component, a database structure for managing and integrating the various datasets, and the use of Matrix Estimation (ME) to simplify the model structure while improving model accuracy through a count comparison validation process.

#### ***Socioeconomic Data Collection***

The data for the land use update was collected from multiple sources, including but not limited to:

- Field review to determine the status of development in situations where information is unavailable or difficult to obtain
- Analysis of current and historical aerial imagery to determine extent of ongoing development
- Review of local and county master plans, long-range plans, sector plans, and area master plans for locations and extent of future growth
- Information obtained from East-Central Florida Task Force Committee meetings
- DRI information obtained from the East-Central Florida Regional Planning Council
- DRI information obtained from the State of Florida Department of Economic Opportunity

#### ***Socioeconomic Data Updates***

The TCFM was validated to actual conditions in the base year 2010. Within the model, the geographic area of coverage is represented by Traffic Analysis Zones (TAZs) containing socioeconomic (SE) data that are the basis of model trip generation. The TCFM uses housing (i.e., dwelling units) and employment as the SE data for the production and attraction of vehicle trips. The year 2010 SE data were refined for the model validation based on updated information. The TAZs within the study corridor were re-evaluated to ensure accurate base year model data. The updated zonal data were then rebalanced to ensure county population and employment growth control totals were not exceeded. The control totals were derived from the University of Florida's BEBR medium-level future year county projection totals. Zonal dataset updates were also developed for future years (2020, 2030, and 2045).

#### ***2010 Transportation Network and Traffic Count Updates***

An important component within the highway network database is the 2010 count dataset. The base year traffic counts are taken from the FDOT count program. For the study corridor, Polk Parkway, traffic counts collected for the Traffic Engineers Annual Report (TEAR) from 2015 were also utilized to refine the project corridor during validation.

In addition to updating the counts in the network database, the database was updated to add new roadway projects that were completed by 2010. Associated facility types, area types, number of lanes, and posted speed attributes were included with these additional roadways.

### ***2010 Model Trip Matrix***

The TCFM validation process used ME to calibrate the base year 2010 zone-to-zone trip table that produced an optimum fit between observed data (i.e., traffic counts) and model-simulated traffic volumes when that trip table is assigned to the transportation network. The use of the ME procedure provides efficiencies in the model validation process in terms of model accuracy that would be difficult to accomplish with the standard model validation approach.

The ME procedure requires a seed trip table to begin the process of iterative refinements. In the original TCFM, the original seed trip table was developed from statewide origin-destination and trip length surveys and a revalidation of the TCFM. This provided the seed table for the original TCFM ME validation that was in turn used to complete the current ME validation to the 2010 count data.

### ***2010 Model Validation***

To evaluate the effectiveness of the TCFM validation and whether it meets or exceeds adopted standards for model accuracy, two indicators of model performance were used: volume-to-count ratios and Root Mean Square Error (RMSE). **Table 5.1** summarizes the RMSE statistics of the TCFM on a regional basis. The model produced an overall RMSE of 7.2 percent for the entire model. For the two counties to which Polk Parkway is closest, the model's RMSE statistic was 8.1 percent in Polk County and 7.1 percent in Orange County. Per FDOT FSUTMS validation standards, an RMSE area-wide value less than 35 percent is the preferable range (*FSUTMS-Cube Framework Phase II Model Calibration and Validation Standards, Table 2.11*). The resulting RMSE values show that the 2010 validation was successful in achieving model volumes that replicated the 2010 traffic counts.

**Table 5.1**  
**Region-Wide Model Validation Statistics (Percent RMSE)**

<b>Volume Group</b>	<b>Model Volume</b>	<b>2010 Count</b>	<b>Number of Counts</b>	<b>Volume/Count Ratio</b>	<b>RMSE</b>
1 – 99	3,666	1,110	14	3.303	367.343
100 - 4,999	8,515,408	8,469,536	3,432	1.005	21.589
5,000 – 9,999	14,082,444	14,053,809	1,947	1.002	9.404
10,000 – 19,999	28,022,808	28,002,284	1,982	1.000	4.656
20,000 – 29,999	10,042,981	10,055,986	425	0.999	3.025
30,000 – 39,999	3,912,809	3,925,398	114	0.997	1.943
40,000 – 49,999	823,585	811,868	18	1.014	2.737
50,000 – 59,999	1,001,611	1,002,800	18	0.999	1.757
60,000 – 69,999	839,455	833,800	13	1.007	2.237
70,000 – 79,999	530,575	524,100	7	1.012	1.639
80,000 – 89,999	1,817,771	1,798,974	21	1.010	2.305
90,000 – 99,999	753,826	747,900	8	1.008	1.652
10,000 – 400,000	103,068	101,800	1	1.012	0.000
<b>Region-wide</b>	<b>70,430,007</b>	<b>70,329,365</b>	<b>8,000</b>	<b>1.001</b>	<b>7.190</b>

### 5.1.2 Future Year Forecast Models

Once validated, the TCFM was used to forecast future traffic with and without the proposed Polk Parkway widening project in place. Forecasts were produced for the years of 2020 and 2035. Model socioeconomic factors were updated for each model year to reflect the best estimate of population, dwelling unit, and employment for each TAZ in the model. The model transportation network was updated to reflect programmed capacity improvements according to each county's Transportation Improvement Program (TIP). Beyond the Five-Year Work Program, a process was developed for adding capacity to conditions where volume-to-capacity ratios exceeded set levels. The model's value for travelers' time was established through an extensive stated preference survey of a sample of the population most likely to use the proposed toll road. A discussion follows for each of these subjects.

***Future Year Land Use Projections***

The socioeconomic data were refined for the two forecast years: 2020 and 2035. The land use data were apportioned on a county-by-county basis to specific TAZs through the use of a Land Use Allocation Model (LUAM). The purpose of the LUAM was to create land use forecasts that were realistic, consistent with the transportation system, and easily updated. The LUAM was used to allocate land use control totals for each county to the TAZ structure within each county, taking three effects into account:

- Current household and employment densities
- Transportation accessibility to each of the TAZs
- Developable land (excluding water and other managed land)

The current land use control totals by county are based on the latest BEBR PS168 and the Bureau of Economic Administration (BEA) data available at the time.

***Future Transportation Network Assumptions***

As part of the network development, roadway facilities in the project area were reviewed to ensure accurate representation for the appropriate roadway classification based on observed traffic counts, posted speed limits, and number of lanes. These data were obtained from FDOT's highway data inventory and aerial photo images from online mapping websites. These updates ensure proper highway traffic assignments. The model also incorporates planned capacity improvements and new projects in the FDOT, FTE, and Central Expressway Authority (CFX) work programs.

***Future Growth Projections within the Corridor***

Land use along the S.R. 570 corridor will continue to drive increases in traffic on the facility. This is particularly true along more urbanized sections of the facility, but with continued growth of the USF Polytechnic University and CSX Intermodal Logistics Center (ILC) for commercial traffic and Legoland for tourist traffic, this could be a potential key element of traffic growth along the facility. However, it is unlikely the corridor will feature heavy volumes of commuter traffic on the facility in the future. Growth in Polk County will continue, but it not expected to produce large numbers of commuters traveling to and from Orange and Hillsborough Counties.

***Future Trip Matrices***

In order to prepare the future models for network assignment, future trip matrix updates for each year were required. The future model year trip matrices were derived from the 2010 base year trip table and updated based on future socioeconomic data, specifically dwelling units and employment. Based on changes in the data for each TAZ, future year trip ends were forecast using area type-specific regression equations applied to the future year dwelling unit and employment estimates. Then the future year trip origins and destinations were averaged for each zone and

combined with the base year validated average trip ends to determine zonal growth factors. Those growth factors were applied to the base year validation trip table using the FRATAR process to produce future trip tables. The FRATAR process proportions future trip estimates to each zone as a function of the product of the current trips between the two zones and the growth factor of the attracting zone. This process was performed iteratively every five years out to year 2045.

### *Travelers' Value of Travel Time Savings*

One of the most important factors influencing a driver's choice to use (or not to use) a toll road is the perception of their travel time value. Certainly, the higher levels of service and safety on toll roads are also value to customers, but the overriding factor affecting the toll road decision is the time saved by using the toll road instead of toll-free alternative routes. Therefore, it is important that a driver's Value of Travel Time Savings (VTTS) in the travel model closely represents a driver's willingness to pay for a perceived time savings, in this case travel time savings translated from a toll cost. This VTTS is applied to all drivers who are potential customers for any path that includes a toll route. For the study corridor, S.R. 570, a VTTS equal to \$19.53/hour was assumed based on previous collected survey data.

## 5.2 FUTURE TRAFFIC FORECAST

Traffic for the SunTrax test facility and RAC was developed following the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, Version 9. The RAC is to be located east of Polk Parkway and north of Braddock Road, adjacent to the SunTrax test facility. According to the future land use element of the City of Auburndale's comprehensive plan, RACs are intended to accommodate residential development, regional shopping centers, other regional attractors, and community facilities. In order to project future land use and traffic demand in the area, a growth scenario was created assuming 11,769 square feet (SF) of the SunTrax operations building, 9,062 SF of the SunTrax storage building and 500,000 SF of the RAC, all within the allowable Floor Area Ratio (FAR). **Table 5.2** shows the trip generation calculation from the assumed growth.

The trip generation estimates for the SunTrax test facility and the RAC were added to the projections from the travel demand model. The TCFM forecast years were 2020 and 2035. Annual Average Daily Traffic (AADT) forecasts for the study area were developed for opening year 2021, interim year 2031, and design year 2041 through interpolation and extrapolation. The future Directional Design Hourly Volumes (DDHVs) were estimated by applying the appropriate K and D factors presented in **Table 2.4** to the AADTs. The volumes were adjusted for accuracy and continuity of flow.

**Table 5.2  
SunTrax Test Facility and Regional Activity Center (RAC) Trip Generation Analysis**

<b>Land Use</b>	<b>Units (KSF)</b>	<b>Daily Trips</b>	<b>PM Peak Trip Rate</b>	<b>PM Peak Trips</b>	<b>PM In</b>	<b>PM Out</b>
SunTrax: Operations Building (Research & Development Center - ITE 760)	11.8	95	1.07	13	2	11
SunTrax: Storage Building (Warehouse - ITE 150)	9.1	32	0.32	3	1	2
RAC: General Retail (Shopping Center - ITE 820)	500	21,470	3.37	1,685	826	859
<b>Total</b>	<b>521</b>	<b>21,597</b>	<b>n/a</b>	<b>1,701</b>	<b>829</b>	<b>872</b>

The mainline and ramps AADTs and the corresponding DDHVs for years 2021, 2031, and 2041 are provided in **Tables 5.3** through **5.5** for No Build, Build without RAC traffic, and Build with RAC traffic, respectively. The bold values represent the mainline volumes and the non-bold values represent ramp volumes.

Future year (2041) turn movement volumes for ramp terminal intersections were developed using the projected ramp DDHVs and existing turn proportions. Cross street through movements and adjacent intersections traffic were developed using growth rates estimated from historical data and verified with the TCFM. The 2021 and 2041 peak hour volumes are presented on **Figures 5.2** through **5.7** for No Build, Build without RAC traffic, and Build with RAC traffic, respectively.

**Table 5.3  
Mainline and Ramp Forecasts for No Build**

Location	Polk Parkway	2021				2031				2041						
		AADT	AM - DDHV		PM - DDHV		AADT	AM - DDHV		PM - DDHV		AADT	AM - DDHV		PM - DDHV	
			SB	NB	SB	NB		SB	NB	SB	NB		SB	NB		
24 - I-4		8,400	370	430	430	370	11,700	540	620	620	540	13,000	590	690	690	590
23 - Pace Road		1,100	90	60	60	90	2,300	160	120	120	160	3,500	240	180	180	240
		1,300	120	90	90	120	2,800	190	150	150	190	4,400	300	230	230	300
21 - EASTERN MAINLINE PLAZA		8,600	400	460	460	400	12,200	570	650	650	570	13,900	650	740	740	650
20 - Braddock Road		8,600	400	460	460	400	12,200	570	650	650	570	13,900	650	740	740	650
18 - Old Dixie Highway		700	40	50	50	40	1,600	100	110	110	100	2,500	130	170	170	130
		2,900	280	110	110	280	4,000	410	160	160	410	5,100	520	220	220	520
		10,800	640	520	520	640	14,600	880	700	700	880	16,500	1,040	790	790	1,040

Note: Values in RED indicate PEAK direction and values in BLUE indicate OFF-PEAK direction

**Table 5.4  
Mainline and Ramp Forecasts for Build without Regional Activity Center**

Location	Polk Parkway	2021					2031					2041				
		AADT	AM - DDHV		PM - DDHV		AADT	AM - DDHV		PM - DDHV		AADT	AM - DDHV		PM - DDHV	
			SB	NB	SB	NB		SB	NB	SB	NB		SB	NB		
24 - I-4		9,000	390	440	440	390	12,700	620	680	680	620	14,400	680	780	780	680
23 - Pace Road		1,000	60	40	40	60	2,000	140	100	100	140	3,000	200	160	160	200
		1,100	90	70	70	90	2,600	170	120	120	170	4,200	280	210	210	280
		9,100	420	470	470	420	13,300	650	700	700	650	15,600	760	830	830	760
20 - Braddock Road		900	40	30	30	40	1,700	120	90	90	120	2,700	180	140	140	180
		400	20	20	20	20	700	50	40	40	50	1,100	80	60	60	80
20 - EASTERN MAINLINE PLAZA		8,600	400	460	460	400	12,300	580	650	650	580	14,000	660	750	750	660
18 - Old Dixie Highway		600	20	30	30	20	1,300	70	90	90	70	2,000	90	140	140	90
		2,800	260	90	90	260	3,600	370	140	140	370	4,500	470	180	180	470
		10,800	640	520	520	640	14,600	880	700	700	880	16,500	1,040	790	790	1,040

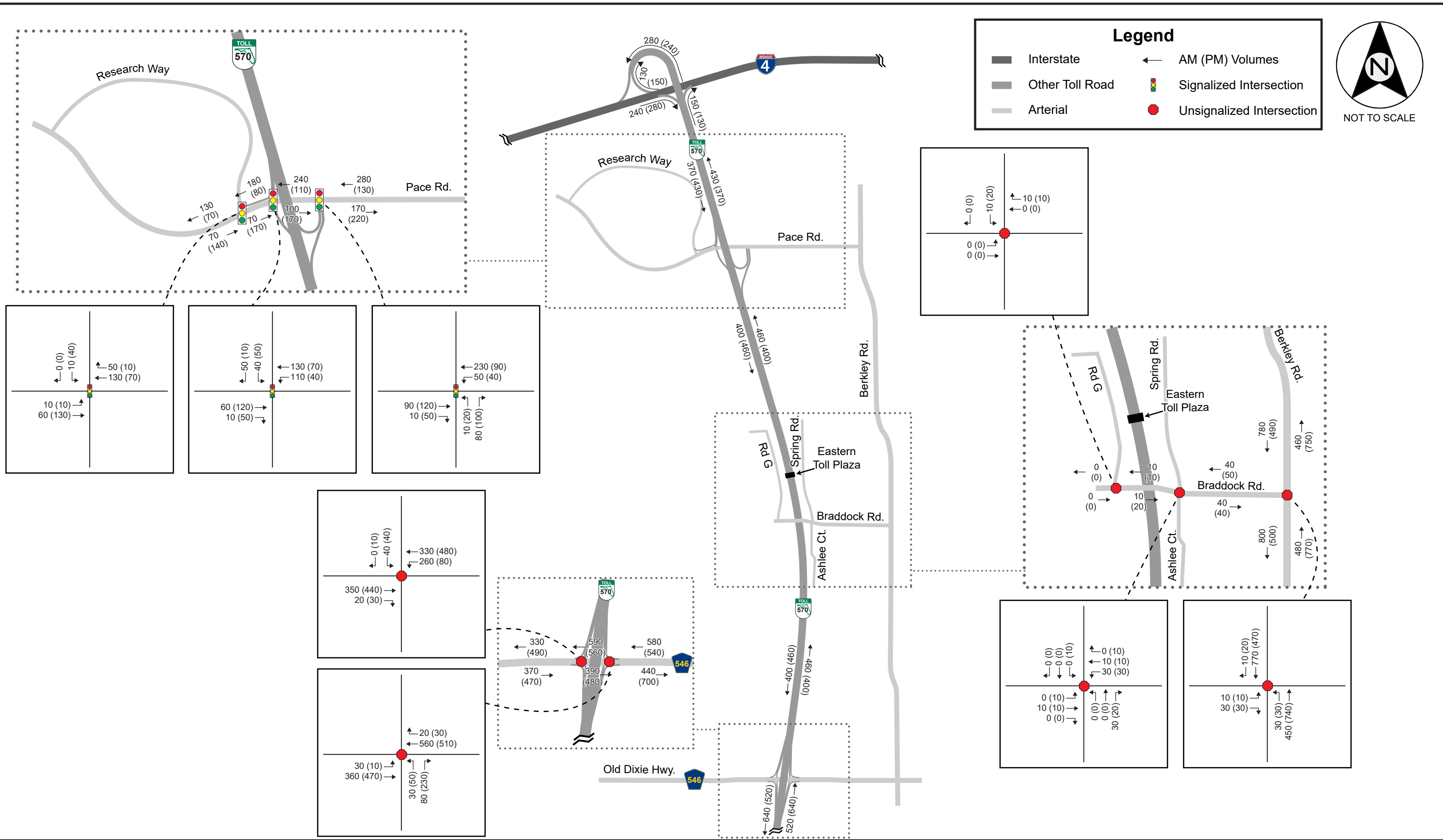
Note: Values in RED indicate PEAK direction and values in BLUE indicate OFF-PEAK direction

