DRAFT

Systems Interchange Justification Report (SIJR)

Florida Department of Transportation

Florida's Turnpike Enterprise

Project Development and Environment (PD&E) Study

Western Beltway (SR 429) Widening

from I-4 to Seidel Road

Osceola and Orange Counties, Florida

Financial Project ID: 446164-1-22-01

February 2023

Western Beltway (SR 429) Widening from I-4 to Seidel Road

Systems Interchange Justification Report

Financial Project No. 446164-1-22-01

Determination of Safety, Operational and Engineering Acceptability

Acceptance of this document indicates successful completion of the review and determination of safety, operational and engineering acceptability of the Interchange Access Request. Approval of the access request is contingent upon compliance with applicable Federal requirements, specifically the National Environmental Policy Act (NEPA) or Department's Project Development and Environment (PD&E) Procedures. Completion of the NEPA/PD&E process is considered approval of the project location design concept described in the environmental document.

Requestor/Interchange Review Coordinator	DocuSigned by: Carol Scott 3B887FB255B94E2...	02/15/2023 | 2:45 PM EST
	Carol Scott, CPM Planning and Environmental Management Administrator	Date
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	Melissa McKinney District Five Planning Manager	Date
Systems Management Administrator	DocuSigned by: Jenna Bowman 4AD03E6A337F4C1...	02/16/2023 | 1:54 PM EST
	Jenna Bowman, PE Systems Implementation Office – Central Office	Date

QUALITY CONTROL CERTIFICATION FOR INTERCHANGE ACCESS REQUEST SUBMITTAL

Submittal Date: Click or tap to enter a date.

FM Number: 446164-1-22-01

Project Title: Western Beltway (SR 429) Widening from I-4 to Seidel Road Systems Interchange Justification Report (SIJR)

District: Turnpike

Requestor: Carol Scott, CPM Phone: 407-264-3023

District IRC: Carol Scott, CPM Phone: 407-264-3023

Document Type: ☐ MLOU ☐ IJR ☐ SIMR ☐ IOAR ☑ OTHER SIJR

Status of Document (Only complete documents will be submitted for review; however, depending on the complexity of the project, interim reviews may be submitted as agreed upon in the Methodology Letter of Understanding [MLOU])

Final Submittal

Quality Control (QC) Statement

This document has been prepared following FDOT Procedure Topic No. 525-030-160 (New or Modified Interchanges) and complies with the FHWA two policy requirements. Appropriate District level quality control reviews have been conducted and all comments and issues have been resolved to their satisfaction. A record of all comments and responses provided during QC review is available in the project file or Electronic Review Comments (ERC) system.

Requestor: DocuSigned by: Carol Scott 3B887FB255B94F2... Date: 02/15/2023 | 2:45 PM EST

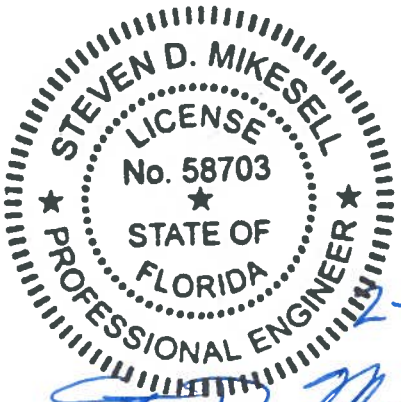
Carol Scott, CPM

IRC: DocuSigned by: Carol Scott 3B887FB255B94F2... Date: 02/15/2023 | 2:45 PM EST

Carol Scott, CPM

I, Steven Mikesell, PE number 58703, certify that I currently hold an active Professional Engineer's License in the State of Florida, and I am competent through education or experience to provide engineering services in the civil and traffic engineering disciplines contained in this report. I further certify that this report was prepared by me or under my responsible charge as defined in Chapter 61G15-18.001 F.A.C. and that the statements, conclusions, and recommendations made herein are true and correct to the best of my knowledge and ability.

Project Description: Western Beltway (SR 429) Widening from I-4 to Seidel Road, Systems Interchange Justification Report (SIJR)



2-7-2023

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Florida's Turnpike Enterprise (FTE) conducted a Project Development and Environment (PD&E) study (FPID: 446164-1-22-01) to increase capacity on the SR 429 mainline, from four to eight lanes, and at the interchanges within the study limits to accommodate existing and future traffic demand, enhance safety, improve travel time reliability, and enhance emergency evacuation. The project is located within Osceola and Orange Counties in Central Florida. This Systems Interchange Justification Report (SIJR) documents traffic forecasts, lane requirement evaluations, traffic operations analysis, and a safety evaluation for the proposed preferred Build Alternative.

Existing Year (2020) Traffic Conditions:

The existing (2020) conditions Synchro traffic analysis indicated that several intersections within the Area of Influence (AOI) are operating at Level of Service (LOS) E or F in one or both AM and PM peak hours. Several turning movements at the intersections along US 192 exhibit LOS F condition due to the heavy through traffic on the arterial during the peak hours. The results of an existing conditions Vissim analysis showed that the southbound SR 429 diverge area upstream of the off-ramp to US 192 operates at a speed of 30 mile per hour (mph) during the PM peak hour. This operating speed is consistent with field observations and is substantially lower than the posted speed limit. During the PM peak hour, the queue at the southbound SR 429 off-ramp at US 192 frequently spills back to the mainline and causes severe congestion on the mainline.

Existing Crash Data

Five years of crash data (2014 – 2018) was used for the safety evaluation for each facility within the Area of Influence (AOI). The data was obtained from the FDOT's Crash Analysis Reporting (CAR) Online system database for state roads. Crash data for non-state roads was obtained from the Signal Four Analytics tool, for the same analysis period. A total of 156 crashes were reported along the SR 429 mainline from I-4 (Mile Post 1) to Seidel Road (Mile Post 11) during the five-year analysis period from 2014 through 2018. The mainline crashes were mostly off-road (49 percent) and rear-end (25 percent). A total number of seven fatal crashes were reported within the study limits: two occurred along the SR 429 mainline between Sinclair Road and US 192 interchanges, three along the SR 429 ramps (I-4 westbound on-ramp, Northbound off-ramp to Sinclair Road and Southbound off-ramp to US 192), and two at the US 192 intersections (one of at East Orange Lake Boulevard and Blake Lake Road/Inspiration Drive). Four out of the seven fatal crashes were run off the road crashes. The US 192 intersections at Inspiration Drive and Formosa Gardens Boulevard are considered high crash locations, which exhibit crash rates that are significantly higher than the statewide average crash rate for similar roadways.

No-Build Conditions:

The future No-Build network was updated to include the following planned and programmed improvements within the study area that were considered in developing the traffic forecast and the interchange concepts and were included in the future traffic analysis:

- Florida's Turnpike/SR 91 mainline widening (FPID: 435784-1) from four to eight lanes. This project extends from SR 50 in Clermont to the Orange County/Lake Countyline. The project is expected to be completed by year 2023.
- Florida's Turnpike/SR 91 mainline widening (FPID: 435785-1) from four to eight lanes. The limits for this project are from the Orange County/Lake County line to Hancock Road in Minneola. It is expected to be completed by year 2024.
- Florida's Turnpike/SR 91 mainline widening (FPID: 435786-1,-2,-3) from four to eight lanes. The limits for this project are from Hancock Road in Minneola to Obrien Road and from Obrien Road to US 27/SR 19 (North). It is expected to be completed by year 2026.

- Western Beltway/SR 429 widening from four to six lanes by CFX from Tilden Road to John Land Apopka Expressway/SR 414. It is expected to be completed by year 2024.
- Poinciana Parkway from Ronald Reagan Parkway to south of US 17/92 and from south of US 17/92 to County Road 532/Osceola Polk County Line Road. It is expected to be completed by year 2025.
- Poinciana Parkway from Ronald Reagan Parkway to Cypress Parkway/CR 580, widening from an undivided two-lane roadway to a divided four lane expressway. It is expected to be completed by year 2023.
- I-4 from County Line Road to west of US 27 and from west of US 27 to west of Kirkman Road/SR 435, widening to 10 lanes (including managed lanes).
- Lake/Orange Expressway (SR 516), a new four lane limited access expressway from US 27 to Western Beltway/SR 429. It is expected to be completed by year 2023.
- Southport Connector Expressway, a divided four lane tolled expressway from Poinciana Parkway to Canoe Creek Road with a full interchange at the Florida's Turnpike/SR 91. PD&E Study completion date 2023
- Avalon Road from US 192 to McKinney Road, widening from two to four lanes.

Transportation System Management and Operations (TSM&O) measures have been implemented at the southbound SR 429 off-ramp to US 192. The TSM&O considerations included geometric improvements at the ramp terminal and two-lanes southbound off-ramp from SR 429. These TSM&O improvements are not expected to satisfy the need for additional capacity on SR 429, improved access to the surface streets, and relief of traffic congestion within the interchanges. Most of the freeway segments along SR 429 are expected to operate over capacity under the No-Build Alternative. Therefore, this PD&E study and the SIJR did not consider a standalone TSM&O Alternative. Note that the Southbound off-ramp improvements at US 192 are part of this PD&E study and have been advanced as the TSM&O alternative. The TSM&O improvements are within FTE's system and will be included in the work program.

Build Conditions:

The Livingston Road interchange is a proposed new interchange with an extension of Livingston Road. The proposed interchange would relieve the US 192 interchange, approximately 1.5 miles north, as well as provide more access to SR 429 for the project area. The extension of Livingston Road would require improvements at the intersection with Formosa Gardens Boulevard. The improvements include signalizing the intersection along with adding turn lanes, and crosswalks. The section of Formosa Gardens Boulevard from north of Livingston Road to just south of Funie Steed Road would be widened to four lanes.