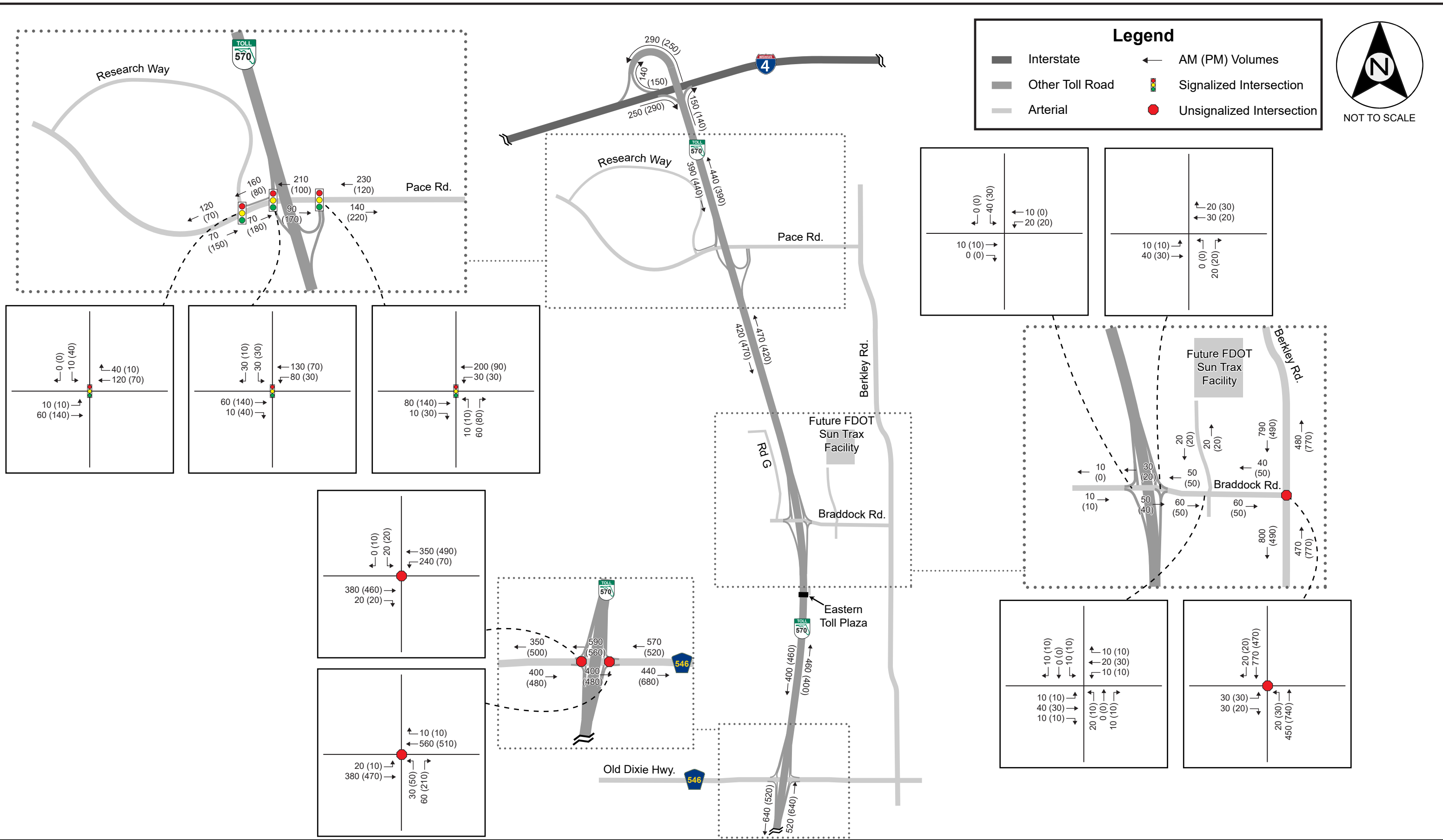


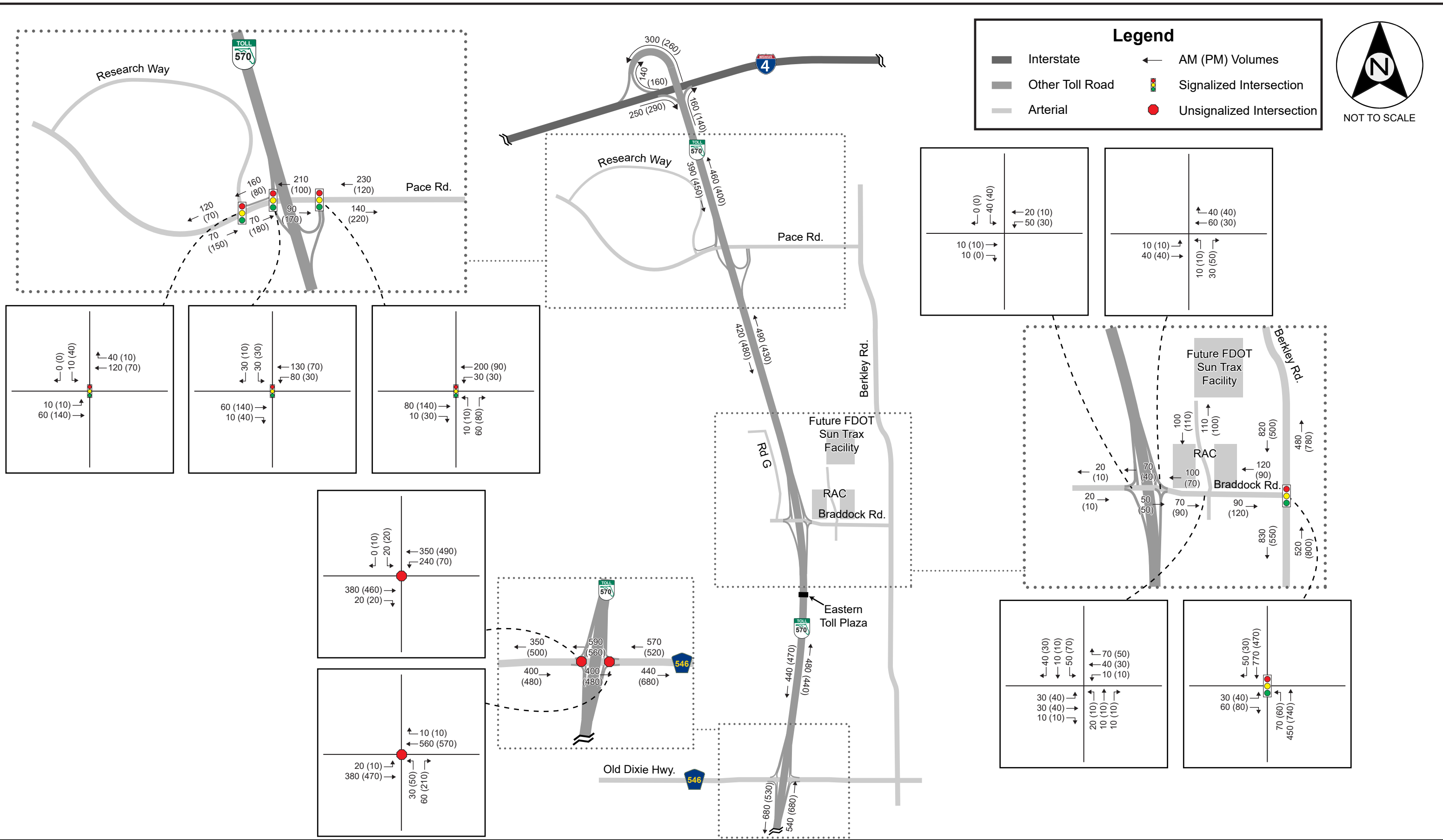
**Table 5.5  
Mainline and Ramp Forecasts for Build with Regional Activity Center**

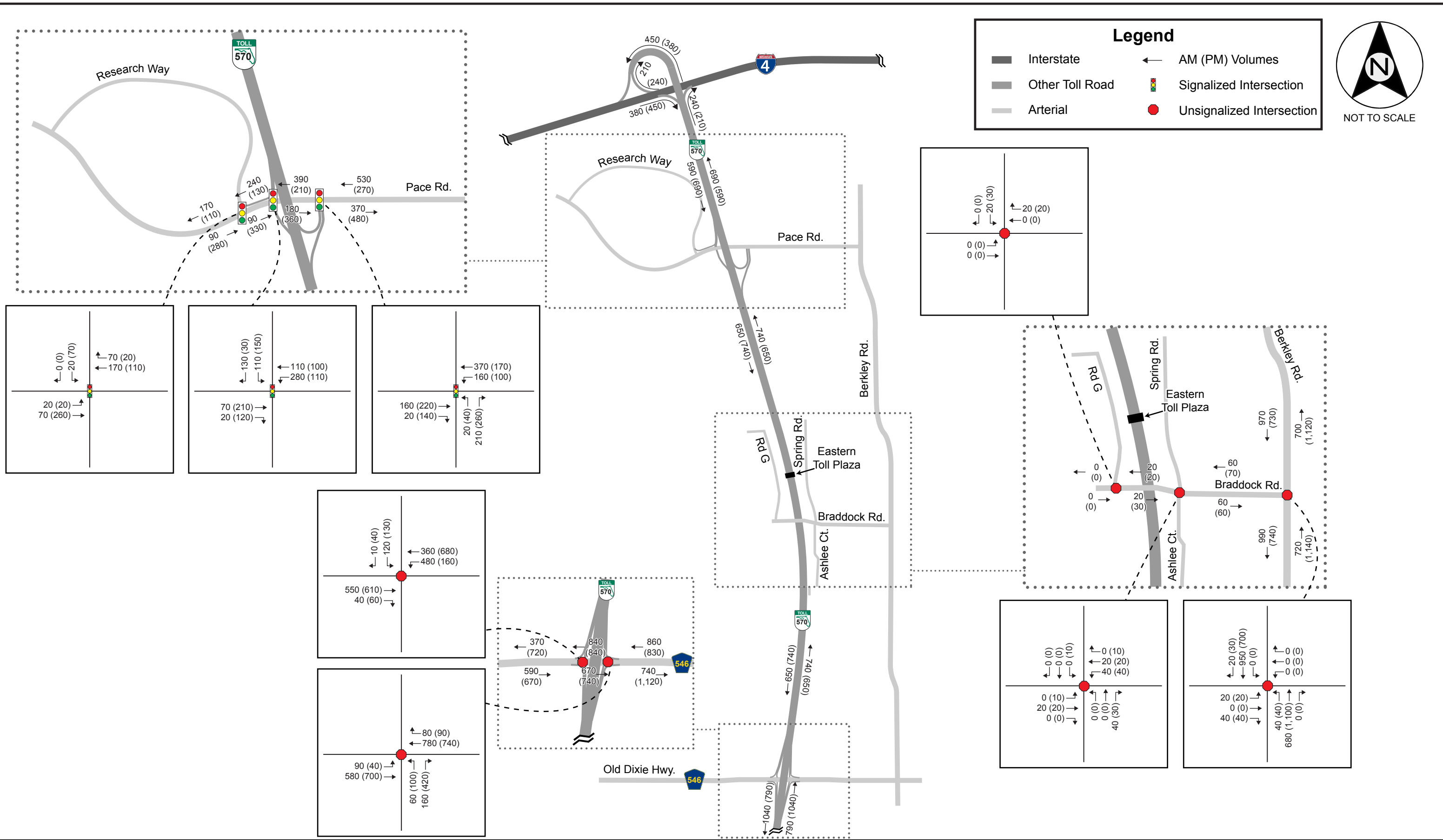
Location	Polk Parkway	2021					2031					2041				
		AADT	AM - DDHV		PM - DDHV		AADT	AM - DDHV		PM - DDHV		AADT	AM - DDHV		PM - DDHV	
			SB	NB	SB	NB		SB	NB	SB	NB		SB	NB		
24 - I-4		9,000	390	450	450	400	13,600	650	730	730	650	16,700	750	870	870	740
23 - Pace Road		1,000	60	40	40	60	2,000	140	100	100	140	3,000	200	160	160	200
		1,100	90	70	70	90	2,600	170	120	120	170	4,200	280	210	210	280
		9,100	420	480	480	430	14,200	680	750	750	680	17,900	830	920	920	820
20 - Braddock Road		1,000	40	50	40	50	2,900	150	140	140	150	4,100	250	230	230	240
		1,000	60	40	30	60	2,400	160	180	180	160	4,400	250	310	310	250
20 - EASTERN MAINLINE PLAZA		9,100	440	470	470	440	13,700	690	790	790	690	18,200	830	1,000	1,000	830
18 - Old Dixie Highway		600	20	30	30	20	1,300	70	90	90	70	2,000	90	140	140	90
		2,800	260	90	90	260	3,600	370	140	140	370	4,500	470	180	180	470
		11,300	680	530	530	680	16,000	990	840	840	990	20,700	1,210	1,040	1,040	1,210

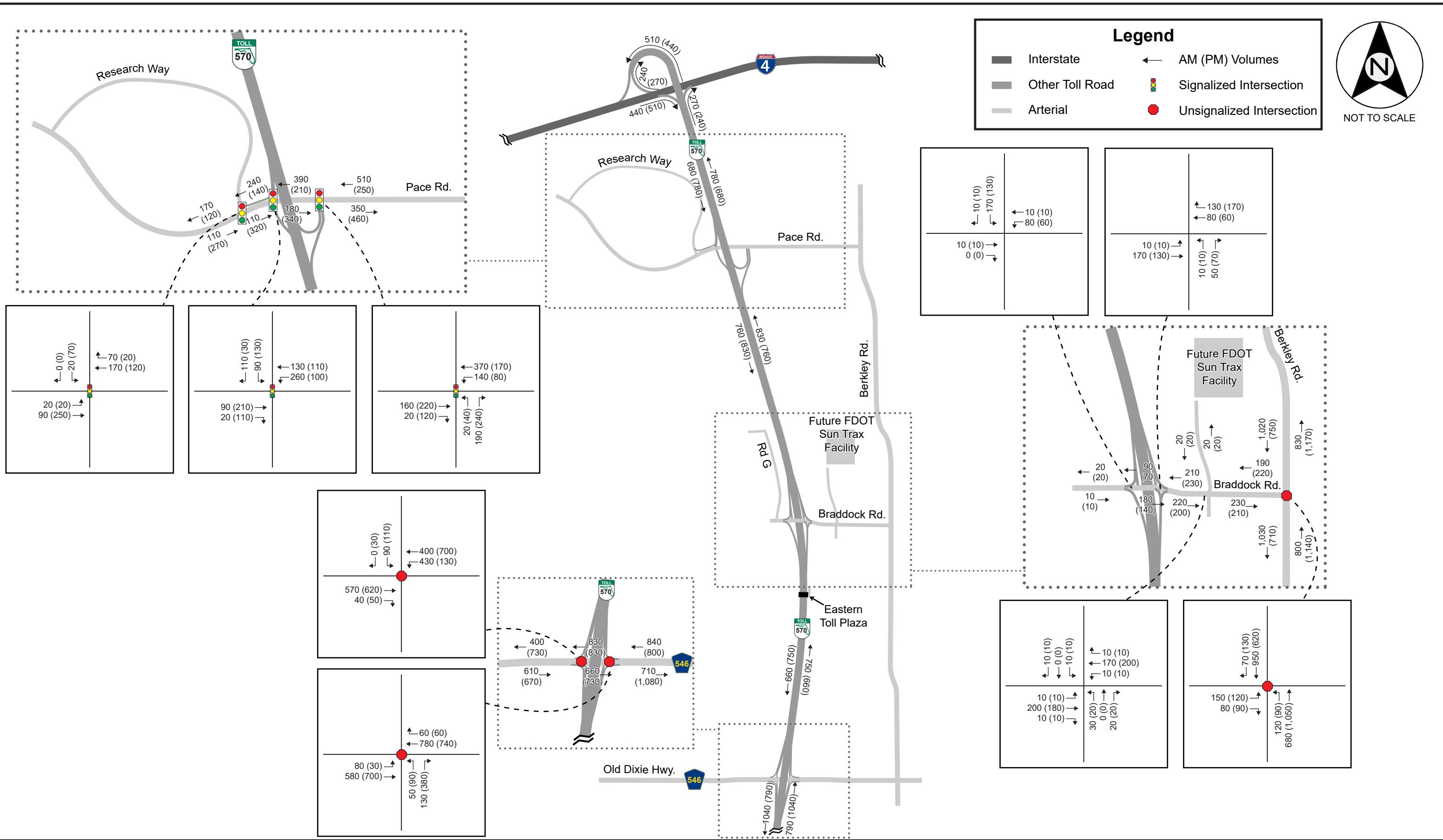
Note: Values in RED indicate PEAK direction and values in BLUE indicate OFF-PEAK direction

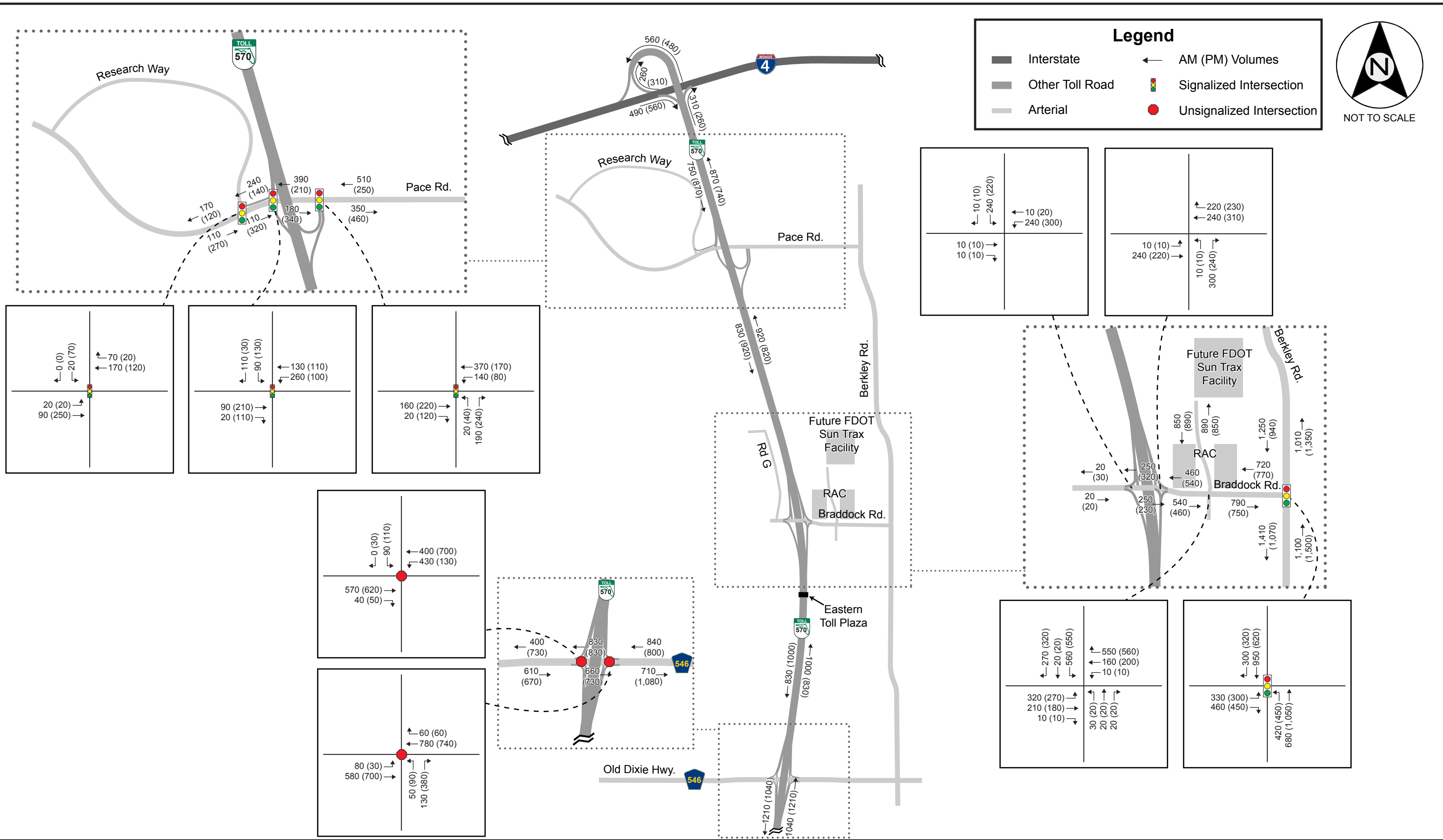












### **5.3 MAINLINE AND RAMPS LANE REQUIREMENTS**

Future lane requirements were evaluated to provide an estimated timeline for the onset of capacity deficiencies along the mainline and ramp roadways. Freeway mainline and ramp Level of Service (LOS) thresholds were based on the FDOT System Planning Office *Estimation of Capacities on Florida Freeways Report*, dated September 2014 and prepared by the Transportation Research Center, University of Florida. The FDOT thresholds were adjusted for local conditions. **Tables 5.6 through 5.8** show the color-coded lane requirements corresponding to LOS C constraints for the mainline and LOS D (capacity) for the ramp roadways, for No Build, Build without RAC traffic, and Build with RAC traffic, respectively.

The analysis shows that two lanes in each direction of Polk Parkway and single-lane interchange ramps will be required through the 2041 design year within the study limits, with or without the proposed interchange and RAC.



**Table 5.6  
Lane Requirements by Year for No Build**

<b>Mainline Maximum Service Volume (LOS C) and Ramp (LOS D) DDHV - Worst Case AM or PM Peak Hour</b>																							
Location	Polk Parkway	Model	Interpolated Volumes														Model	Extrapolated Volumes					
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
24 - I-4		410	430	450	460	480	500	520	540	550	570	590	610	630	640	660	680	700	710	730	750	760	780
23 - Pace Rd.		70	80	80	90	100	110	110	120	130	140	140	150	160	170	170	180	190	200	210	220	230	240
		100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	280	290	300
21 - EASTERN MAINLINE PLAZA		440	460	480	500	520	540	560	580	590	610	630	650	670	690	710	730	730	730	740	740	740	740
20 - Braddock Rd.		440	460	480	500	520	540	560	580	590	610	630	650	670	690	710	730	730	730	740	740	740	740
18 - Old Dixie Highway		40	50	50	60	60	70	80	80	90	90	100	110	110	120	120	130	140	140	150	160	160	170
		270	280	290	310	320	330	340	350	370	380	390	400	410	430	440	450	460	470	490	500	510	520
		630	650	680	700	720	740	770	790	810	830	860	880	900	920	950	970	980	990	1,010	1,020	1,030	1,040

Inputs	
Truck % (t <sub>r</sub> )	8.00%
Free Flow Speed (mph)	70
Peak Hour Factor (PHF)	0.95

Freeway LOS Thresholds	
Lanes	LOS C
2	2,680
3	4,020
4	5,360
5	6,700
6	8,040

Ramp Capacity by Number of Lanes	
1	1,520
2	3,040

Speed - 40 to 50 MPH

Ramp Capacity by Number of Lanes	
1	1,490
2	2,980

Speed 25 MPH

**Table 5.7  
Lane Requirements by Year for Build without Regional Activity Center**

<b>Mainline Maximum Service Volume (LOS C) and Ramp (LOS D) DDHV - Worst Case AM or PM Peak Hour</b>																							
<b>Location</b>	<b>Polk Parkway</b>	<b>Model</b>	<b>Interpolated Volumes</b>														<b>Model</b>	<b>Extrapolated Volumes</b>					
		<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>2037</b>	<b>2038</b>	<b>2039</b>	<b>2040</b>	<b>2041</b>
24 - I-4		410	430	460	480	500	530	550	570	600	620	640	670	690	710	740	760	760	770	770	770	780	780
23 - Pace Rd.		70	80	80	90	90	100	100	110	110	120	120	130	130	140	140	150	160	170	180	180	190	200
		100	110	120	130	130	140	150	160	170	180	190	200	200	210	220	230	240	250	260	260	270	280
20 - Braddock Rd.		440	460	490	510	540	560	580	610	630	660	680	700	730	750	780	800	810	810	820	820	830	830
		0	40	50	50	60	70	80	80	90	100	100	110	120	130	130	140	150	150	160	170	170	180
<b>20 - EASTERN MAINLINE PLAZA</b>		0	20	30	30	30	30	40	40	40	40	50	50	50	60	60	60	70	70	70	80	80	
18 - Old Dixie Highway		440	460	480	500	520	540	560	580	590	610	630	650	670	690	710	730	730	740	740	740	750	750
		40	40	50	50	60	60	60	70	70	80	80	80	90	90	100	100	110	110	120	130	130	140
		270	280	290	300	310	320	330	340	340	350	360	370	380	390	400	410	420	430	440	450	460	470
		630	650	680	700	720	740	770	790	810	830	860	880	900	920	950	970	980	990	1,010	1,020	1,030	1,040

<b>Inputs</b>	
Truck % (t <sub>r</sub> )	8.00%
Free Flow Speed (mph)	70
Peak Hour Factor (PHF)	0.95

<b>Freeway LOS Thresholds</b>	
Lanes	LOS C
2	2,680
3	4,020
4	5,360
5	6,700
6	8,040

<b>Ramp Capacity by Number of Lanes</b>	
1	1,520
2	3,040

Speed - 40 to 50 MPH

<b>Ramp Capacity by Number of Lanes</b>	
1	1,490
2	2,980

Speed 25 MPH

**Table 5.8  
Lane Requirements by Year for Build with Regional Activity Center**

<b>Mainline Maximum Service Volume (LOS C) and Ramp (LOS D) DDHV - Worst Case AM or PM Peak Hour</b>																							
<b>Location</b>	<b>Polk Parkway</b>	<b>Model</b>	<b>Interpolated Volumes</b>														<b>Model</b>	<b>Extrapolated Volumes</b>					
		<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>2037</b>	<b>2038</b>	<b>2039</b>	<b>2040</b>	<b>2041</b>
24 - I-4		410	430	460	480	510	530	550	580	600	630	650	670	700	720	750	770	790	800	820	840	850	870
23 - Pace Rd.		70	80	80	90	90	100	100	110	110	120	120	130	130	140	140	150	160	170	180	180	190	200
		100	110	120	130	130	140	150	160	170	180	190	200	200	210	220	230	240	250	260	260	270	280
20 - Braddock Rd.		440	460	490	510	540	560	590	610	640	660	690	710	740	760	790	810	830	850	870	880	900	920
		0	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250
<b>20 - EASTERN MAINLINE PLAZA</b>		0	60	80	90	110	120	130	140	150	160	170	180	200	210	220	230	240	260	270	280	300	310
		440	470	500	520	550	580	610	640	660	690	720	750	780	800	830	860	880	910	930	950	980	1,000
18 - Old Dixie Highway		40	40	50	50	60	60	60	70	70	80	80	80	90	90	100	100	110	110	120	130	130	140
		270	280	290	300	310	320	330	340	340	350	360	370	380	390	400	410	420	430	440	450	460	470
		630	660	690	720	760	790	820	850	880	910	940	970	1,010	1,040	1,070	1,100	1,120	1,140	1,160	1,170	1,190	1,210

<b>Inputs</b>	
Truck % (t <sub>r</sub> )	8.00%
Free Flow Speed (mph)	70
Peak Hour Factor (PHF)	0.95

<b>Freeway LOS Thresholds</b>	
Lanes	LOS C
2	2,680
3	4,020
4	5,360
5	6,700
6	8,040

<b>Ramp Capacity by Number of Lanes</b>	
1	1,520
2	3,040

Speed - 40 to 50 MPH

<b>Ramp Capacity by Number of Lanes</b>	
1	1,490
2	2,980

Speed 25 MPH

The alternatives evaluated for the proposed interchange are described in this section, as well as future traffic operational analysis and safety assessment.

## **6.1 ANALYSIS ALTERNATIVES**

Future conditions analysis involved estimating lane geometry at the proposed Braddock Road interchange ramp terminal and SunTrax access road intersections. The following interchange alternatives were evaluated in addition to the No Build:

### **Tight Diamond Interchange (TDI)**

The proposed interchange ramp terminal intersections would be closely spaced and signalized. A conceptual layout is presented on **Figure 6.1**.

### **Tight Diamond Interchange with Roundabouts (TDIR)**

Two roundabouts would be provided at the interchange ramp terminals instead of signalized intersections. The ramp terminal intersections would be closely spaced, similar to the TDI. A conceptual layout is presented on **Figure 6.2**.

Two alternatives for the Braddock Road and SunTrax access road intersection were also evaluated: signalized and a roundabout. For analysis purposes, the signalized intersection was included in the TDI alternative, whereas the roundabout intersection was included in the TDIR alternative.

The Build lane geometry is presented on **Figures 6.3** and **6.4** for the TDI and TDIR alternatives, respectively. The lane geometry was estimated using design year 2041 peak hour volumes with RAC traffic to assess worst case conditions. For signalized intersections, lane geometry was first estimated using Synchro and then verified using VISSIM microsimulation analysis. The proposed lane geometry at the Braddock Road interchange ramp terminals would be the same with or without the RAC, for both the TDI and TDIR alternatives. At the SunTrax access road intersection with Braddock Road, additional lane geometry would be required with the planned RAC traffic in the design year, such as an exclusive southbound left-turn lane for the signalized intersection and a second circulatory lane for the roundabout.