The Vissim microsimulation software was used to evaluate traffic operations for the US 192 corridor with and without the proposed SR 429 at Livingston Road interchange. Networkwide performance measures for the Build Alternative without SR 429 at Livingston Road interchange shows that demand on the US 192 would be high enough to cause queue back-ups approximately 1.2 miles onto the southbound SR 429 mainline from the southbound SR 429 off-ramp terminal intersection at US 192. The queues are fully eliminated with the new SR 429 reliever interchange at Livingston Road. Additionally, up to an 18 percent reduction in network travel time and 40 percent reduction in average delay per vehicle is estimated with the proposed new SR 429 at Livingston Road interchange.

A user benefit over a 21-year project life span for the Build Alternative with and without Livingston Road interchange was estimated for US 192 study area using projected reduction in network travel time. Fuel consumption and emissions as well as a potential reduced number of crashes at US 192 interchange were not included. Based on 2022 dollars, the estimated user benefit is $72 Million for travel time from year 2030 to 2050.

Therefore, inclusion of the new full reliever interchange improves the operations at US 192 interchange by rerouting traffic to Livingston Road interchange.

The preferred Build Alternative was selected with the new interchange at Livingston Road (referred to as Build or preferred Build herein). The mainline widening of SR 429 has been proposed from four lanes to eight lanes for the length of the project. An Auxiliary Lane will be provided between the US 192 and the new Livingston Road interchange on both directions. Under Build conditions, performance along SR 429 improved compared to No-Build conditions and anticipated to operate at an acceptable LOS D or better.

Under Build conditions, it is estimated that the reduction in delay based on Synchro analysis results for the study area including 18 intersections (11 signalized and 7 unsignalized) will range between 71 and 77 percent during 2050 peak periods. This reduction for the study area network is due to the anticipated diversion of traffic from US 192 to the proposed new interchange on SR 429 at Livingston Road, added capacity and new traffic signals at unsignalized ramp terminals. The following is a list of improvements provided under the Build Alternative:

- Sinclair Road and SR 429 both ramp terminals (added a traffic signal at the southbound ramp terminal and provided capacity improvements)
- Connector Road and SR 429 northbound ramp terminal (added a traffic signal and provided capacity improvements)
- Livingston Road ramp terminal (added a new T-ramp interchange)
- Livingston Road and Formosa Gardens Boulevard intersection (added a traffic signal and provided capacity improvements)
- US 192 and West Orange Lake Boulevard intersection (a traffic reduction is expected due to the new SR 429 at Livingston Road interchange)
- US 192 and SR 429 southbound ramp terminal (provided capacity improvements)
- US 192 and SR 429 northbound ramp terminal (provided capacity improvements)
- US 192 and East Orange Lake Boulevard (provided capacity improvements)
- US 192 and Inspiration Drive a traffic reduction is expected due to the new SR 429 at Livingston Road interchange rerouting traffic)
- Formosa Gardens Boulevard (a traffic reduction is expected due to the new SR 429 Livingston Road interchange)
- Western Way and SR 429 both ramp terminals (added traffic signals at both ramp terminals and provided capacity improvements)
- Seidel Road and Avalon Road (provided capacity improvements)
- Seidel Road and SR 429 both ramp terminals (added traffic signals and provided capacity improvements)

Future Safety Evaluation:

A quantitative safety analysis was performed based on the Highway Safety Manual (HSM) and Interchange Access Request User's Guide Safety Analysis Guidance 2020. The analysis was conducted using the predictive methods in Chapters 12 and 19 of the HSM, where available, and the Enhanced Interchange Safety Analysis Tool (ISATe), which apply a combination of Safety Performance Functions (SPFs), and crash modification factors (CMFs) to estimate frequency and cost of crashes for each segment and intersection. The cost of crashes was based on the KABCO distribution and crash values from the Florida Design Manual 2022. The Build Alternative is predicted to have a 21-year crash cost savings of approximately $10 million compared to the No-Build Alternative, in 2022 present value for the entire AOI.

Future Conditions:

The analysis showed that the proposed new interchange at Livingston Road meet the requirements for the Federal Highway Administration's (FHWA) two policy points. First, the operational and safety analysis conducted for this SIJR confirmed that the proposed improvements under the Build Alternative do not have an adverse impact on the operations and safety of SR 429 or the local street network while improving traffic operations through the design year. Second, the proposed accesses connect to public roads only and will provide for all traffic movements.

The widening of the Western Beltway (SR 429) PD&E Study (FPID No. 446164-1) is expected to be completed by Spring 2023. Design, Right of Way (ROW), and Construction phases are not funded in the Turnpike Five Year Work Program (2023 thru 2027).

Florida's Turnpike Enterprise (FTE) conducted a Project Development and Environment (PD&E) Study (FPID: 446164-1-22-01) to evaluate the widening of the Western Beltway (SR 429) and improving the interchanges within the study limits. The project is located within Osceola and Orange Counties in Central Florida. The study limits are from north of Interstate 4 (I-4) to Seidel Road, approximately 10 miles. **Figure 1.1** shows the project location and study limits.

State Road (SR) 429 is a north-south limited-access tolled facility that forms a portion of the beltway around the Orlando metropolitan area. SR 429 extends nearly 23 miles from U.S. Highway 441 in Apopka south to I-4 in Osceola County, providing West Orange and Osceola counties with an alternate north-south route to heavily traveled I-4. The segment from I-4 to Seidel Road is owned and operated by FTE and the remainder is owned by the Central Florida Expressway Authority (CFX).

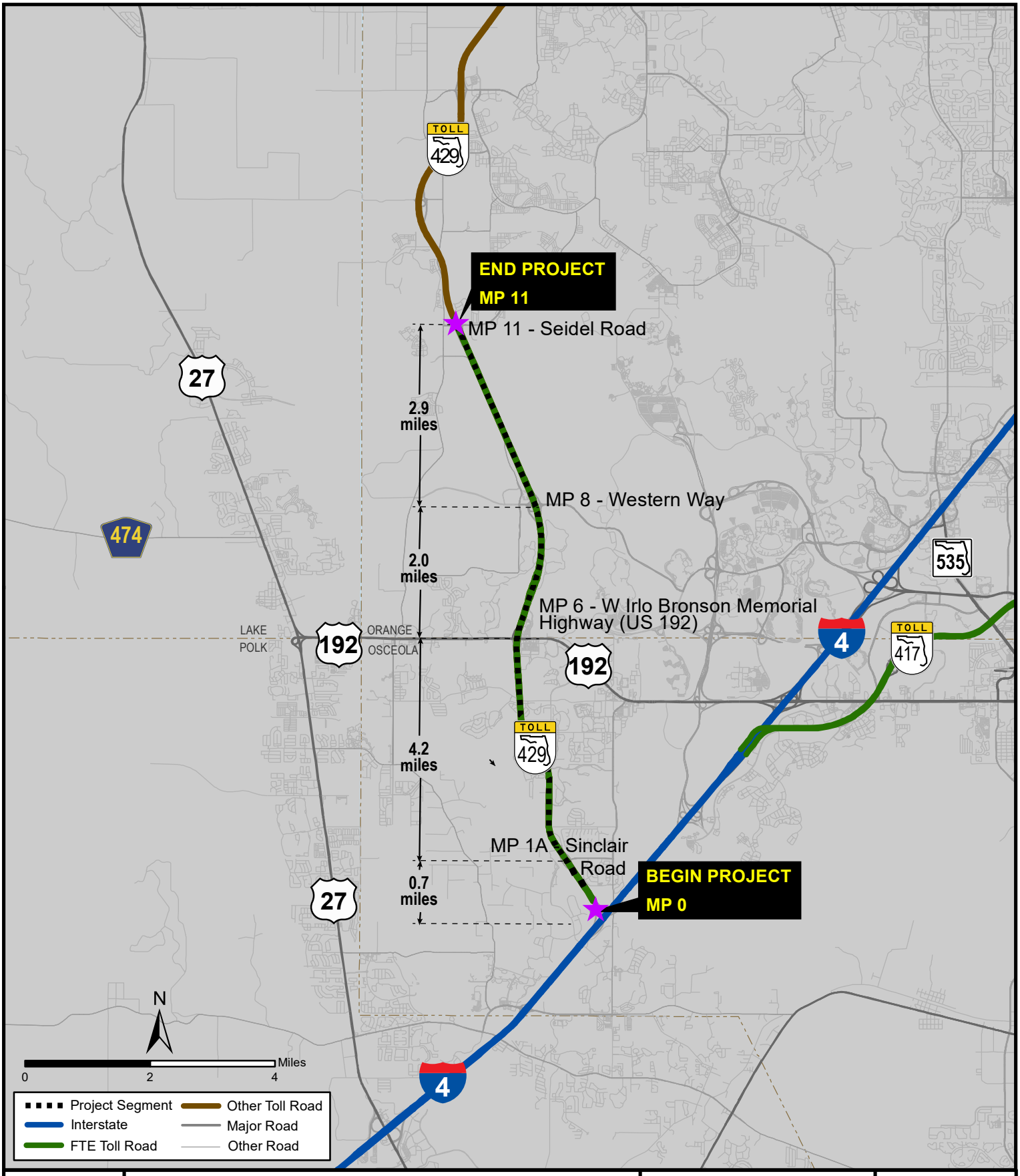
The PD&E study involves widening of the SR 429 mainline from two to four lanes per direction from north of I-4 to Seidel Road, incorporating interchange improvements or modifications, providing safety improvements along SR 429, and adding a potential new interchange location.