## **6.2 FUTURE OPERATIONAL PERFORMANCE**

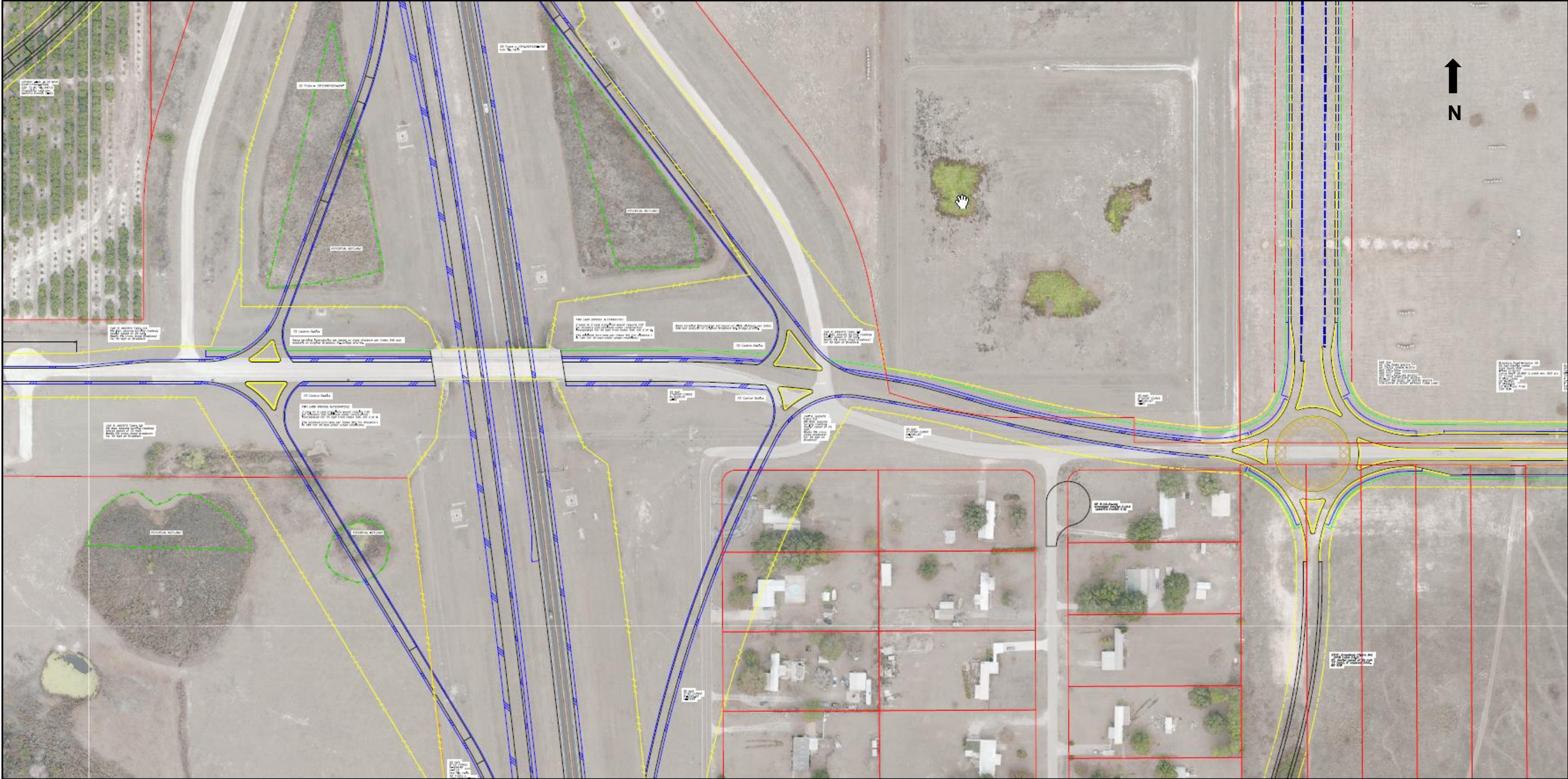
Future conditions analysis of the No Build and Build Braddock Road interchange assumed Build conditions on the Polk Parkway mainline, and was performed for the opening (2021) and design (2041) years. A summary of the analysis results is provided in this section, while detailed output reports and analysis files are provided in **Appendix D**.

### **6.2.1 Freeway Segment Analysis**

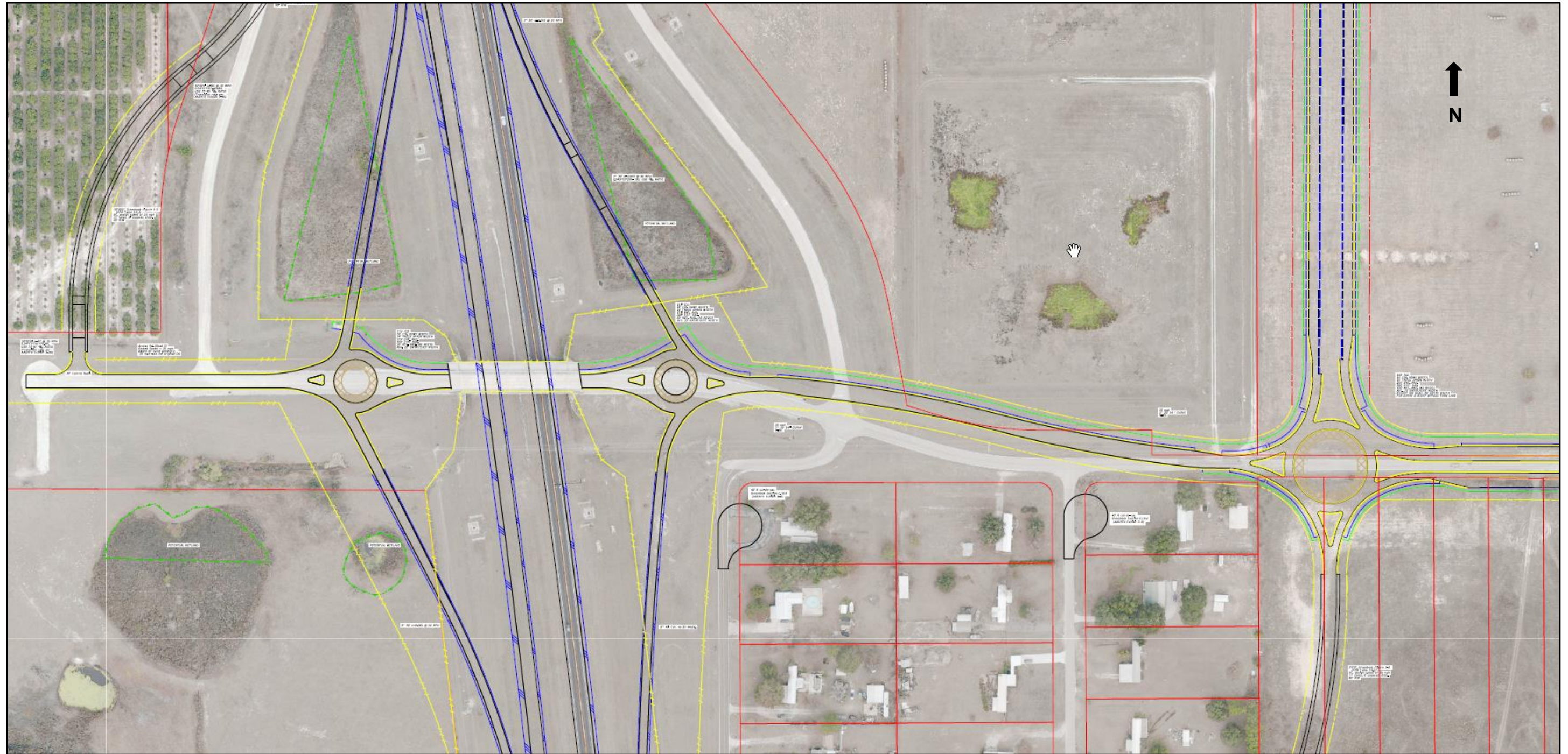
The future year peak hour traffic volumes were evaluated in each direction for freeway segments: basic, weave, and merge/diverge influence areas. The HCS results are summarized in **Tables 6.1**

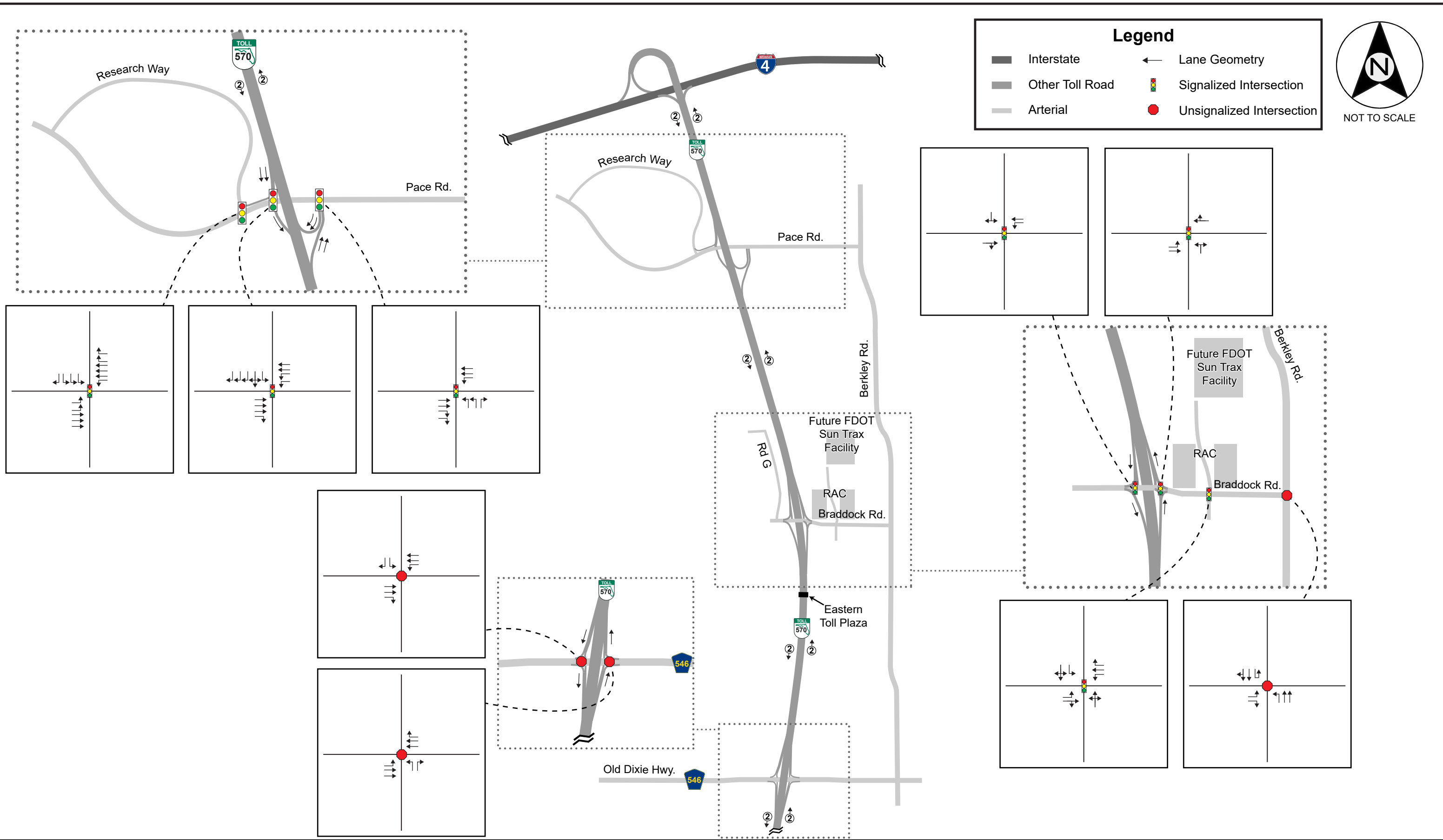
and 6.2, respectively, for the opening year 2021 and design year 2041 conditions. The results show that the freeway segments would operate at an acceptable LOS A or B in the future.

Figure 6.1  
Tight Diamond Interchange

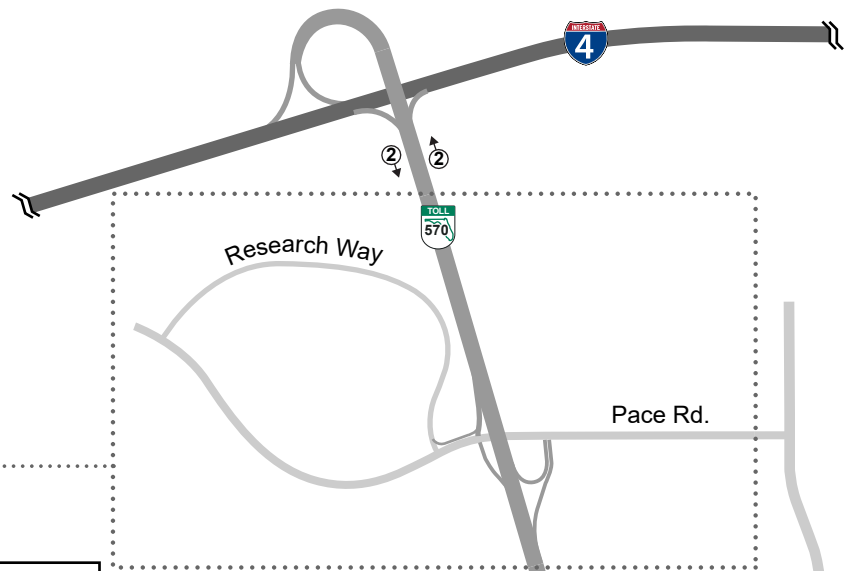
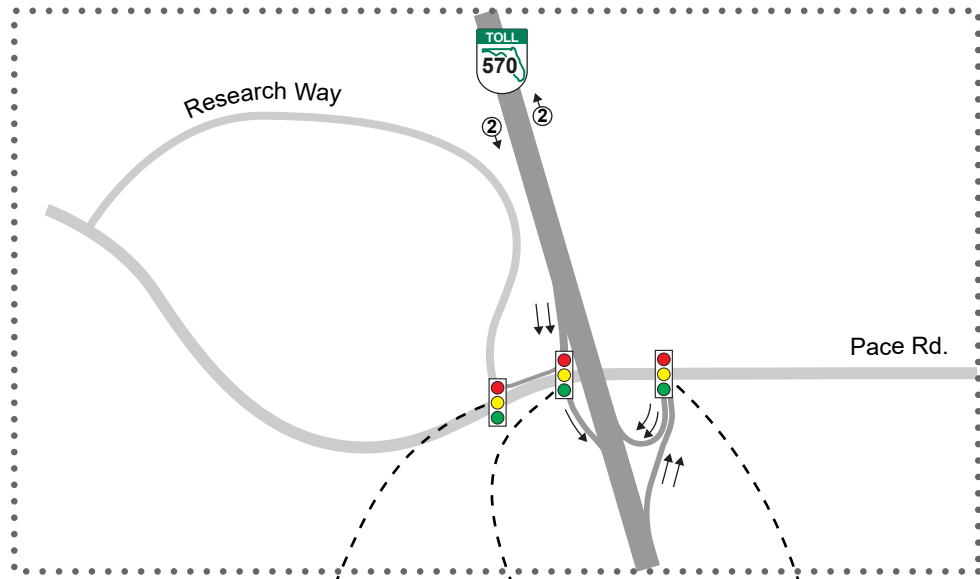


**Figure 6.2**  
**Tight Diamond Interchange with Roundabouts**



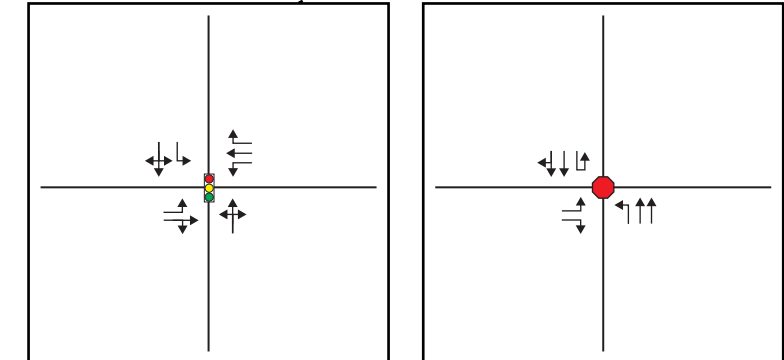
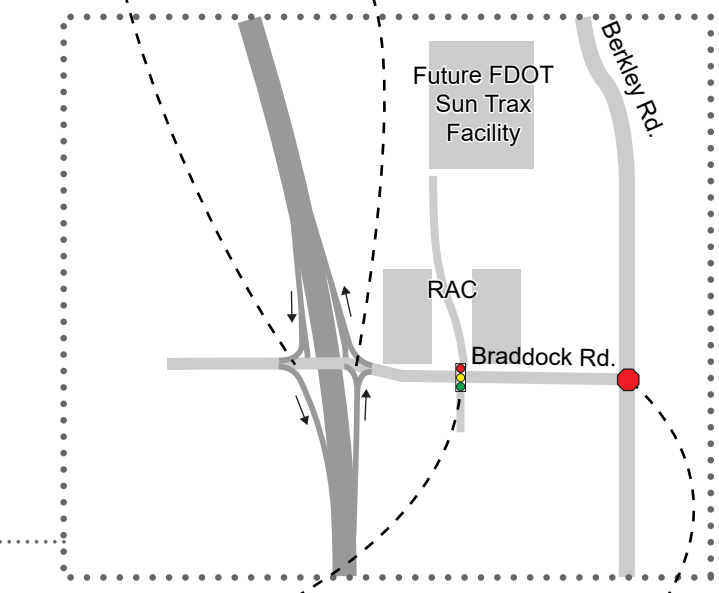
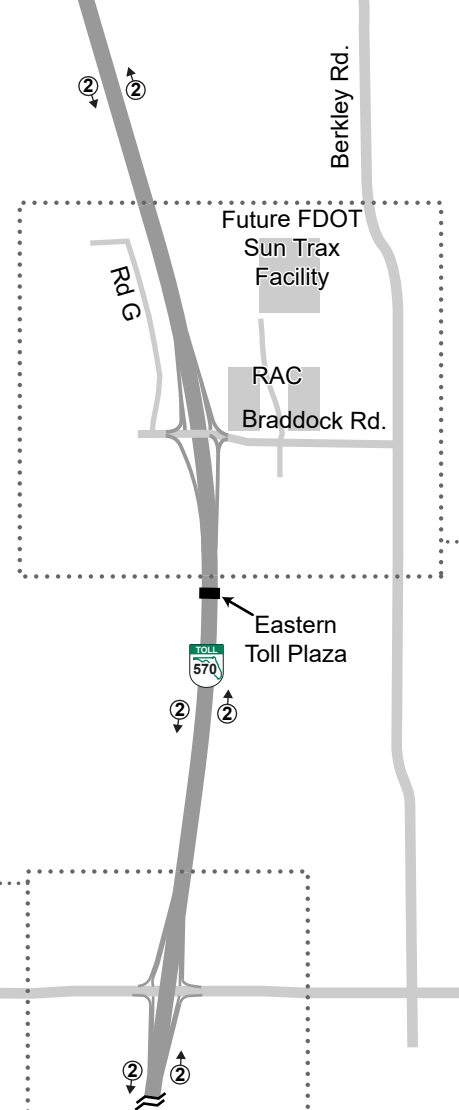
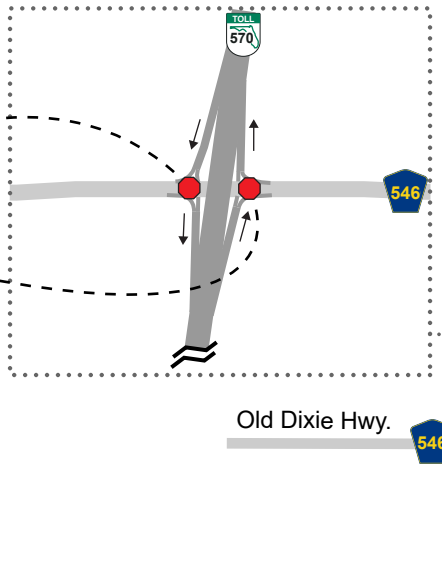
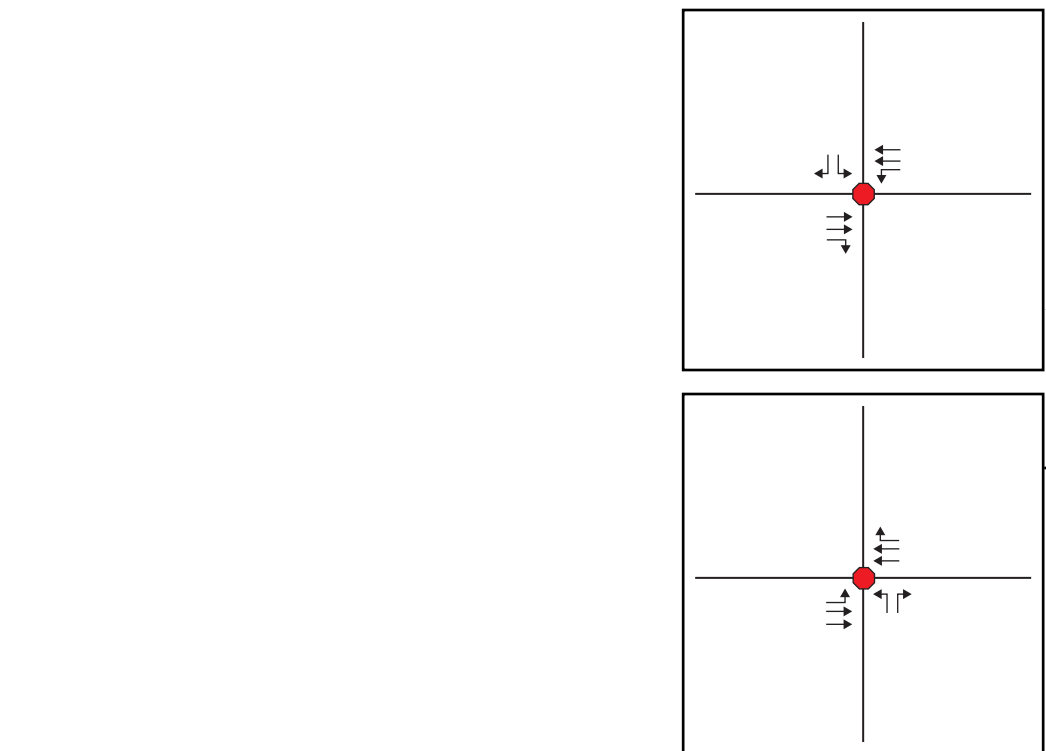
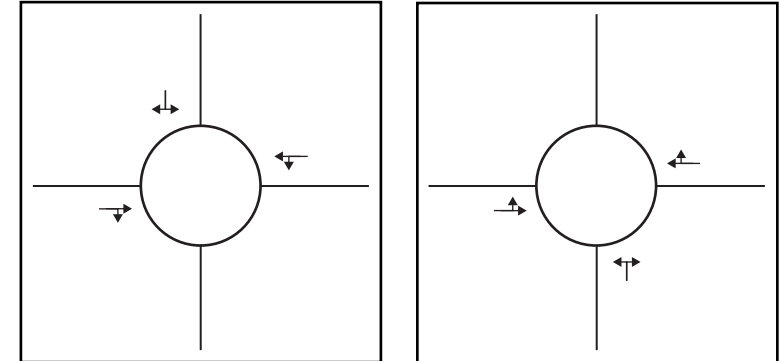
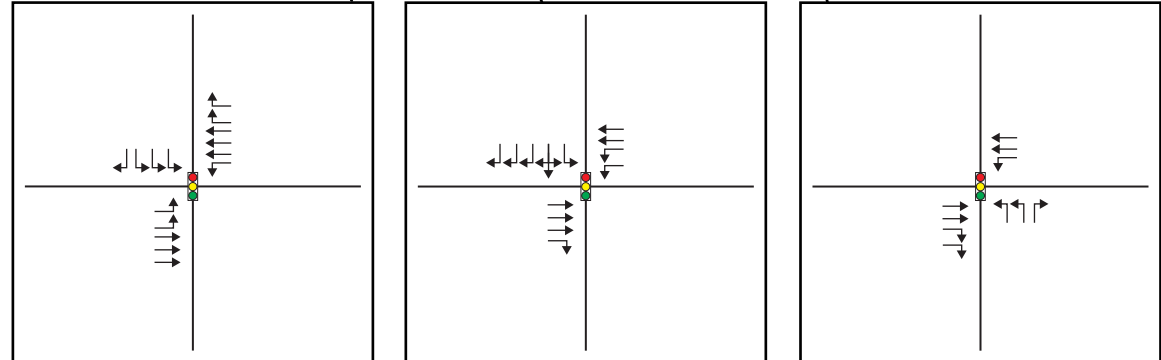
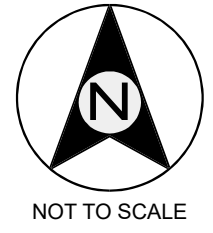






**Legend**

- Interstate
- Other Toll Road
- Arterial
- Lane Geometry
- Signalized Intersection
- Unsignalized Intersection
- Roundabout



### 6.2.2 Ramp Capacity Analysis

**Tables 6.3** and **6.4** summarize ramp capacity evaluation for the opening year 2021 and design year 2041 conditions, respectively. Results show that the highest V/C expected at the ramp roadways is 0.4 in the 2041 design year, even with the planned RAC.

### 6.2.3 Intersection Analysis

Analysis results for the signalized (Synchro) and unsignalized (HCS) intersections are presented in **Tables 6.5** through **6.10** for the No Build, Build without RAC, and Build with RAC. Results presented in these tables for the signalized intersections at the interchange ramp terminals are for the TDI alternative. Due to Synchro limitations in analyzing roundabouts, the TDIR alternative was initially evaluated using SIDRA, but the results were deemed inaccurate because of the macroscopic nature of the software, which does not capture vehicle interactions at the circulatory roadway. Thus, the TDIR was evaluated using the VISSIM microsimulation tool, which accounts for driver and vehicle interactions, in addition to the TDI. The VISSIM results are presented in **Section 6.2.4**.

Results in **Tables 6.5** through **6.7** show that the intersections within the AOI operate at an acceptable LOS C or better in the opening year 2021 for No Build, Build without RAC traffic, and Build with RAC traffic conditions.

As shown in **Table 6.8**, most of the intersections are expected to operate at an acceptable LOS C or better in the design year 2041 under No Build conditions. The only exception is the unsignalized intersection of Old Dixie Highway and the Polk Parkway westbound ramps, which is reported with an unacceptable LOS E/F. Results for the Build interchange scenario without RAC traffic (**Table 6.9**) are very similar to the No Build since the additional traffic is minimal, except that a second unsignalized intersection (Braddock Road and Berkley Road) is reported with an unacceptable LOS E/F. A small improvement is reported at the Old Dixie Highway intersections in **Table 6.9** compared to **Table 6.8** because some traffic is diverted to the proposed interchange. When the RAC traffic is added to the Build interchange scenario (**Table 6.10**), most of the intersections still operate at an acceptable LOS C or better. The unsignalized intersection of Old Dixie Highway and Polk Parkway westbound ramps operate at an unacceptable LOS F, similar to the Build scenario without RAC traffic in **Table 6.9**. The major impact of the RAC traffic would be at the unsignalized intersection of Braddock Road and Berkley Road, which is reported with an unacceptable LOS F and very long delays. Signalization of this intersection and addition of turn lanes should be considered in the future as traffic demand increases. Traffic data can be collected to perform signal warrant analysis 5 to 10 years after the interchange is open and additional development has occurred in the area.

**Table 6.1  
2021 Peak Hour HCS Freeway Segment Level of Service**

Segment	Segment Type	Lanes	Volume (vph)		LOS/Density	
			AM	PM	AM	PM
<b>No Build</b>						
<b>Polk Parkway - Southbound/Westbound</b>						
I-4 Ramps to Pace Road off-ramp	Basic	2	370	430	A	A
I-4 Ramps to Pace Road off-ramp	Diverge	2	370	430	A	A
Pace Road off-ramp to on-ramp	Basic	2	280	370	A	A
Pace Road on-ramp to Old Dixie Highway off-ramp	Merge	2	280	370	A	A
Pace Road on-ramp to Old Dixie Highway off-ramp	Basic	2	400	460	A	A
Pace Road on-ramp to Old Dixie Highway off-ramp	Diverge	2	400	460	A	A
Old Dixie Highway off-ramp to on-ramp	Basic	2	360	410	A	A
Downstream to Old Dixie Highway on-ramp	Merge	2	360	410	B/11	A
Downstream to Old Dixie Highway on-ramp	Basic	2	640	520	A	A
<b>Polk Parkway - Northbound/Eastbound</b>						
Upstream of Old Dixie Highway off-ramp	Basic	2	520	640	A	A
Upstream of Old Dixie Highway off-ramp	Diverge	2	520	640	A	A
Old Dixie Highway off-ramp to on-ramp	Basic	2	410	360	A	A
Old Dixie Highway on-ramp to Pace Road off-ramp	Merge	2	410	360	A	A
Old Dixie Highway on-ramp to Pace Road off-ramp	Basic	2	460	400	A	A
Old Dixie Highway on-ramp to Pace Road off-ramp	Diverge	2	460	400	A	A
Pace Road off-ramp to on-ramp	Basic	2	370	280	A	A
Pace Road on-ramp to I-4 Ramps	Merge	2	370	280	A	A
Pace Road on-ramp to I-4 Ramps	Basic	2	430	370	A	A
<b>Build without RAC</b>						
<b>Polk Parkway - Southbound/Westbound</b>						
I-4 Ramps to Pace Road off-ramp	Basic	2	390	440	A	A
I-4 Ramps to Pace Road off-ramp	Diverge	2	390	440	A	A
Pace Road off-ramp to on-ramp	Basic	2	330	400	A	A
Pace Road on-ramp to Braddock Road off-ramp	Merge	2	330	400	A	A
Pace Road on-ramp to Braddock Road off-ramp	Basic	2	420	470	A	A
Pace Road on-ramp to Braddock Road off-ramp	Diverge	2	420	470	A	A
Braddock Road off-ramp to on-ramp	Basic	2	380	440	A	A
Braddock Road on-ramp to Old Dixie Highway off-ramp	Merge	2	380	440	A	A
Braddock Road on-ramp to Old Dixie Highway off-ramp	Basic	2	400	460	A	A
Braddock Road on-ramp to Old Dixie Highway off-ramp	Diverge	2	400	460	A	A
Old Dixie Highway off-ramp to on-ramp	Basic	2	380	430	A	A
Downstream to Old Dixie Highway on-ramp	Merge	2	380	430	B/11	A
Downstream to Old Dixie Highway on-ramp	Basic	2	640	520	A	A
<b>Polk Parkway - Northbound/Eastbound</b>						
Upstream of Old Dixie Highway off-ramp	Basic	2	520	640	A	A
Upstream of Old Dixie Highway off-ramp	Diverge	2	520	640	A	A
Old Dixie Highway off-ramp to on-ramp	Basic	2	430	380	A	A
Old Dixie Highway on-ramp to Braddock Road off-ramp	Merge	2	430	380	A	A
Old Dixie Highway on-ramp to Braddock Road off-ramp	Basic	2	460	400	A	A
Old Dixie Highway on-ramp to Braddock Road off-ramp	Diverge	2	460	400	A	A
Braddock Road off-ramp to on-ramp	Basic	2	440	380	A	A
Braddock Road on-ramp to Pace Road off-ramp	Merge	2	440	380	A	A
Braddock Road on-ramp to Pace Road off-ramp	Basic	2	470	420	A	A
Braddock Road on-ramp to Pace Road off-ramp	Diverge	2	470	420	A	A
Pace Road off-ramp to on-ramp	Basic	2	400	330	A	A
Pace Road on-ramp to I-4 Ramps	Merge	2	400	330	A	A
Pace Road on-ramp to I-4 Ramps	Basic	2	440	390	A	A
<b>Build with RAC</b>						
<b>Polk Parkway - Southbound/Westbound</b>						
I-4 Ramps to Pace Road off-ramp	Basic	2	390	450	A	A
I-4 Ramps to Pace Road off-ramp	Diverge	2	390	450	A	A
Pace Road off-ramp to on-ramp	Basic	2	330	410	A	A
Pace Road on-ramp to Braddock Road off-ramp	Merge	2	330	410	A	A
Pace Road on-ramp to Braddock Road off-ramp	Basic	2	420	480	A	A
Pace Road on-ramp to Braddock Road off-ramp	Diverge	2	420	480	A	A
Braddock Road off-ramp to on-ramp	Basic	2	380	440	A	A
Braddock Road on-ramp to Old Dixie Highway off-ramp	Merge	2	380	440	A	A
Braddock Road on-ramp to Old Dixie Highway off-ramp	Basic	2	440	470	A	A
Braddock Road on-ramp to Old Dixie Highway off-ramp	Diverge	2	440	470	A	A
Old Dixie Highway off-ramp to on-ramp	Basic	2	420	440	A	A
Downstream to Old Dixie Highway on-ramp	Merge	2	420	440	B/11	A
Downstream to Old Dixie Highway on-ramp	Basic	2	680	530	A	A
<b>Polk Parkway - Northbound/Eastbound</b>						
Upstream of Old Dixie Highway off-ramp	Basic	2	530	680	A	A
Upstream of Old Dixie Highway off-ramp	Diverge	2	530	680	A	A
Old Dixie Highway off-ramp to on-ramp	Basic	2	440	420	A	A
Old Dixie Highway on-ramp to Braddock Road off-ramp	Merge	2	440	420	A	A
Old Dixie Highway on-ramp to Braddock Road off-ramp	Basic	2	470	440	A	A
Old Dixie Highway on-ramp to Braddock Road off-ramp	Diverge	2	470	440	A	A
Braddock Road off-ramp to on-ramp	Basic	2	430	380	A	A
Braddock Road on-ramp to Pace Road off-ramp	Merge	2	430	380	A	A
Braddock Road on-ramp to Pace Road off-ramp	Basic	2	480	430	A	A
Braddock Road on-ramp to Pace Road off-ramp	Diverge	2	480	430	A	A
Pace Road off-ramp to on-ramp	Basic	2	410	340	A	A
Pace Road on-ramp to I-4 Ramps	Merge	2	410	340	A	A
Pace Road on-ramp to I-4 Ramps	Basic	2	450	400	A	A