This Systems Interchange Justification Report (SIJR) has been developed in accordance with FDOT Policy Topic No. 000-525-015-h, Approval of New or Modified Access to Limited Access Highways on the State Highway System (SHS); the 2022 FDOT Interchange Access Request User's Guide (IARUG); FDOT Procedure No. 525-030-160-l, New or Modified Interchanges; and FDOT Procedure No. 525-030-120-K, Project Traffic Forecasting. The Methodology Letter of Understanding (MLOU) for the SIJR was approved by FTE, the Requestor, FDOT District Five, and FDOT Systems Implementation Office in October 2021. A copy of the signed MLOU is provided in **Appendix A**. Per the MLOU, analysis years for the SIJR are 2020 (existing), 2030 (opening) and 2050 (design).

1.1 PURPOSE AND NEED

The purpose of the project is to increase capacity on the SR 429 mainline and at the interchanges within the study limits to accommodate existing and future traffic demand, enhance safety, improve travel time reliability, and enhance emergency evacuation. SR 429 serves north-south trips on the west side of the Orlando metropolitan area and provides access to Disney World attractions around the study area. Currently, traffic backs up on SR 429 in the southbound direction towards I-4 during the evening commute. While these backups are primarily caused by congestion on I-4, additional capacity will be needed on SR 429. The US 192 interchange also has capacity deficiencies. Long queues have been observed occasionally at the southbound off-ramp during the evening commute. The queues sporadically extend to the SR 429 expressway mainline, impacting traffic flow and creating a safety concern on the high-speed facility.

Traffic on SR 429 has been increasing by more than 10 percent per year within the study limits. This can be attributed to the high increase in population and employment opportunities in the area, as well as recreational activities. Travel forecasts show that traffic on SR 429 is expected to increase at an average yearly rate of about 6 percent from 2020 to 2030 and 4 percent from 2030 to 2050. As a result, the existing four-lane capacity on SR 429 will be exceeded, triggering a need for additional capacity.

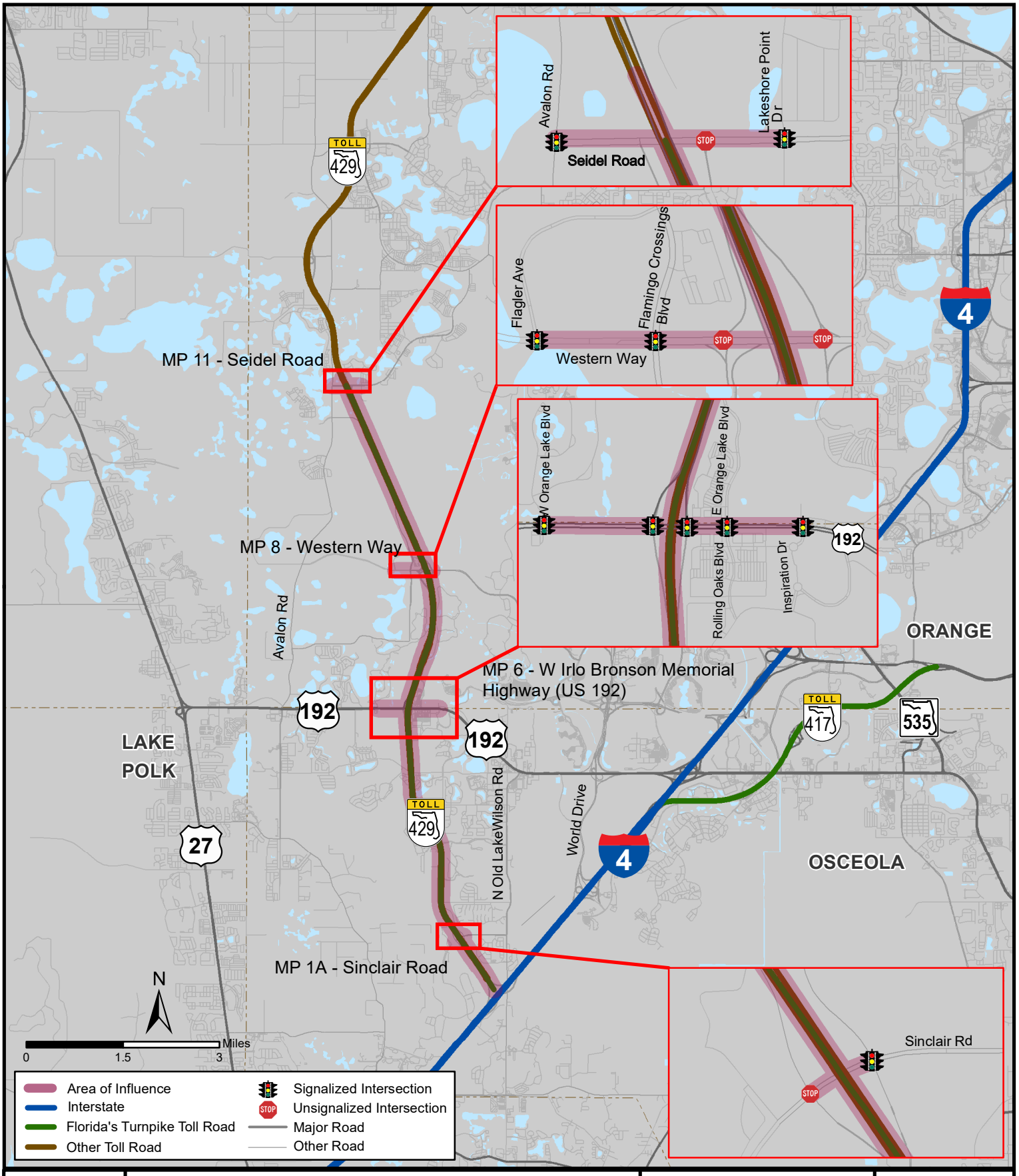


FLORIDA'S TURNPIKE	**Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road Systems Interchange Justification Report (SIJR)**	**Project Location and Study Limits**	**Figure 1.1**

1.2 AREA OF INFLUENCE

The Area of Influence (AOI) for traffic operations analysis is shown on **Figure 1.2**. The SR 429 widening will extend approximately 10 miles starting north of I-4 and ending at Seidel Road. Traffic impacts are expected at the following interchanges and intersections that are within the AOI:

- Interchanges in study area:
  - Sinclair Road at Milepost 1A
  - US 192 at MP 6
  - Western Way at MP 8
  - Seidel Road at MP 11
- Ramps to and from I-4
  - SR 429 Southbound Ramps
  - SR 429 Northbound Ramps
- Intersections along Sinclair Road (MP 1A)
  - SR 429 Southbound Ramps
  - SR 429 Northbound Ramps
  - The intersection of Old Lake Wilson Road and Sinclair Road is more than 3,500 feet (0.68 miles) from the Sinclair Road and SR 429 northbound off-ramp signal. This intersection would have minor to negligible impact on traffic operations; hence it was not included in the study area.
- Intersections along US 192 (MP 6)
  - West Orange Lake Boulevard
  - SR 429 Southbound Ramps
  - SR 429 Northbound Ramps
  - East Orange Lake Boulevard/Rolling Oaks Boulevard
  - Inspiration Drive
  - Formosa Gardens Boulevard
- Intersections along Livingston Road
  - Formosa Gardens Boulevard
  - Potential new SR 429 ramps
- Intersections along Western Way (MP 8)
  - SR 429 Southbound Ramps
  - SR 429 Northbound Ramps
  - Flagler Avenue
  - Flamingo Crossings Boulevard
- Intersections along Seidel Road (MP 11)
  - SR 429 Southbound Ramp
  - SR 429 Northbound Ramp
  - Avalon Road
  - Lakeshore Pointe Drive/Horizon School Entrance



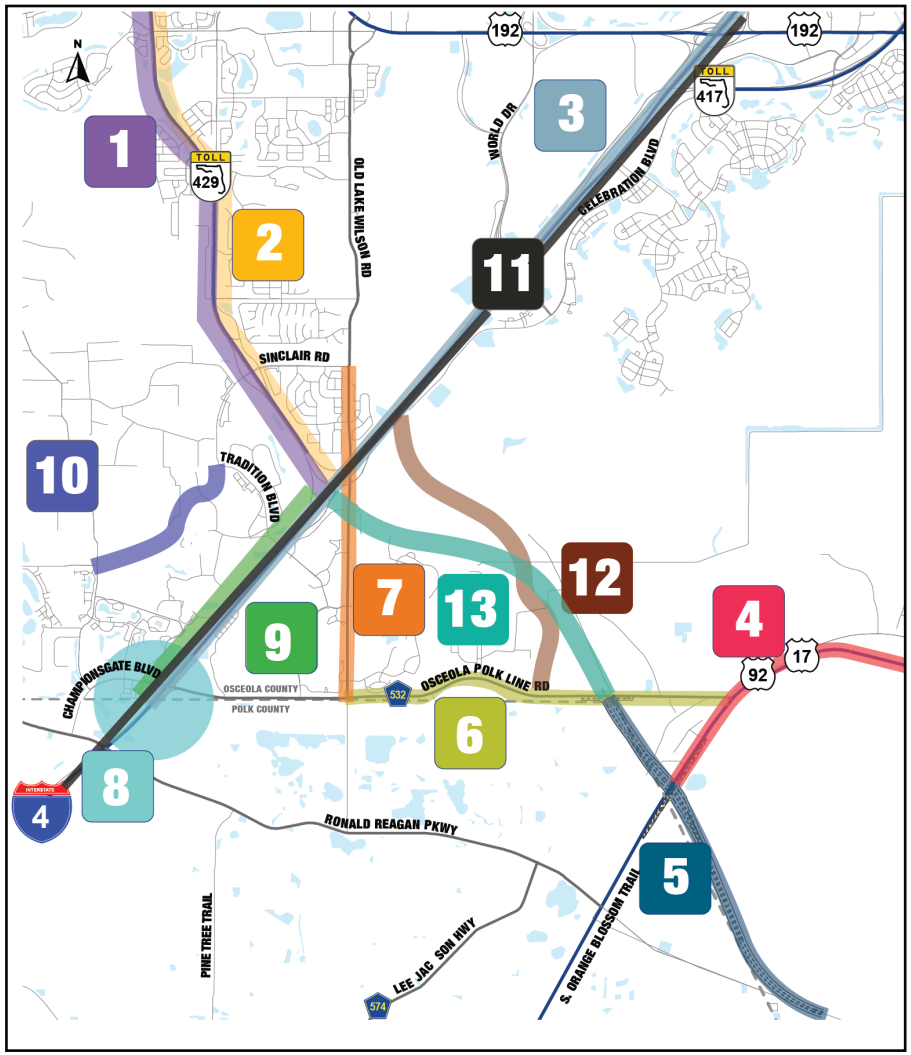
FLORIDA'S TURNPIKE	**SR 429 Widening PD&E Study from I-4 to Seidel Road** **Systems Interchange Justification Report (SIJR)**	**Area of Influence**	**Figure 1.2**

1.3 PLANNED AND PROGRAMMED PROJECTS

Planned and programmed improvements within the study area were considered in developing the traffic and interchange concepts and were included in the future traffic analysis. The planned improvements are shown on **Figure 1.3** and listed below:

- SR 429 Milling and Resurfacing from I-4 to Seidel Road (FPID No. 440289-1 and 440290-1) Estimated Completion Date: 01/2023
- SR 429 PD&E Study from North of I-4 to Seidel Road (FPID No. 446164-1-22-01, under PD&E) Estimated Completion Date: 02/2023
- I-4 Beyond the Ultimate (BtU) – Segment 1A from West of CR 532 to East of SR 522 (Osceola Parkway) (FPID No. 431456-1, not funded for construction, currently funded for right-of-way acquisition)
- US 17/US 92 PD&E Study from Poinciana Parkway to West of Poinciana Boulevard [FPID No. 437200-1, under design in Fiscal Year (FY) 26] Estimated PD&E Completion Date: 05/2023
- Poinciana Parkway from Ronald Reagan Parkway to CR 532 [Central Florida Expressway (CFX) project, under design]
- CR 532 Widening from South Old Lake Wilson Road to US 17/US 92 (CFX project, under design)
- South Old Lake Wilson Road PD&E Study from CR 532 to Sinclair Road (Osceola County project, under PD&E) Estimated PD&E Completion Date: 03/2023
- CR 532 Diverging Diamond Interchange (FPID No. 444187-1, Estimated Completion Date: 07/2023.
- I-4 Auxiliary Lanes and Resurfacing from CR 532 to SR 429 (FPID No. 444329-1 and 443958-1, under construction). Estimated Completion Date: 08/2023
- Sinclair Road Extension from Tradition Boulevard to Bella Citta Boulevard (Osceola County project, under PD&E)
- Brightline Phase 3 from Orlando International Airport to Tampa (Brightline project, under PD&E)
- Celebration Boulevard Extension (Osceola County Comprehensive Plan, unfunded need)
- Poinciana Parkway Extension Connector (FPID No.446581-1, under PD&E). Estimated Completion Date: 09/2023

1. **SR 429 Milling and Resurfacing from I-4 to Seidel Road**
   (FPID No. 440289-1 & 440290-1, under construction)
2. **SR 429 PD&E Study from I-4 to Seidel Road**
   (FPID No. 446164-1, under PD&E)
3. **I-4 Beyond the Ultimate – Segment 1A from W. of CR 532 to E. of SR 522**
   (FPID No. 431456-1, not funded for construction)
4. **US 17/92 PD&E Study from Poinciana Parkway to West of Poinciana Blvd.**
   (FPID No. 437200-1, under design in FY 26)
5. **Poinciana Parkway from Ronald Reagan Parkway to CR 532**
   (CFX Project, under design)
6. **CR 532 Widening from from S. Old Lake Wilson Road to US 17/92**
   (CFX Project, under design)
7. **S. Old Lake Wilson Road PD&E from CR 532 to Sinclair Road**
   (Osceola County Project, under PD&E)
8. **CR 532 Diverging Diamond Interchange**
   (FPID No. 444187-1, under construction)
9. **I-4 Auxiliary Lanes and Resurfacing from CR 532 to SR 429**
   (FPID No. 444329-1 & 443958-1, under construction)
10. **Sinclair Road Extension from Tradition Boulevard to Bella Cita Boulevard**
    (Osceola County Project, under PD&E)
11. **Brightline Phase 3 from Orlando International Airport to Tampa**
    (Brightline Project, under PD&E)
12. **Celebration Boulevard Extension**
    (Osceola County Comprehensive Plan, unfunded need)
13. **Poinciana Parkway Extension**
    (FPID No. 446581-1, under PD&E)



FLORIDA'S TURNPIKE	Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road Systems Interchange Justification Report (SIJR)	**Planned and Programmed Projects within the Study Vicinity**

Figure 1.3

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

2.1 TRAFFIC OPERATIONAL ANALYSIS METHODOLOGY

Signalized intersections were evaluated using Synchro Version 11, based on the Highway Capacity Manual (HCM) Sixth Edition Level of Service (LOS) and delay thresholds presented in **Table 2.1**. Unlike the HCM, Synchro has additional procedures for estimating control delay, such as estimation of right turns on red, queues and delays associated with starvation and spillback. Thus, Synchro is expected to yield results that are more representative of traffic conditions observed in the field than the HCM because of these additional refinements. Unsignalized intersections were evaluated using the Highway Capacity Software (HCS) Version 7.9, following the criteria presented in **Table 2.2**.

Table 2.1
Signalized Intersection HCM Sixth Edition Level of Service Criteria

Control Delay (seconds/vehicles)	LOS by Volume-to-Capacity Ratio*	
	≤1.0	>1.0
(HCM Exhibit19-8)		
≤10	A	F
>10-20	B	F
>20-35	C	F
>35-55	D	F
>55-80	E	F
>80	F	F

*For approach-based and intersection wide assessments, level of service is defined solely by control delay. Control delay and volume-to-capacity ratio are used to characterize level of service for a lane group.

Table 2.2
Unsignalized Intersection HCM Sixth Edition Level of Service Criteria

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

*For approach-based and intersection-wide assessments, level of service is defined solely by control delay. Delay is measured in seconds per vehicle. Control delay and volume-to-capacity ratio are used to characterize level of service for a lane group.

Freeway segments (basic, merge/diverge, and weave) analysis was based on the capacity thresholds published in the *2020 Florida Department of Transportation (FDOT) Quality and Level of Service (LOS) Handbook*. 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 7.9 was used to identify levels of service along freeway segments. The analysis was based on the FDOT Traffic Analysis Handbook and followed the Highway Capacity Manual (HCM) Sixth Edition methodologies. The HCM estimates level of service based on density – a function of flow rate (volumes) and travel speed – for uninterrupted flow facilities such as basic freeway/Collector-Distributor (C-D) roadway segments, merge and diverge segments, and freeway/C-D roadway weaving segments. Density is measured in passenger cars per mile per lane (pcpmpl). The HCM Sixth Edition level of service and density thresholds for freeway segments are listed in **Table 2.3**.

Table 2.3
Freeway Segments HCM Sixth Edition Level of Service Criteria

LOS	Basic (HCM Exhibit 12-15)	Merge / Diverge (HCM Exhibit 14-3)	Weaving (HCM Exhibit 13-6)
A	≤ 11	≤ 10	0-10
B	> 11-18	> 10-20	> 10-20
C	> 18-26	> 20-28	> 20-28
D	> 26-35	> 28-35	> 28-35
E	> 35-45	> 35	> 35-43
F	Demand exceeds capacity or density > 45	Demand exceeds capacity	Demand exceeds capacity or density > 43

Source: Highway Capacity Manual Sixth Edition.

The HCS software was calibrated based on the adjusted FDOT capacities. Tests were conducted using the following parameters and assumptions for SR 429 to determine a factor for calibrating capacity and speed:

- SR 429 Future Build Alternative Free-Flow Speed (FFS) = 75 mph
- SR 429 Design Hour Truck (DHT) percentage = 7 percent
- Lane width = 12 feet
- Right shoulder clearance = 6 feet
- Driver Population = Mostly Familiar
- Weather Type = Non-Severe Weather
- Incident Type = No Incident
- Demand Adjustment Factor = 1.00

A capacity and speed adjustment factor of 0.99 was determined.

Capacity analysis for ramp roadways was based on thresholds from the HCM Exhibit 14-12 as provided in **Table 2.4**.