**Table 6.2  
2041 Peak Hour HCS Freeway Segment Level of Service**

Segment	Segment Type	Lanes	Volume (vph)		LOS/Density	
			AM	PM	AM	PM
<b>No Build</b>						
<b>Polk Parkway - Southbound/Westbound</b>						
I-4 Ramps to Pace Road off-ramp	Basic	2	590	690	A	A
I-4 Ramps to Pace Road off-ramp	Diverge	2	590	690	A	A
Pace Road off-ramp to on-ramp	Basic	2	350	510	A	A
Pace Road on-ramp to Old Dixie Highway off-ramp	Merge	2	350	510	A	A
Pace Road on-ramp to Old Dixie Highway off-ramp	Basic	2	650	740	A	A
Pace Road on-ramp to Old Dixie Highway off-ramp	Diverge	2	650	740	A	B/11
Old Dixie Highway off-ramp to on-ramp	Basic	2	520	570	A	A
Downstream to Old Dixie Highway on-ramp	Merge	2	520	570	B/14	B/12
Downstream to Old Dixie Highway on-ramp	Basic	2	1,040	790	A	A
<b>Polk Parkway - Northbound/Eastbound</b>						
Upstream of Old Dixie Highway off-ramp	Basic	2	790	1,040	A	A
Upstream of Old Dixie Highway off-ramp	Diverge	2	790	1,040	B/11	B/14
Old Dixie Highway off-ramp to on-ramp	Basic	2	570	520	A	A
Old Dixie Highway on-ramp to Pace Road off-ramp	Merge	2	570	520	B/12	B/11
Old Dixie Highway on-ramp to Pace Road off-ramp	Basic	2	740	650	A	A
Old Dixie Highway on-ramp to Pace Road off-ramp	Diverge	2	740	650	A	A
Pace Road off-ramp to on-ramp	Basic	2	510	350	A	A
Pace Road on-ramp to I-4 Ramps	Merge	2	510	350	A	A
Pace Road on-ramp to I-4 Ramps	Basic	2	690	590	A	A
<b>Build without RAC</b>						
<b>Polk Parkway - Southbound/Westbound</b>						
I-4 Ramps to Pace Road off-ramp	Basic	2	680	780	A	A
I-4 Ramps to Pace Road off-ramp	Diverge	2	680	780	A	A
Pace Road off-ramp to on-ramp	Basic	2	480	620	A	A
Pace Road on-ramp to Braddock Road off-ramp	Merge	2	480	620	A	A
Pace Road on-ramp to Braddock Road off-ramp	Basic	2	760	830	A	A
Pace Road on-ramp to Braddock Road off-ramp	Diverge	2	760	830	B/11	B/12
Braddock Road off-ramp to on-ramp	Basic	2	580	690	A	A
Braddock Road on-ramp to Old Dixie Highway off-ramp	Merge	2	580	690	B/11	B/12
Braddock Road on-ramp to Old Dixie Highway off-ramp	Basic	2	660	750	A	A
Braddock Road on-ramp to Old Dixie Highway off-ramp	Diverge	2	660	750	A	B/11
Old Dixie Highway off-ramp to on-ramp	Basic	2	570	610	A	A
Downstream to Old Dixie Highway on-ramp	Merge	2	570	610	B/14	B/12
Downstream to Old Dixie Highway on-ramp	Basic	2	1,040	790	A	A
<b>Polk Parkway - Northbound/Eastbound</b>						
Upstream of Old Dixie Highway off-ramp	Basic	2	790	1,040	A	A
Upstream of Old Dixie Highway off-ramp	Diverge	2	790	1,040	B/11	B/14
Old Dixie Highway off-ramp to on-ramp	Basic	2	610	570	A	A
Old Dixie Highway on-ramp to Braddock Road off-ramp	Merge	2	610	570	B/12	B/11
Old Dixie Highway on-ramp to Braddock Road off-ramp	Basic	2	750	660	A	A
Old Dixie Highway on-ramp to Braddock Road off-ramp	Diverge	2	750	660	B/11	A
Braddock Road off-ramp to on-ramp	Basic	2	690	580	A	A
Braddock Road on-ramp to Pace Road off-ramp	Merge	2	690	580	B/13	B/12
Braddock Road on-ramp to Pace Road off-ramp	Basic	2	830	760	A	A
Braddock Road on-ramp to Pace Road off-ramp	Diverge	2	830	760	A	A
Pace Road off-ramp to on-ramp	Basic	2	620	480	A	A
Pace Road on-ramp to I-4 Ramps	Merge	2	620	480	A	A
Pace Road on-ramp to I-4 Ramps	Basic	2	780	680	A	A
<b>Build with RAC</b>						
<b>Polk Parkway - Southbound/Westbound</b>						
I-4 Ramps to Pace Road off-ramp	Basic	2	750	870	A	A
I-4 Ramps to Pace Road off-ramp	Diverge	2	750	870	A	A
Pace Road off-ramp to on-ramp	Basic	2	550	710	A	A
Pace Road on-ramp to Braddock Road off-ramp	Merge	2	550	710	A	B/11
Pace Road on-ramp to Braddock Road off-ramp	Basic	2	830	920	A	A
Pace Road on-ramp to Braddock Road off-ramp	Diverge	2	830	920	B/12	B/13
Braddock Road off-ramp to on-ramp	Basic	2	580	690	A	A
Braddock Road on-ramp to Old Dixie Highway off-ramp	Merge	2	580	690	B/12	B/14
Braddock Road on-ramp to Old Dixie Highway off-ramp	Basic	2	830	1,000	A	A
Braddock Road on-ramp to Old Dixie Highway off-ramp	Diverge	2	830	1,000	B/12	B/14
Old Dixie Highway off-ramp to on-ramp	Basic	2	740	860	A	A
Downstream to Old Dixie Highway on-ramp	Merge	2	740	860	B/16	B/15
Downstream to Old Dixie Highway on-ramp	Basic	2	1,210	1,040	B/11	A
<b>Polk Parkway - Northbound/Eastbound</b>						
Upstream of Old Dixie Highway off-ramp	Basic	2	1,040	1,210	A	B/11
Upstream of Old Dixie Highway off-ramp	Diverge	2	1,040	1,210	B/14	B/16
Old Dixie Highway off-ramp to on-ramp	Basic	2	860	740	A	A
Old Dixie Highway on-ramp to Braddock Road off-ramp	Merge	2	860	740	B/14	B/13
Old Dixie Highway on-ramp to Braddock Road off-ramp	Basic	2	1,000	830	A	A
Old Dixie Highway on-ramp to Braddock Road off-ramp	Diverge	2	1,000	830	B/14	B/12
Braddock Road off-ramp to on-ramp	Basic	2	690	580	A	A
Braddock Road on-ramp to Pace Road off-ramp	Merge	2	690	580	B/13	B/12
Braddock Road on-ramp to Pace Road off-ramp	Basic	2	920	820	A	A
Braddock Road on-ramp to Pace Road off-ramp	Diverge	2	920	820	A	A
Pace Road off-ramp to on-ramp	Basic	2	710	540	A	A
Pace Road on-ramp to I-4 Ramps	Merge	2	710	540	A	A
Pace Road on-ramp to I-4 Ramps	Basic	2	870	740	A	A

**Table 6.3  
2021 Peak Hour Ramp Capacity Analysis**

Polk Parkway Interchange	Ramp	Lanes	Volume (vph)		Capacity (vph)	V/C	
			AM	PM		AM	PM
<b>No Build</b>							
I-4	Westbound off-ramp	1	130	150	1,490	0.1	0.1
	Eastbound on-ramp	1	150	130	1,520	0.1	0.1
	Westbound on-ramp	1	280	240	1,520	0.2	0.2
	Eastbound off-ramp	1	240	280	1,520	0.2	0.2
Pace Road	Westbound off-ramp	2	90	60	1,520	0.1	0.0
	Eastbound on-ramp	2	60	90	1,490	0.0	0.1
	Westbound on-ramp	1	120	90	1,520	0.1	0.1
	Eastbound off-ramp	2	90	120	1,520	0.1	0.1
Old Dixie Highway	Westbound off-ramp	1	40	50	1,520	0.0	0.0
	Eastbound on-ramp	1	50	40	1,520	0.0	0.0
	Westbound on-ramp	1	280	110	1,520	0.2	0.1
	Eastbound off-ramp	1	110	280	1,520	0.1	0.2
<b>Build without RAC</b>							
I-4	Westbound off-ramp	1	140	150	1,490	0.1	0.1
	Eastbound on-ramp	1	150	140	1,520	0.1	0.1
	Westbound on-ramp	1	290	250	1,520	0.2	0.2
	Eastbound off-ramp	1	250	290	1,520	0.2	0.2
Pace Road	Westbound off-ramp	2	60	40	1,520	0.0	0.0
	Eastbound on-ramp	2	40	60	1,490	0.0	0.0
	Westbound on-ramp	1	90	70	1,520	0.1	0.0
	Eastbound off-ramp	2	70	90	1,520	0.0	0.1
Braddock Road	Westbound off-ramp	1	40	30	1,520	0.0	0.0
	Eastbound on-ramp	1	30	40	1,520	0.0	0.0
	Westbound on-ramp	1	20	20	1,520	0.0	0.0
	Eastbound off-ramp	1	20	20	1,520	0.0	0.0
Old Dixie Highway	Westbound off-ramp	1	20	30	1,520	0.0	0.0
	Eastbound on-ramp	1	30	20	1,520	0.0	0.0
	Westbound on-ramp	1	260	90	1,520	0.2	0.1
	Eastbound off-ramp	1	90	260	1,520	0.1	0.2
<b>Build with RAC</b>							
I-4	Westbound off-ramp	1	140	160	1,490	0.1	0.1
	Eastbound on-ramp	1	160	140	1,520	0.1	0.1
	Westbound on-ramp	1	300	260	1,520	0.2	0.2
	Eastbound off-ramp	1	250	290	1,520	0.2	0.2
Pace Road	Westbound off-ramp	2	60	40	1,520	0.0	0.0
	Eastbound on-ramp	2	40	60	1,490	0.0	0.0
	Westbound on-ramp	1	90	70	1,520	0.1	0.0
	Eastbound off-ramp	2	70	90	1,520	0.0	0.1
Braddock Road	Westbound off-ramp	1	40	40	1,520	0.0	0.0
	Eastbound on-ramp	1	50	50	1,520	0.0	0.0
	Westbound on-ramp	1	60	30	1,520	0.0	0.0
	Eastbound off-ramp	1	40	60	1,520	0.0	0.0
Old Dixie Highway	Westbound off-ramp	1	20	30	1,520	0.0	0.0
	Eastbound on-ramp	1	30	20	1,520	0.0	0.0
	Westbound on-ramp	1	260	90	1,520	0.2	0.1
	Eastbound off-ramp	1	90	260	1,520	0.1	0.2

**Table 6.4  
2041 Peak Hour Ramp Capacity Analysis**

Polk Parkway Interchange	Ramp	Lanes	Volume (vph)		Capacity (vph)	V/C	
			AM	PM		AM	PM
<b>No Build</b>							
I-4	Westbound off-ramp	1	210	240	1,490	0.1	0.2
	Eastbound on-ramp	1	240	210	1,520	0.2	0.1
	Westbound on-ramp	1	450	380	1,520	0.3	0.3
	Eastbound off-ramp	1	380	450	1,520	0.3	0.3
Pace Road	Westbound off-ramp	2	240	180	1,520	0.2	0.1
	Eastbound on-ramp	2	180	240	1,490	0.1	0.2
	Westbound on-ramp	1	300	230	1,520	0.2	0.2
	Eastbound off-ramp	2	230	300	1,520	0.2	0.2
Old Dixie Highway	Westbound off-ramp	1	130	170	1,520	0.1	0.1
	Eastbound on-ramp	1	170	130	1,520	0.1	0.1
	Westbound on-ramp	1	520	220	1,520	0.3	0.1
	Eastbound off-ramp	1	220	520	1,520	0.1	0.3
<b>Build without RAC</b>							
I-4	Westbound off-ramp	1	240	270	1,490	0.2	0.2
	Eastbound on-ramp	1	270	240	1,520	0.2	0.2
	Westbound on-ramp	1	510	440	1,520	0.3	0.3
	Eastbound off-ramp	1	440	510	1,520	0.3	0.3
Pace Road	Westbound off-ramp	2	200	160	1,520	0.1	0.1
	Eastbound on-ramp	2	160	200	1,490	0.1	0.1
	Westbound on-ramp	1	280	210	1,520	0.2	0.1
	Eastbound off-ramp	2	210	280	1,520	0.1	0.2
Braddock Road	Westbound off-ramp	1	180	140	1,520	0.1	0.1
	Eastbound on-ramp	1	140	180	1,520	0.1	0.1
	Westbound on-ramp	1	80	60	1,520	0.1	0.0
	Eastbound off-ramp	1	60	80	1,520	0.0	0.1
Old Dixie Highway	Westbound off-ramp	1	90	140	1,520	0.1	0.1
	Eastbound on-ramp	1	140	90	1,520	0.1	0.1
	Westbound on-ramp	1	470	180	1,520	0.3	0.1
	Eastbound off-ramp	1	180	470	1,520	0.1	0.3
<b>Build with RAC</b>							
I-4	Westbound off-ramp	1	260	310	1,490	0.2	0.2
	Eastbound on-ramp	1	310	260	1,520	0.2	0.2
	Westbound on-ramp	1	560	480	1,520	0.4	0.3
	Eastbound off-ramp	1	490	560	1,520	0.3	0.4
Pace Road	Westbound off-ramp	2	200	160	1,520	0.1	0.1
	Eastbound on-ramp	2	160	200	1,490	0.1	0.1
	Westbound on-ramp	1	280	210	1,520	0.2	0.1
	Eastbound off-ramp	2	210	280	1,520	0.1	0.2
Braddock Road	Westbound off-ramp	1	250	230	1,520	0.2	0.2
	Eastbound on-ramp	1	230	240	1,520	0.2	0.2
	Westbound on-ramp	1	250	310	1,520	0.2	0.2
	Eastbound off-ramp	1	310	250	1,520	0.2	0.2
Old Dixie Highway	Westbound off-ramp	1	90	140	1,520	0.1	0.1
	Eastbound on-ramp	1	140	90	1,520	0.1	0.1
	Westbound on-ramp	1	470	180	1,520	0.3	0.1
	Eastbound off-ramp	1	180	470	1,520	0.1	0.3