Table 2.4
Ramp Roadway Capacity HCM Sixth Edition Level of Service Criteria

Ramp FFS (mph)	Single-Lane Ramps Capacity (pc/h)	Two-Lane Ramps Capacity (pc/h)
(HCM Exhibit 14-12)		
> 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

Note: Free Flow Speed (FFS) measured in miles per hour (mph);
Capacity measured in passenger cars per hour (pc/h)

The PTV VISSIM microsimulation software version (22.0) was used to evaluate traffic operations for the US 192 corridor only based on the approved MLOU. Freeway segments (basic, merge/diverge and weave), ramps, and intersections within the influence area of the SR 429 and US 192 interchange were evaluated using VISSIM. VISSIM is a microscopic traffic flow simulation model based on car following, lane change, and queuing logic. VISSIM models each individual vehicle within the network to identify the performance measures for freeways, ramps, and intersections.

The VISSIM model was developed consistent with the latest FDOT Traffic Analysis Handbook, May 2021. Model development and parameter adjustments were performed using the latest techniques and best engineering practices.

The VISSIM model calibration and analysis for freeway segments were based on the FDOT capacity thresholds adjusted for local conditions. Arterial links were calibrated based on flow rates from the HCM and to an actual flow in the network model depending on vehicle interactions, signal control, intersection geometry, truck proportion, proximity of adjacent intersections. The calibration parameters were adjusted iteratively, to make sure that the model reasonably reflects existing field conditions. The model calibration thresholds shown in Table 7-7 of the FDOT Traffic Analysis Handbook 2021 were used.

In the VISSIM microsimulation, Measures of Effectiveness (MOEs) selected for analysis of freeway segments included percentage of demand served, speed, and density in passenger cars per mile per lane (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 directly related to HCM level of service criteria. However, density from VISSIM (i.e., vehicles per mile) was converted to pcpmpl by dividing the VISSIM density by the number of lanes and multiplying by a heavy vehicle factor, following the HCM methodology.

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 directly related to the HCM level of service criteria.

2.1.1 Measures of Effectiveness (MOEs)

Analyses of the interchange ramp terminals and adjacent intersections were conducted using Synchro 11 software. The level of service threshold for state roads during peak travel hours is D in urbanized areas, per the State Highway System Policy No. 000-525-006c, effective April 19, 2017.

It should be noted that the traffic operational objectives were to maintain or improve No-Build operations such that level of service thresholds could be met in the design year without incurring significant costs related to the widening of SR 429. However, due to the projected growth in traffic within the study area, the proposed Build Alternatives may not meet FDOT's LOS D threshold in urbanized areas because of design and/or right of way constraints.

In addition to the signalized intersection level of service criteria stated above, operational analysis criteria included the following MOE's:

HCS Analysis

- Freeway Level of Service and Density (passenger cars/mile/lane)
- Ramp Roadway Capacity (passenger cars/hour) and Volume-to-Capacity Ratio

Synchro Analysis

- Level of Service and Delay (seconds/vehicle)
- 95th Percentile Queue Lengths
- Interchange off-ramp queue lengths: The 95th percentile queue was used to determine the required storage length for the interchange off-ramp queue lengths.

VISSIM Analysis

- Network-wide Output: average speed, total travel time, total delay time, latent demand, and vehicles arrived.
- Intersections/interchange performance: estimated speed, processed volume, delay, and maximum queue length for all movements.

2.2 TRAFFIC FACTORS

This study used the Standard K factor for the SR 429 mainline and arterials. Consistent with other FDOT districts, FTE has developed Standard K factors for use in planning and design applications. The K factors for the SR 429 ramps, as well as the D factors for the mainline and ramps, were estimated from the FTE's annual factor development and toll and count data. The K and D factors were adjusted where applicable based on future projections to account for anticipated changes in land use and traffic patterns.

The Design Hour Truck (DHT) factor is the proportion of trucks within the peak hour and is assumed to be half of the daily truck (T_{24}) proportion rounded up to the nearest whole number for this study. Daily truck (T_{24}) factors for the SR 429 mainline and tolled ramps were estimated from FTE's monthly class data from Fiscal Year 2019 Enterprise One Reports (Toll Traffic by Vehicle Class by Month). The data were averaged to estimate daily trucks (3 axles and more) and adjusted to account for buses and 2-axle single unit trucks. Truck percentages for the

non-tolled ramps along SR 429 were estimated from applicable adjacent truck toll data. Arterial Truck and D factors were obtained from the 2019 Florida Traffic Online (FTO) database. The estimated D factors were verified in the field. Existing PHFs were used for existing conditions and a PHF of 0.95 was assumed for future conditions. The PHF is calculated to be the total peak hour volume divided by four times the highest 15-minute flow rate within the peak hour. It accounts for the variability of traffic flow within the peak hour. The future year traffic factors for this study are presented in **Table 2.5**.

Table 2.5
Future Traffic Factors

Segment	K	D	T_{24}	DHT
SR 429 Freeway Mainline	**10.5%***	**58.0%**	**13%**	**7%**
SR 429 Ramps				
Sinclair Road (MP 1)				
Northbound on-ramp and southbound off-ramp	11%	65%	7%	4%
Northbound off-ramp and southbound on-ramp	9%	63%	7%	4%
US 192 (MP 6)				
Northbound on-ramp and southbound off-ramp	10%	53%	8%	4%
Northbound off-ramp and southbound on-ramp	10%	56%	8%	4%
Western Way (MP 8)				
Northbound on-ramp and southbound off-ramp	11%	66%	4%	2%
Northbound off-ramp and southbound on-ramp	13%	62%	4%	2%
Seidel Road (MP 11)				
Northbound off-ramp and southbound on-ramp	11%	59%	7%	4%
Arterials				
Sinclair Road	9.0%*	59%	7%	4%
US 192		61%	5%	3%
Western Way		70%	4%	2%
Seidel Road		54%	4%	2%

Sources:
*SR 429 Standard K factor is based on FTE's annual factor development.
Ramps K factors are estimated from FTE's annual factor development and toll and count data for, Arterials Standard K factor is from Florida Traffic Online (FTO) and *FDOT Project Traffic Forecasting Handbook*.
D and T factors are estimated from FTE's annual factor development and toll and count data, following the *FDOT Project Traffic Forecasting Handbook*. The estimated D factors were verified in the field.

2.3 ANALYSIS YEARS

The Traffic Forecasting and Traffic Operational Analysis years are provided below.

Traffic Forecasting

- Base Year 2017
- Opening Year 2025
- Horizon Year 2045

Traffic Operational Analysis

- Existing Year 2020
- Opening Year 2030
- Design Year 2050

2.4 TRAVEL DEMAND FORECASTING

The Central Florida Regional Planning Model (CFRPM), Version 6.1 developed by FDOT District 5 was used as the basis for the development of traffic forecast for this SIJR. The CFRPM 6.1 model was developed in two versions: a Daily model and a Time of Day (ToD) model, which included the most recent available socioeconomic data from MetroPlan Orlando. The ToD version of the model was revalidated for year 2015 by FTE, renamed as CFRPM v6.1 ToD FTE version, and adopted for this study.

The CFRPM 6.1 ToD FTE version is a Peak Season Weekday Average Daily Traffic (PSWADT) model. Years 2025 and 2045 model PSWADT were converted to Annual Average Daily Traffic (AADT) using the Model Output Conversion Factor (MOCF) for the study area. The model AADT volumes were then adjusted following the National Cooperative Highway Research Program (NCHRP) 765 methodology, where applicable, and supplemented with historical volumes, count data, and model proportions for turn movements. Reasonableness checks were made for growth rates, K factor, and D factor. Traffic forecasts were compared for reasonableness with the following three studies in the area: I-4 at CR 532/SR 429 SIMR (FPIDs: 444187-1 and 444329-1), CFX Lake Orange Connector PD&E Study (from US 27 to SR 429), and CFX Poinciana Parkway PD&E Study (from Polk County Line to CR 532). Traffic volumes for years 2030 and 2050 were developed through interpolation/extrapolation, respectively, corresponding to the opening and design analysis years.

2.5 SAFETY STUDY

Five years of crash data (2014 – 2018) was used for the safety evaluation for each facility within the AOI based on the MLOU. The data was obtained from the FDOT's Crash Analysis Reporting (CAR) Online system database for state roads. Crash data for non-state roads was obtained from the Signal Four Analytics tool, for the same analysis period. The analysis was conducted using the predictive methods in Chapters 12 and 19 of the HSM, where available, and the Enhanced Interchange Safety Analysis Tool (ISATe), which apply a combination of Safety Performance Functions (SPFs), and crash modification factors (CMFs) to estimate frequency and cost of crashes for each segment and intersection. The cost of crashes was based on the KABCO distribution and crash values from the Florida Design Manual 2022.

Existing conditions such as population, land use, roadway facilities, existing traffic data collection, and crash data are described in this section.

3.1 REGIONAL POPULATION, EMPLOYMENT AND LAND USE

The project study area is located in Orange and Osceola counties. According to data from the University of Florida's Bureau Economic and Business Research (BEBR) in 2020, Orange County was the 5th largest county by population in Florida, while Osceola County was the 16th in 2020. Osceola County's population, however, between 2010 and 2020 grew at 44.7 percent, highest in the state during that period. Orange County grew by 24.8 percent during the same period, 5th highest in the state. Both counties grew by larger percentages than the State of Florida (14.6 percent). **Table 3.1** provides a summary of the county population growth between 2010 and 2020.

Table 3.1
Historical Population and Growth

Area	US Census	BEBR Estimate	Change	% Change
	2010	2020	2010 - 2020	2010 – 2020
Orange County	1,145,956	1,429,908	283,952	24.8
Osceola County	268,685	388,656	119,971	44.7
Florida	18,801,330	21,538,187	2,736,857	14.6

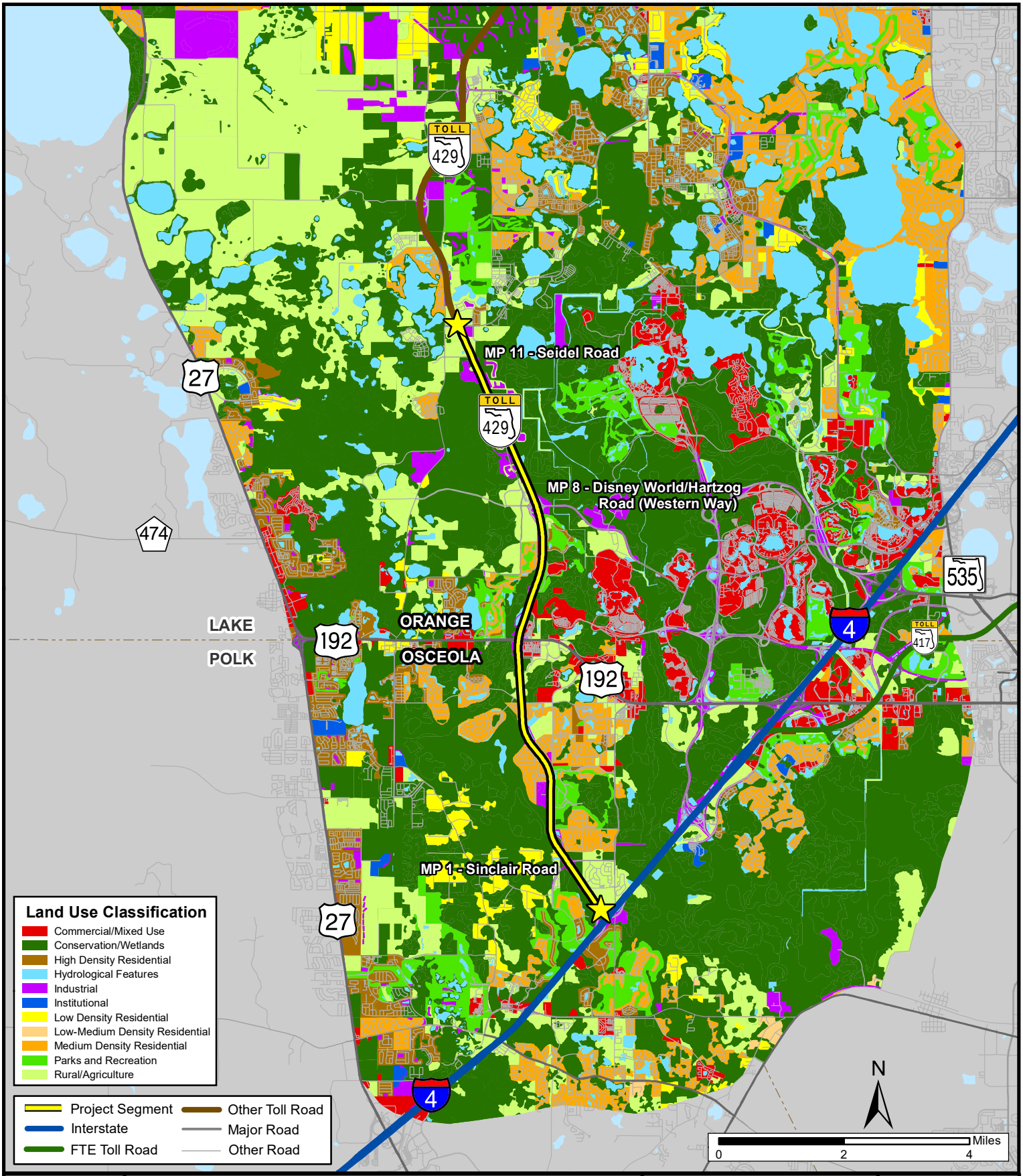
Source: Bureau of Economic and Business Research – Florida Estimates of Population 2019

The existing land in the immediate vicinity of the project corridor, between Seidel Road (Milepost 11) and Hartzog Road/Western Way (Milepost 8) is comprised of wetlands and other undeveloped areas of conservation and open lands. South of the Hartzog Road/Western Way (Milepost 8) interchange, the land use on the eastern side of the facility is largely Disney-owned property where Animal Kingdom and Blizzard Beach Water Park are located. South of US 192 (Milepost 6), the land use is primarily medium-density residential (single and multi-family housing) and timeshare/resort properties. The western side of SR 429, between Hartzog Road/Western Way (Milepost 8) and the SR 429/I-4 interchange (Milepost 0) features less intense land uses; comprised largely of low to medium density residential and timeshare/resort properties as shown on **Figure 3.1**.

The project study area contains 19 Developments of Regional Impact (DRI) and over 90 Planned Unit Developments (PUDs). Of the 19 DRI, the largest of these is Celebration, located south of SR 417 / Beachline West and bisected by I-4. The number of DRIs and PUDs in the corridor have made this area a high growth area for several years. In addition to the sheer number of developments, many of these developments either currently feature ongoing development activity or have remaining approved entitlements for future growth. Note that Everest Place development is included in the model TAZ # 1294. A list of the DRIs is shown in **Table 3.2** and a corresponding map of the developments is shown on **Figure 3.2**.

Table 3.2
List of Study Area Developments of Regional Impact

Map Number ID	DRI Name	Map Number ID	DRI Name
1	Bonnet Creek Resort	11	The Parkway
2	Cagan Crossings	12	Reunion Resort & Club
3	Celebration	13	Rida (Championsgate)
4	Fantasy Heights	14	Rolling Oaks
5	Formosa Gardens	15	Stoneybrook South
6	Lake Vista Village	16	Summer Bay
7	Landmark Sun Resort & Spa	17	Westgate
8	Lindfields	18	Westside
9	Mystic Dunes	19	World Gateway
10	Orange Lake Resort and Country Club		



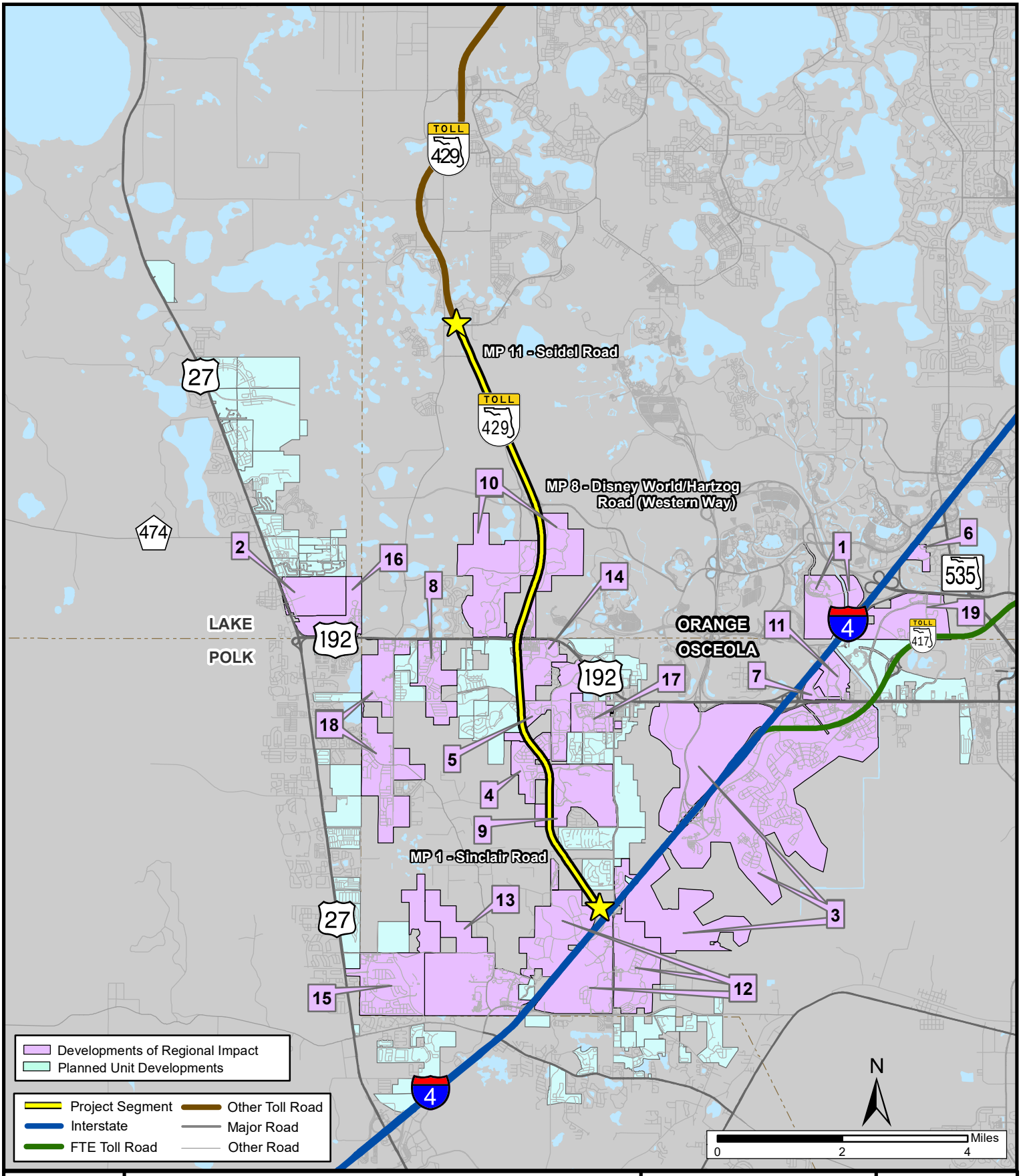
FLORIDA'S TURNPIKE

Western Beltway (SR 429) Widening PD&E Study
from I-4 to Seidel Road
Systems Interchange Justification Report (SIJR)

Existing Land Use

Figure 3.1

Source: 2018 HERE NavStreets, South Florida Water Management District Land Use and Cover (2009), and Southwest Florida Water Management District Land Use and Cover (2011); Map Produced by Florida's Turnpike Enterprise/AECOM



FLORIDA'S TURNPIKE	**Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road Systems Interchange Justification Report (SIJR)**	**Study Area Major Developments**	**Figure 3.2**

Source: 2020 HERE NavStreets; Florida Department of Economic Opportunity, 2021. Map Produced by Florida's Turnpike Enterprise / AECOM.