**Table 6.5  
2021 No Build Peak Hour Intersection Level of Service/Delay (s/veh)**

Intersection	Eastbound			Westbound			Northbound			Southbound			Overall
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
<b>AM</b>													
<b>Pace Road</b>													
Research Way	B/18	A	-	A	A	A	-	-	-	B/18	-	A	A
Polk Parkway Westbound Ramps	-	B/12	A	C/22	A	-	-	-	-	C/23	-	A	B/10
Polk Parkway Eastbound Ramps	-	B/13	A	C/25	A	-	C/20	-	A	-	-	-	A
<b>Braddock Road</b>													
Road G*	A	A	-	-	A	A	-	-	-	A	-	A	A
Spring Road*	A	A	A	A	A	A	A	A	A	A	A	A	A
Berkley Road*	B/13	-	B/13	-	-	-	A	A	-	B/10	A	A	B/13
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	A	A	-	-	-	-	C/19	-	A	C/19
Polk Parkway Eastbound Ramps*	A	A	-	-	A	A	B/14	-	B/10	-	-	-	B/14
<b>PM</b>													
<b>Pace Road</b>													
Research Way	B/17	A	-	A	A	A	-	-	-	B/17	-	A	A
Polk Parkway Westbound Ramps	-	A	A	C/20	A	-	-	-	-	C/21	-	A	A
Polk Parkway Eastbound Ramps	-	B/11	A	C/23	A	-	B/19	-	A	-	-	-	A
<b>Braddock Road</b>													
Road G*	A	A	-	-	A	A	-	-	-	A	-	A	A
Spring Road*	A	A	A	A	A	A	A	A	A	A	A	A	A
Berkley Road*	B/12	-	B/12	-	-	-	A	A	-	B/13	A	A	B/13
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	A	A	-	-	-	-	C/16	-	B/10	C/16
Polk Parkway Eastbound Ramps*	A	A	-	-	A	A	B/15	-	B/12	-	-	-	B/15

- Not Applicable      \*Unsignalized

**Table 6.6  
2021 Build without RAC Peak Hour Intersection Level of Service/Delay (s/veh)**

Intersection	Eastbound			Westbound			Northbound			Southbound			Overall
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
<b>AM</b>													
<b>Pace Road</b>													
Research Way	B/18	A	-	A	A	A	-	-	-	B/18	-	A	A
Polk Parkway Westbound Ramps	-	B/11	A	C/21	A	-	-	-	-	C/22	-	A	A
Polk Parkway Eastbound Ramps	-	B/11	A	C/23	A	-	B/19	-	A	-	-	-	A
<b>Braddock Road</b>													
Polk Parkway Westbound Ramps	-	A	A	A	A	-	-	-	-	B/19	-	B/19	B/12
Polk Parkway Eastbound Ramps	A	A	-	-	A	A	A	-	A	-	-	-	A
SunTrax Access	A	A	A	A	A	A	A	A	A	C/21	A	A	A
Berkley Road*	C/18	-	B/12	-	-	-	A	A	-	B/10	A	A	C/18
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	A	A	-	-	-	-	C/18	-	A	C/18
Polk Parkway Eastbound Ramps*	A	A	-	-	A	A	B/14	-	A	-	-	-	B/14
<b>PM</b>													
<b>Pace Road</b>													
Research Way	B/17	A	-	A	A	A	-	-	-	B/17	-	A	A
Polk Parkway Westbound Ramps	-	A	A	B/18	A	-	-	-	-	B/18	-	A	A
Polk Parkway Eastbound Ramps	-	B/11	A	C/23	A	-	B/19	-	A	-	-	-	A
<b>Braddock Road</b>													
Polk Parkway Westbound Ramps	-	A	A	A	A	-	-	-	-	B/18	-	B/18	B/11
Polk Parkway Eastbound Ramps	A	A	-	-	A	A	A	-	A	-	-	-	A
SunTrax Access	A	A	A	A	A	A	A	A	A	B/15	A	A	A
Berkley Road*	C/16	-	B/10	-	-	-	A	A	-	B/13	A	A	C/16
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	A	A	-	-	-	-	C/15	-	B/10	C/15
Polk Parkway Eastbound Ramps*	A	A	-	-	A	A	B/15	-	B/12	-	-	-	B/15

- Not Applicable      \*Unsignalized

**Table 6.7**  
**2021 Build with RAC Peak Hour Intersection Level of Service/Delay (s/veh)**

Intersection	Eastbound			Westbound			Northbound			Southbound			Overall
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
<b>AM</b>													
<b>Pace Road</b>													
Research Way	B/18	A	-	A	A	A	-	-	-	B/18	-	A	A
Polk Parkway Westbound Ramps	-	B/11	A	C/21	A	-	-	-	-	C/22	-	A	A
Polk Parkway Eastbound Ramps	-	B/11	A	C/23	A	-	B/19	-	A	-	-	-	A
<b>Braddock Road</b>													
Polk Parkway Westbound Ramps	-	A	A	A	A	-	-	-	-	C/21	-	C/21	A
Polk Parkway Eastbound Ramps	A	A	-	-	A	A	A	-	A	-	-	-	A
SunTrax Access	B/10	B/12	B/12	B/10	B/17	A	C/23	C/23	C/23	C/28	B/15	B/15	B/14
Berkley Road*	C/21	-	B/12	-	-	-	B/10	A	-	B/10	A	A	C/21
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	A	A	-	-	-	-	C/18	-	A	C/18
Polk Parkway Eastbound Ramps*	A	A	-	-	A	A	B/14	-	A	-	-	-	B/14
<b>PM</b>													
<b>Pace Road</b>													
Research Way	B/17	A	-	A	A	A	-	-	-	B/17	-	A	A
Polk Parkway Westbound Ramps	-	A	A	B/18	A	-	-	-	-	B/18	-	A	A
Polk Parkway Eastbound Ramps	-	B/11	A	C/23	A	-	B/19	-	A	-	-	-	A
<b>Braddock Road</b>													
Polk Parkway Westbound Ramps	-	A	A	A	A	-	-	-	-	C/21	-	C/21	B/12
Polk Parkway Eastbound Ramps	A	A	-	-	A	A	A	-	A	-	-	-	A
SunTrax Access	A	B/11	B/11	A	B/17	A	C/23	C/23	C/23	C/28	B/18	B/18	B/15
Berkley Road*	C/17	-	B/11	-	-	-	A	A	-	B/13	A	A	C/17
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	A	A	-	-	-	-	C/15	-	B/10	C/15
Polk Parkway Eastbound Ramps*	A	A	-	-	A	A	B/15	-	B/12	-	-	-	B/15

- Not Applicable      \*Unsignalized

**Table 6.8**  
**2041 No Build Peak Hour Intersection Level of Service/Delay (s/veh)**

Intersection	Eastbound			Westbound			Northbound			Southbound			Overall
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
<b>AM</b>													
<b>Pace Road</b>													
Research Way	B/18	A	-	A	A	A	-	-	-	B/18	-	A	A
Polk Parkway Westbound Ramps	-	B/15	A	C/25	A	-	-	-	-	C/27	-	A	B/16
Polk Parkway Eastbound Ramps	-	B/16	A	C/30	A	-	C/23	-	A	-	-	-	B/12
<b>Braddock Road</b>													
Road G*	A	A	-	-	A	A	-	-	-	A	-	A	A
Spring Road*	A	A	A	A	A	A	A	A	A	A	A	A	A
Berkley Road*	C/17	-	C/17	-	-	-	B/11	A	-	B/12	A	A	C/17
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	B/12	A	-	-	-	-	F/86	-	A	F/86
Polk Parkway Eastbound Ramps*	B/10	A	-	-	A	A	C/21	-	B/12	-	-	-	C/21
<b>PM</b>													
<b>Pace Road</b>													
Research Way	B/17	A	-	A	A	A	-	-	-	B/17	-	A	A
Polk Parkway Westbound Ramps	-	B/14	A	C/24	A	-	-	-	-	C/25	-	A	B/12
Polk Parkway Eastbound Ramps	-	B/15	A	C/28	A	-	C/22	-	A	-	-	-	B/11
<b>Braddock Road</b>													
Road G*	A	A	-	-	A	A	-	-	-	A	-	A	A
Spring Road*	A	A	A	A	A	A	A	A	A	A	A	A	A
Berkley Road*	C/15	-	C/15	-	-	-	A	A	-	C/19	A	A	C/19
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	A	A	-	-	-	-	E/42	-	B/11	E/42
Polk Parkway Eastbound Ramps*	A	A	-	-	A	A	C/25	-	C/25	-	-	-	C/25

- Not Applicable      \*Unsignalized



**Table 6.9**  
**2041 Build without RAC Peak Hour Intersection Level of Service/Delay (s/veh)**

Intersection	Eastbound			Westbound			Northbound			Southbound			Overall
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
<b>AM</b>													
<b>Pace Road</b>													
Research Way	B/18	A	-	A	A	A	-	-	-	B/18	-	A	A
Polk Parkway Westbound Ramps	-	B/15	A	C/24	A	-	-	-	-	C/26	-	A	B/14
Polk Parkway Eastbound Ramps	-	B/16	A	C/29	A	-	C/23	-	A	-	-	-	B/12
<b>Braddock Road</b>													
Polk Parkway Westbound Ramps	-	B/13	B/13	A	A	-	-	-	-	B/14	-	B/14	B/11
Polk Parkway Eastbound Ramps	A	A	-	-	A	A	A	-	A	-	-	-	A
SunTrax Access	A	B/10	B/10	A	B/10	A	A	A	A	C/23	A	A	A
Berkley Road*	<b>F/98</b>	-	B/14	-	-	-	B/12	A	-	B/12	A	A	<b>F/98</b>
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	B/12	A	-	-	-	-	<b>F/51</b>	-	A	<b>F/51</b>
Polk Parkway Eastbound Ramps*	B/10	A	-	-	A	A	C/20	-	B/12	-	-	-	C/20
<b>PM</b>													
<b>Pace Road</b>													
Research Way	B/17	A	-	A	A	A	-	-	-	B/17	-	A	A
Polk Parkway Westbound Ramps	-	B/13	A	C/23	A	-	-	-	-	C/24	-	A	B/12
Polk Parkway Eastbound Ramps	-	B/15	A	C/27	A	-	C/21	-	A	-	-	-	B/11
<b>Braddock Road</b>													
Polk Parkway Westbound Ramps	-	B/12	B/12	A	A	-	-	-	-	B/10	-	B/10	A
Polk Parkway Eastbound Ramps	A	A	-	-	A	A	A	-	A	-	-	-	A
SunTrax Access	A	B/10	B/10	A	B/10	A	A	A	A	C/23	A	A	A
Berkley Road*	E/41	-	B/12	-	-	-	A	A	-	C/18	A	A	<b>E/41</b>
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	A	A	-	-	-	-	D/33	-	B/11	D/33
Polk Parkway Eastbound Ramps*	A	A	-	-	A	A	C/23	-	C/21	-	-	-	C/23

- Not Applicable      \*Unsignalized

**Table 6.10**  
**2041 Build with RAC Peak Hour Intersection Level of Service/Delay (s/veh)**

Intersection	Eastbound			Westbound			Northbound			Southbound			Overall
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
<b>AM</b>													
<b>Pace Road</b>													
Research Way	B/15	A	-	A	A	A	-	-	-	B/15	-	A	A
Polk Parkway Westbound Ramps	-	B/13	A	C/20	A	-	-	-	-	C/22	-	A	B/12
Polk Parkway Eastbound Ramps	-	B/14	A	C/24	A	-	C/20	-	A	-	-	-	A
<b>Braddock Road</b>													
Polk Parkway Westbound Ramps	-	B/14	B/14	A	A	-	-	-	-	C/22	-	C/22	B/15
Polk Parkway Eastbound Ramps	A	A	-	-	B/12	B/12	A	-	A	-	-	-	A
SunTrax Access	C/30	C/22	C/22	B/17	C/33	A	D/42	D/42	D/42	D/52	C/30	C/30	C/27
Berkley Road*	<b>F/&gt;999</b>	-	<b>F/140</b>	-	-	-	E/41	A	-	B/12	A	A	<b>F/&gt;999</b>
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	B/12	A	-	-	-	-	<b>F/51</b>	-	A	<b>F/51</b>
Polk Parkway Eastbound Ramps*	B/10	A	-	-	A	A	C/20	-	B/12	-	-	-	C/20
<b>PM</b>													
<b>Pace Road</b>													
Research Way	B/17	A	-	A	A	A	-	-	-	B/17	-	A	A
Polk Parkway Westbound Ramps	-	B/13	A	C/23	A	-	-	-	-	C/24	-	A	B/12
Polk Parkway Eastbound Ramps	-	B/15	A	C/27	A	-	C/21	-	A	-	-	-	B/11
<b>Braddock Road</b>													
Polk Parkway Westbound Ramps	-	B/15	B/15	A	A	-	-	-	-	C/21	-	C/21	B/13
Polk Parkway Eastbound Ramps	A	A	-	-	B/13	B/13	A	-	A	-	-	-	B/11
SunTrax Access	C/29	C/22	C/22	B/17	C/34	A	D/36	D/36	D/36	D/54	C/25	C/25	C/27
Berkley Road*	<b>F/407</b>	-	E/48	-	-	-	C/21	A	-	C/18	A	A	<b>F/407</b>
<b>Old Dixie Highway</b>													
Polk Parkway Westbound Ramps*	-	A	A	A	A	-	-	-	-	D/33	-	B/11	D/33
Polk Parkway Eastbound Ramps*	A	A	-	-	A	A	C/23	-	C/21	-	-	-	C/23

- Not Applicable      \*Unsignalized

#### **6.2.4 Microsimulation Evaluation**

VISSIM microsimulation analysis was performed for the two Build interchange alternatives only since the study area is expected to be largely under-saturated in the future, as the analysis results in **Sections 6.2.1** through **6.2.3** indicate. Lane geometry was estimated using design year 2041 peak hour volumes with RAC traffic only, to assess worst case conditions. For the signalized intersections alternative (TDI), lane geometry estimated using Synchro was verified in VISSIM. For the roundabout intersections alternative (TDIR), the VISSIM software was used to estimate lane geometry to capture driver and vehicle intersections that cannot otherwise be captured in SIDRA macroscopic analysis.

In the absence of an existing conditions VISSIM model, the design year model was developed following methodologies previously adopted by the FTE for other similar projects. The model included the Polk Parkway mainline from south of Braddock Road to north of Braddock Road, the proposed interchange ramp terminals, and the SunTrax access road along Braddock Road. The model was developed consistent with the latest Federal Highway Administration (FHWA) and FDOT guidelines: *FHWA Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software, July 2004*; and *FDOT Traffic Analysis Handbook: A Reference for Planning and Operations, March 2014*. Reference was also made to the Oregon Department of Transportation's (ODOT) guidelines: *Protocol for VISSIM Simulation, June 2011*. Model development and parameter adjustments were performed using the latest techniques and best engineering practices.

The North America vehicle models and distributions developed by PTV America in January 2010 were adopted in this study. Desired speeds and distributions were developed based on posted speed limits. The speed distributions assumed an 85<sup>th</sup> percentile speed of 5 mph higher than the posted speed. The upper speed distribution limit was set to 10 mph greater than the posted speed and the lower limit was set to 5 mph lower than the posted speed. Upper speed represents free-flow conditions. Trucks were modeled with a 5 mph lower speed than cars.