3.2 ROADWAY FACILITIES

The following is a description of the roadways within the study limits.

SR 429

SR 429 extends nearly 23 miles from U.S. Highway 441 in Apopka south to Interstate 4 in Osceola County, providing West Orange and Osceola counties with an alternate north-south route to heavily traveled I-4. The segment from I-4 to Seidel Road is owned and operated by FTE and the remainder is owned by CFX. The SR 429 mainline within the study area has two 12-foot lanes, a 10-foot outside shoulder, and an inside shoulder that varies in width from 2 to 4 feet. The posted speed limit is 70 mph. SR 429 serves north-south trips on the west side of the Orlando metropolitan area and provides access to Disney World attractions around the study area.

Sinclair Road

Sinclair Road is an east-west, four-lane, divided major collector with a posted speed limit of 35 mph within the project area. Sinclair Road crosses SR 429 at approximately MP 1.0, forming a diamond interchange with SR 429. The ramps to and from the south are tolled. The northbound ramps terminal intersection is signalized whereas the southbound ramps terminal intersection is unsignalized. The northbound on-ramp is connected to SR 429 from Sinclair Road by a Connector Road.

US 192

US 192 is a six-lane, divided, east-west principal arterial within the project limits, with a posted speed limit of 55 mph west of SR 429 and 50 mph east of SR 429. US 192 forms a diamond interchange with SR 429 at approximately MP 6. The ramps to and from the south are tolled and the ramp terminal intersections are signalized. US 192 is lined with tourist attractions, commercial plazas, and residential developments. The US 192 intersections at West Orange Lake Boulevard, East Orange Lake Boulevard/Rolling Oaks Boulevard, Inspiration Drive, and Formosa Gardens Boulevard are also analyzed to consider the influence on these intersections have on traffic operations, as they are closely spaced from the interchange. These access roads provide access to commercial and residential developments. **Figure 3.3** shows an aerial photograph of US 192 within the vicinity of SR 429.

Western Way

Western Way is an east-west, four-lane, divided major collector within the project limits, with a posted speed limit of 35 mph west of SR 429 and 45 mph east of SR 429. Western Way forms a diamond interchange with SR 429 at approximately MP 8 and has a loop ramp in the southwest quadrant serving the southbound SR 429 to eastbound Western Way movement. The ramps at the Western Way interchange are non-tolled and ramp terminal intersections are unsignalized. West of SR 429, there are two signalized intersections at Flagler Avenue/Warbler Way and at Hartzog Road that are in close proximity to the interchange and are considered to be part of the AOI. Western Way primarily provides access to Disney World attractions and resorts in the area. It also serves residential and commercial developments in the region. **Figure 3.4** depicts the Western Way and SR 429 interchange.

Seidel Road

Seidel Road is an east-west local roadway that crosses SR 429 at MP 11. It is a four-lane divided major collector within the project limits. The posted speed limit is 45 mph. Seidel Road forms a partial diamond interchange with SR 429, serving trips to/from the south only. The two ramps are tolled, and ramp terminal intersections are unsignalized. **Figure 3.5** is an aerial map of the Seidel Road and SR 429 interchange. Signalized intersections within the interchange's AOI include Avalon Road and Lakeshore Pointe Drive located west and east of SR 429, respectively. Note that in year 2020, both intersections were unsignalized.

FLORIDA'S TURNPIKE

Western Beltway (SR 429) Widening PD&E Study
from I-4 to Seidel Road
Systems Interchange Justification Report (SIJR)

US 192 and SR 429
Interchange Aerial Photograph

Figure 3.3

FLORIDA'S TURNPIKE

Western Beltway (SR 429) Widening PD&E Study
from I-4 to Seidel Road
Systems Interchange Justification Report (SIJR)

Western Way and SR 429
Interchange Aerial Photograph

Figure 3.4

FLORIDA'S TURNPIKE

Western Beltway (SR 429) Widening PD&E Study
from I-4 to Seidel Road
Systems Interchange Justification Report (SIJR)

Seidel Road and SR 429
Interchange Aerial Photograph

Figure 3.5

3.3 DATA COLLECTION

Existing conditions traffic data was obtained from the ongoing PD&E study counts conducted for the Western Beltway widening from north of I-4 to Seidel Road in October 2019, January 2020, and February 2020. Additionally, data for the PD&E study were collected from Fiscal Year 2020 Enterprise One Reports and the Florida Traffic Online (FTO) database. During a field visit in 2021, it was noticed that Avalon Road was widened to 4-lanes and signals were installed at both Avalon Road and Lakeshore Pointe Drive. Also, Horizon High School was constructed and opened in the southeastern quadrant of Seidel Road and Lakeshore Pointe Drive intersection. Therefore, additional turning movement counts were conducted at both intersections and the AOI was extended to include both intersections.

As shown in **Tables 3.3** and **3.4**, the 2020 existing AADT and peak hour volumes were developed using the 2020 traffic counts and by applying growth rates to traffic counts collected in year 2019 and adjusting year 2021 counts to account for COVID-19 impacts based on the MLOU. Growth rates were estimated based on historic traffic data. The data was then be aggregated and balanced for continuity of flow and consistency.

Table 3.3
Hose and Toll Count Locations

Interchange/Mainline	Count Location	Count Date
I-4 Ramps	I-4 eastbound to SR 429 northbound ramp	February 2020
	I-4 westbound to SR 429 northbound ramp	
	SR 429 southbound to I-4 eastbound ramp	
	SR 429 southbound to I-4 westbound ramp	
SR 429 mainline	Between I-4 and Sinclair Road (sum of I-4 ramps)	
US 192	SR 429 northbound on-ramp	
	SR 429 southbound off-ramp	
	SR 429 northbound off-ramp	
	SR 429 southbound on-ramp	
Western Way	SR 429 northbound on-ramp	
	SR 429 southbound off-ramps (loop and diagonal)	
	SR 429 southbound on-ramp	
	SR 429 northbound off-ramp	
Seidel Road (Toll)	SR 429 southbound ramp	October 2019
	SR 429 northbound ramp	
SR 429 mainline	Between Western Way and US 192 (Mainline Plaza)	February 2020

Source: SR 429 PD&E Study from I-4 to Seidel Road traffic data collection

Table 3.4
Turning Movement Count Intersections within the PD&E Study Area of Influence

Cross-Street	Intersection Count Location	Count Date
Sinclair Road	SR 429 Southbound Ramps	October 2019
	SR 429 Northbound Ramps	
US 192	West Orange Lake Boulevard	January 2020
	East Orange Lake Boulevard	
	SR 429 Southbound Ramps	October 2019
	SR 429 Northbound Ramps	
	Inspiration Drive	October 2021
Western Way	SR 429 Southbound Ramps	October 2019
	SR 429 Northbound Ramps	
	Flagler Avenue	October 2021
	Flamingo Crossings Boulevard	
Seidel Road	SR 429 Southbound Ramp	October 2019
	SR 429 Northbound Ramp	
	Avalon Road	October 2021
	Lakeshore Pointe Drive	

Source: Traffic data collection
Year 2019 data was adjusted to year 2020 by applying appropriate growth rates based on historical data.
Year 2021 data was adjusted using available historical growth rates and nearby intersections counts to year 2020 and account for COVID-19 impacts

Data collection was conducted in accordance with the procedures from the latest edition of the FDOT Manual on Uniform Traffic Studies (MUTS), Topic No. 750-020-007. Field visits were conducted to collect information on existing lane geometry, storage lengths, and traffic signal related data. The signal timing plans for signalized intersections were obtained from Orange and Osceola Counties.

3.4 EXISTING CRASH DATA

3.4.1 Crash Data Analysis

Crash data for state roads within the project AOI were processed using the most recent five-year data from FDOT's Crash Analysis Reporting (CAR) Online system, from 2014 through 2018 (See **Appendix B**). Crash data for non-state roads were obtained from the Signal Four Analytics tool. Signal Four data were processed for the same time period as the CAR Online data. Detailed crash reports (long/short forms) were reviewed to verify the accuracy of the information obtained from the database.

A total of 650 crashes were reported within the AOI during the five-year study period from 2014 through 2018, as presented in **Table 3.5**. The number of crashes in the study area increased each year except in 2018. Most of the crashes resulted in injury and property damage only. Seven fatal crashes were reported during the five-year analysis period.