The analysis was based on four hours of simulation with 30 minutes seeding time. An average of 10 random seed runs was used to assess the output to account for the stochasticity of the microsimulation model. Changes were made to car following and lane change parameters to ensure reasonable traffic flow rates, based on other similar projects. Flow rates for freeway segments were estimated based on the capacity thresholds published in the FDOT System Planning Office *Estimation of Capacities on Florida Freeways Report*, dated September 2014 and prepared by the Transportation Research Center, University of Florida. The FDOT thresholds were adjusted for local conditions such as speed, truck proportion, PHF, and driver population. Freeway capacity ranged from about 1,950 to 2,000 vehicles per hour (vph) depending on the segment. Arterial parameters were changed to ensure an ideal saturation flow rate of about 1,900 passenger cars per hour per lane (pcphpl), per the HCM. The ideal flow rate is inherently reduced to an actual flow in the network model depending on vehicle interactions, signal control, intersection geometry,

truck proportion, and proximity of adjacent intersections, among others. The driving parameters that were adjusted are presented in **Table 6.11**.

**Table 6.11  
Adjusted Driving Behavior Parameters**

Facility Type	Parameter Type	Driving Behavior Parameters	Units	Default Values	Freeway Basic	Freeway Merge/Diverge	Freeway Weave	Arterial Basic
Freeway	Car Following	CC1 (Headway time)	Secs	<b>0 - 0.9</b>	0 - 1.18	0 - 1.13	0 - 1.08	
	Lane Change	Waiting time before diffusion Cooperative lane change	Secs	<b>60</b> <b>No</b>	180 Yes	180 Yes	180 Yes	
Arterial	Car Following	Additive part of safety distance		<b>2.00</b>				2.24
		Multiplicative part of safety distance		<b>3.00</b>				3.24
	Lane Change	Waiting time before diffusion Cooperative lane change	Secs	<b>60</b> <b>No</b>				180 Yes

**Tables 6.12** through **6.15** show the AM and PM peak hour VISSIM intersection performance for the 2041 peak hour volumes with RAC traffic. The microsimulation results show that the recommended Build lane geometry for the signalized intersections (TDI) and roundabouts (TDIR) provide acceptable operations during the design year. The two alternatives can process the projected demand, while the delays and queues would be within acceptable levels. The small unmet demand is due to model stochasticity and low volumes. The results presented in **Tables 6.14** and **6.15** are for the TDIR alternative with two circulatory lanes.

**Table 6.12  
2041 Build with RAC AM Peak Hour VISSIM Intersection Performance for TDI**

Intersection	Northbound			Southbound			Eastbound			Westbound			Overall
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
<b>Input Volumes (Demand)</b>													
Westbound Ramps	-	-	-	240	-	10	-	10	10	240	10	-	520
Eastbound Ramps	10	-	300	-	-	-	10	240	-	-	240	220	1,020
SunTrax Access	30	20	20	560	20	270	320	210	10	10	160	550	2,180
<b>Percentage Served</b>													
Westbound Ramps	-	-	-	97%	-	86%	-	93%	84%	98%	100%	-	97%
Eastbound Ramps	100%	-	96%	-	-	-	92%	97%	-	-	98%	99%	97%
SunTrax Access	98%	92%	92%	98%	100%	99%	93%	99%	100%	100%	98%	99%	98%
<b>Average Delay (Seconds) for the worst 30-minute period</b>													
Westbound Ramps	-	-	-	22	-	26	-	11	17	10	7	-	16
Eastbound Ramps	19	-	19	-	-	-	11	7	-	-	13	11	13
SunTrax Access	40	41	42	29	38	37	28	22	18	16	30	18	27
<b>Average and (Maximum) Queue in Feet for the worst 30-minute period</b>													
Westbound Ramps	-	-	-	33 (239)	-	33 (239)	-	1 (38)	1 (38)	11 (145)	11 (145)	-	-
Eastbound Ramps	32 (242)	-	32 (242)	-	-	-	7 (207)	7 (207)	-	-	26 (250)	26 (250)	-
SunTrax Access	15 (104)	15 (104)	15 (104)	106 (397)	106 (397)	106 (397)	59 (297)	59 (297)	59 (297)	74 (460)	74 (460)	74 (460)	-

- Not Applicable

**Table 6.13  
2041 Build with RAC PM Peak Hour VISSIM Intersection Performance for TDI**

Intersection	Northbound			Southbound			Eastbound			Westbound			Overall
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
<b>Input Volumes (Demand)</b>													
Westbound Ramps	-	-	-	220	-	10	-	10	10	300	20	-	570
Eastbound Ramps	10	-	240	-	-	-	10	220	-	-	310	230	1,020
SunTrax Access	20	20	20	550	20	320	270	180	10	10	200	560	2,180
<b>Percentage Served</b>													
Westbound Ramps	-	-	-	98%	-	89%	-	100%	78%	98%	94%	-	97%
Eastbound Ramps	97%	-	97%	-	-	-	100%	98%	-	-	98%	100%	98%
SunTrax Access	95%	98%	94%	100%	100%	99%	94%	100%	100%	94%	98%	100%	99%
<b>Average Delay (Seconds) for the worst 30-minute period</b>													
Westbound Ramps	-	-	-	23	-	25	-	18	17	9	7	-	15
Eastbound Ramps	20	-	18	-	-	-	13	6	-	-	11	10	12
SunTrax Access	39	44	40	30	45	41	26	23	21	19	27	14	26
<b>Average and (Maximum) Queue in Feet for the worst 30-minute period</b>													
Westbound Ramps	-	-	-	31 (242)	-	31 (242)	-	1 (38)	1 (38)	12 (164)	12 (164)	-	-
Eastbound Ramps	25 (203)	-	25 (203)	-	-	-	6 (211)	6 (211)	-	-	27 (294)	27 (294)	-
SunTrax Access	14 (95)	14 (95)	14 (95)	125 (450)	125 (450)	125 (450)	47 (245)	47 (245)	47 (245)	63 (398)	63 (398)	63 (398)	-

- Not Applicable

**Table 6.14**  
**2041 Build with RAC AM Peak Hour VISSIM Intersection Performance for TDIR**

Intersection	Northbound			Southbound			Eastbound			Westbound			Overall
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
<b>Input Volumes (Demand)</b>													
Westbound Ramps	-	-	-	220	-	10	-	10	10	300	20	-	570
Eastbound Ramps	10	-	240	-	-	-	10	220	-	-	310	230	1,020
SunTrax Access	20	20	20	550	20	320	270	180	10	10	200	560	2,180
<b>Percentage Served</b>													
Westbound Ramps	-	-	-	97%	-	91%	-	99%	78%	99%	95%	-	97%
Eastbound Ramps	99%	-	97%	-	-	-	100%	98%	-	-	98%	100%	98%
SunTrax Access	95%	98%	95%	100%	100%	99%	94%	100%	100%	93%	98%	100%	99%
<b>Average Delay (Seconds) for the worst 30-minute period</b>													
Westbound Ramps	-	-	-	4	-	3	-	6	4	2	1	-	2
Eastbound Ramps	4	-	3	-	-	-	2	2	-	-	2	2	2
SunTrax Access	18	10	3	4	4	4	13	11	8	9	12	3	6
<b>Average and (Maximum) Queue in Feet for the worst 30-minute period</b>													
Westbound Ramps	-	-	-	1 (82)	-	1 (82)	-	0 (28)	0 (28)	0 (32)	0 (32)	-	-
Eastbound Ramps	1 (83)	-	1 (83)	-	-	-	0 (29)	0 (29)	-	-	0 (59)	0 (59)	-
SunTrax Access	1 (55)	1 (55)	1 (55)	0 (30)	0 (30)	0 (30)	24 (303)	24 (303)	24 (303)	6 (119)	6 (119)	6 (119)	-

- Not Applicable

**Table 6.15**  
**2041 Build with RAC PM Peak Hour VISSIM Intersection Performance for TDIR**

Intersection	Northbound			Southbound			Eastbound			Westbound			Overall
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
<b>Input Volumes (Demand)</b>													
Westbound Ramps	-	-	-	240	-	10	-	10	10	240	10	-	520
Eastbound Ramps	10	-	300	-	-	-	10	240	-	-	240	220	1,020
SunTrax Access	30	20	20	560	20	270	320	210	10	10	160	550	2,180
<b>Percentage Served</b>													
Westbound Ramps	-	-	-	97%	-	86%	-	94%	84%	99%	100%	-	97%
Eastbound Ramps	100%	-	96%	-	-	-	93%	97%	-	-	98%	100%	98%
SunTrax Access	98%	94%	92%	99%	100%	99%	93%	100%	100%	100%	98%	99%	98%
<b>Average Delay (Seconds) for the worst 30-minute period</b>													
Westbound Ramps	-	-	-	3	-	2	-	2	2	2	1	-	2
Eastbound Ramps	4	-	3	-	-	-	2	2	-	-	2	2	2
SunTrax Access	15	11	3	4	4	3	14	12	12	8	11	3	7
<b>Average and (Maximum) Queue in Feet for the worst 30-minute period</b>													
Westbound Ramps	-	-	-	1 (78)	-	1 (78)	-	0 (23)	0 (23)	0 (37)	0 (37)	-	-
Eastbound Ramps	1 (92)	-	1 (92)	-	-	-	0 (32)	0 (32)	-	-	0 (59)	0 (59)	-
SunTrax Access	1 (52)	1 (52)	1 (52)	-	-	-	35 (403)	35 (403)	35 (403)	6 (122)	6 (122)	6 (122)	-

- Not Applicable

### **6.3 FUTURE SAFETY EVALUATION**

This section discusses estimated future safety impacts within the study area resulting from the proposed Braddock Road and Polk Parkway interchange. As discussed in **Section 3.3**, the highest safety ratio within the study area is 0.39, indicating that this is a low crash location. The area is largely under-saturated both in the existing and the future conditions. Thus, effect on safety within the study area due to the proposed interchange is expected to be minimal. Furthermore, single-lane roundabouts are recommended at the interchange ramp terminal intersections over signalized intersections. It is expected that the single-lane roundabouts would result in 30 percent fewer crashes than the signalized intersections.

The proposed interchange is supported by the City of Auburndale and is included in the *Lakeland Area Draft 2040 Cost-Feasible Highway Network* as a 2019-2040 unfunded need by the Polk Transportation Planning Organization. The proposed interchange is included in the Turnpike Five-Year Work Program and Master Plan with an anticipated opening year of 2021.

There are no anticipated signing issues associated with the proposed Braddock Road and Polk Parkway interchange. A project layout map and conceptual signage plan are presented in **Appendix E**.



This section discusses the proposed Polk Parkway and Braddock Road interchange with regard to FHWA's eight policy points, per the MLOU.

**Point 1. Existing System is Incapable of Accommodating the Traffic**

*The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands (23 CFR 625.2(a)).*

The proposed interchange provides additional access to Polk Parkway. The No-Build alternative can neither provide the desired direct access to/from the FDOT SunTrax test facility or other land uses, nor be modified to provide the desired direct access.

**Point 2. All Reasonable Alternatives to a New Interchange have been Considered**

*The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the Interstate without the proposed change(s) in access (23 CFR 625.2(a)).*

The proposed interchange does not preclude future implementation of any Transportation System Management (TSM) options. Ramp metering, mass transit, and HOV are either not justified or cannot be accommodated to effectively provide access to Polk Parkway at Braddock Road.

**Point 3. Proposal does not Adversely Impact Operational Safety of the Existing Freeway**

*An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate*

*facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d), and 23 CFR 655.603(d)).*

The proposed access is on Polk Parkway and not on an interstate facility. There are no known detriments to the safety and operation of Polk Parkway, either current or future, from the proposed interchange at Braddock Road. The proposed interchange is not anticipated to introduce any significant adverse impacts within the AOI.

**Point 4. A Full Interchange with all Traffic Movements at a Public Road is Provided**

*The proposed access connects to a public road only and will provide for all traffic movements. Less than “full interchanges” may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards for federal-aid projects on the interstate system (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)).*

The proposed interchange connects Polk Parkway to Braddock Road, a public road within Polk County jurisdiction, and provides full directional access to the public. The proposed interchange will be designed to conform to the American Association of State Highway and Transportation Officials (AASHTO) and FDOT *Plans Preparation Manual* (PPM) design standards.

**Point 5. The Proposal is Consistent with Local and Regional Plans**

*The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted Metropolitan Transportation Plan, in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within transportation management areas, as appropriate, and as specified in 23 CFR part 450, and the transportation conformity requirements of 40 CFR parts 51 and 93.*

The proposed interchange is supported by the City of Auburndale and is included in the *Lakeland Area Draft 2040 Cost-Feasible Highway Network* as a 2019-2040 unfunded need by the Polk Transportation Planning Organization. The proposed interchange is included in the Turnpike Five-Year Work Program and Master Plan with an anticipated opening year of 2021.

**Point 6. Consistency with State Highway Master Plans**

*In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access*

*changes within the context of a longer-range system or network plan (23 U.S.C. 109(d), 23 CFR 625.2(a), 655.603(d), and 771.111).*

This criterion is not applicable.

**Point 7. Coordinated with the Area's Development**

*When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements (23 CFR 625.2(a) and 655.603(d)). The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and Interstate access point (23 CFR 625.2(a) and 655.603(d)).*

The proposed interchange is driven by the need for additional access to Polk Parkway to serve the anticipated FDOT test facility and other local developments, as well as to support the economic development and growth of the City of Auburndale. The interchange will be coordinated with other transportation system improvements proposed by Polk County, the City of Lakeland, and FDOT District 1.

**Point 8. Request Needs to Consider Planning and Environmental Constraints**

*The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing (23 CFR 771.111).*

No potential fatal flaws from a planning and environmental perspective are anticipated for the proposed improvements.

The new interchange proposed at Braddock Road and Polk Parkway at MP 21 will support the FDOT SunTrax test facility (FPID: 437300-1) and the expected land use development in the vicinity of the interchange within the City of Auburndale, such as the proposed RAC, Commerce Center DRI, and the recently established Florida Polytechnic University. A PD&E study is underway to evaluate the proposed interchange and widening of Braddock Road from Polk Parkway to Berkley Road (FPID: 438018-1). The PD&E study is being conducted concurrently with the Design-Build project for widening the two-lane section of Polk Parkway to four lanes, from MP 18 to MP 22. This IJR has been developed to support the PD&E study and the need for the proposed interchange.

The IJR provides traffic forecasts, lane requirement evaluations, traffic operations analysis, and safety evaluations within the AOI of the proposed interchange. Lane requirement analysis shows that two lanes in each direction of Polk Parkway and single-lane interchange ramps will be required through the 2041 design year within the study limits, with or without the proposed interchange and planned RAC. The widened Polk Parkway and the ramps are expected to be largely under-saturated in the future. The effect on safety within the study area due to the proposed interchange is expected to be negligible.

The analysis evaluated both signalized intersections and roundabout intersections at the proposed interchange ramp terminals and at the SunTrax test facility access road, to determine the required lane geometry for the design year, considering traffic from the planned RAC. The proposed lane geometry is presented on **Figures 6.3** and **6.4** for the two interchange alternatives. The analysis showed that the proposed lane geometry would provide acceptable operations during the design year: the projected demand would be processed, while the delays and queues would be within acceptable levels. The proposed lane geometry at the Braddock Road interchange ramp terminals would be the same with or without the traffic from the planned RAC, for both the signalized alternative and the roundabout alternative. From a safety perspective, the single-lane roundabouts at the interchange ramp terminal intersections are recommended over the signalized intersections. At the SunTrax access road intersection with Braddock Road, additional lane geometry would be required with the planned RAC traffic in the design year, such as an exclusive southbound left-turn lane for the signalized intersection and a second circulatory lane for the roundabout. The signalized intersection is recommended at this location over the roundabout due to the right-of-way requirements and safety concerns associated with multi-lane roundabouts. The recommended lane geometry is presented in **Figure 6.3**.

The analysis showed that the unsignalized intersection of Braddock Road and Berkley Road would operate at an unacceptable LOS F in the design year, and delays would be long with the traffic from the planned RAC. Signalization of this intersection and addition of turn lanes should be considered in the future as traffic demand increases. Traffic data can be collected to perform signal warrant analysis 5 to 10 years after the interchange is open and additional development has occurred in the area.

# **APPENDICES**

## **PROVIDED ELECTRONICALLY**



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