Table 3.5
Number of Crashes and Crash Severity by Year

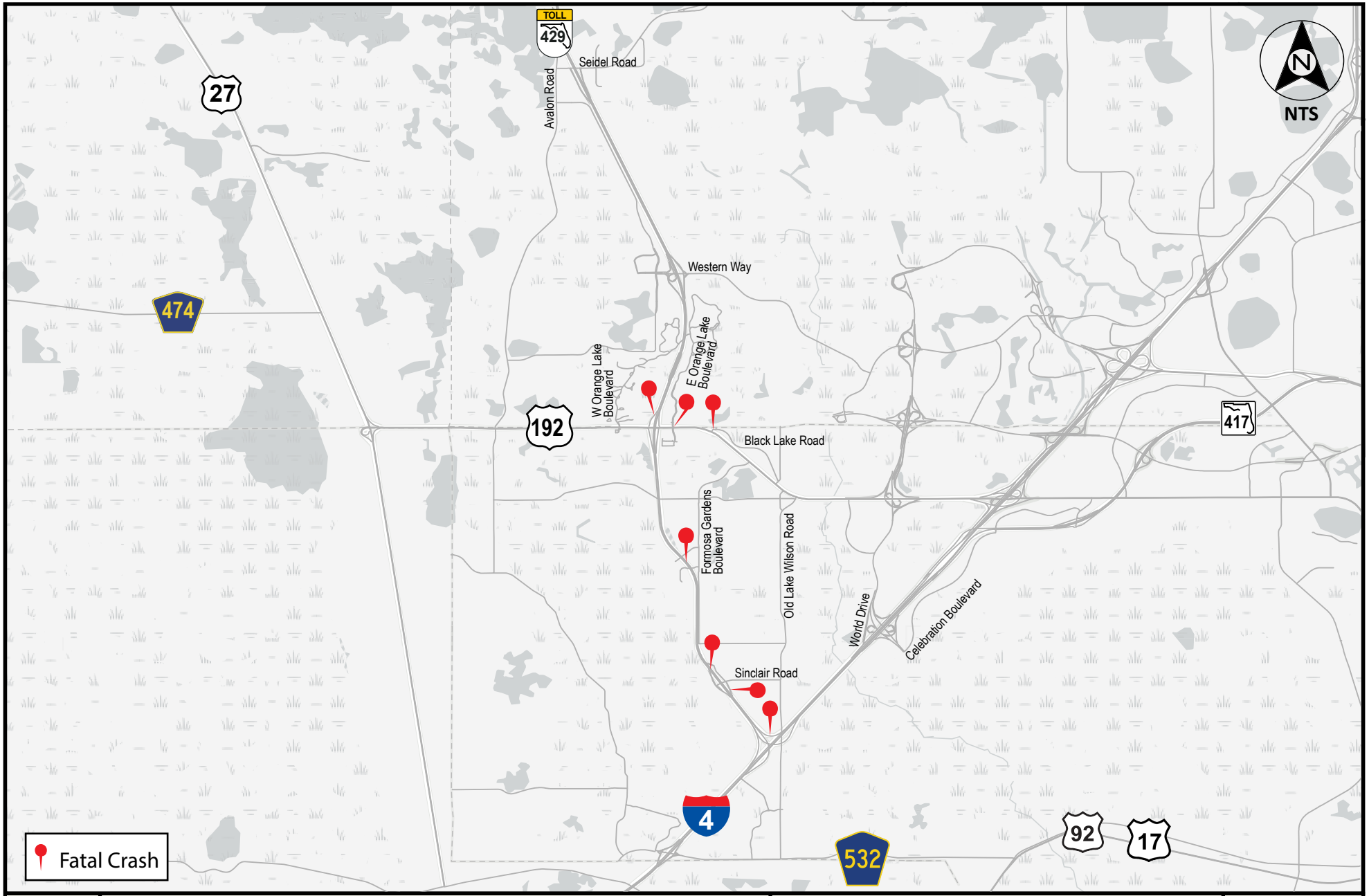
Crash Severity	2014	2015	2016	2017	2018	Total	Proportion
Fatality	1	2	0	2	2	7	1.1%
Incapacitating Injury	2	6	5	3	5	21	3.2%
Non-Incapacitating Injury	5	14	19	16	10	64	9.8%
Possible	16	24	28	38	28	134	20.6%
Property Damage Only (PDO)	72	68	71	114	99	424	65.2%
Total	**96**	**114**	**123**	**173**	**144**	**650**	**100.0%**

Table 3.6 summarizes the crashes based on location. Forty-one percent of the crashes occurred at the intersections, 24.0 percent along the SR 429 mainline, 8.3 percent along the SR 429 ramps, and 26.8 percent at the midblock along the arterials within the project limits.

Table 3.6
Number of Crashes by Location and Year

Roadway Segment	2014	2015	2016	2017	2018	Total	Proportion
SR 429 Mainline	10	17	32	51	46	156	24.0%
SR 429 Ramps	10	9	8	14	13	54	8.3%
Intersections	48	48	54	60	56	266	40.9%
Midblock	28	40	29	48	29	174	26.8%
Total	**96**	**114**	**123**	**173**	**144**	**650**	**100.0%**

Figure 3.6 shows all fatal crashes within the study area. A total number of seven fatal crashes were reported, two occurred along the SR 429 mainline between Sinclair Road and US 192 interchanges, three along the SR 429 ramps (I-4 westbound on-ramp, northbound off-ramp to Sinclair Road and southbound off-ramp to US 192), and two at the intersection of US 192 at East Orange Lake Boulevard and Black Lake Road/Inspiration Drive. Four out of the seven fatal crashes occurred due to vehicles running off the road.



FLORIDA'S TURNPIKE

Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road

Systems Interchange Justification Report (SIJR)

Fatal Crash Location Map (2014-2018)

Figure 3.6

SR 429 Mainline from I-4 to Seidel Road Crashes

A total of 156 crashes were reported along SR 429 mainline from I-4 to Seidel Road during the five-year analysis period from 2014 through 2018. The mainline crashes were mostly off-road (49 percent) and rear-end (25 percent), as illustrated on **Figure 3.7**. Most of the crashes resulted in property damage only and occurred on dry pavement conditions during the day. Two fatal crashes were reported within the five-year study period, which one of them was caused by a rear-end and the other one by an off-road crash, both during the day.

Figure 3.7
SR 429 Mainline Crash Data Summary from I-4 to Seidel Road (2014-2018)

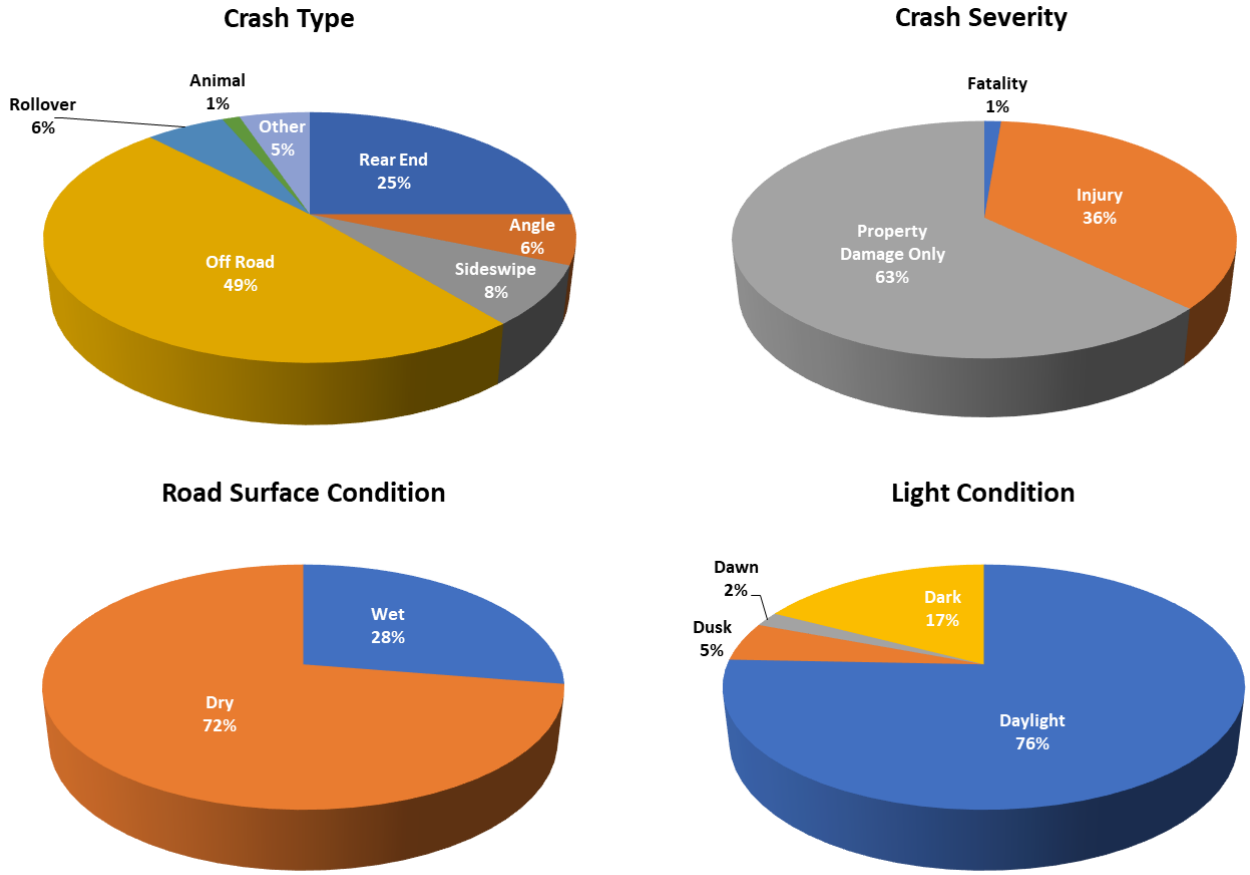
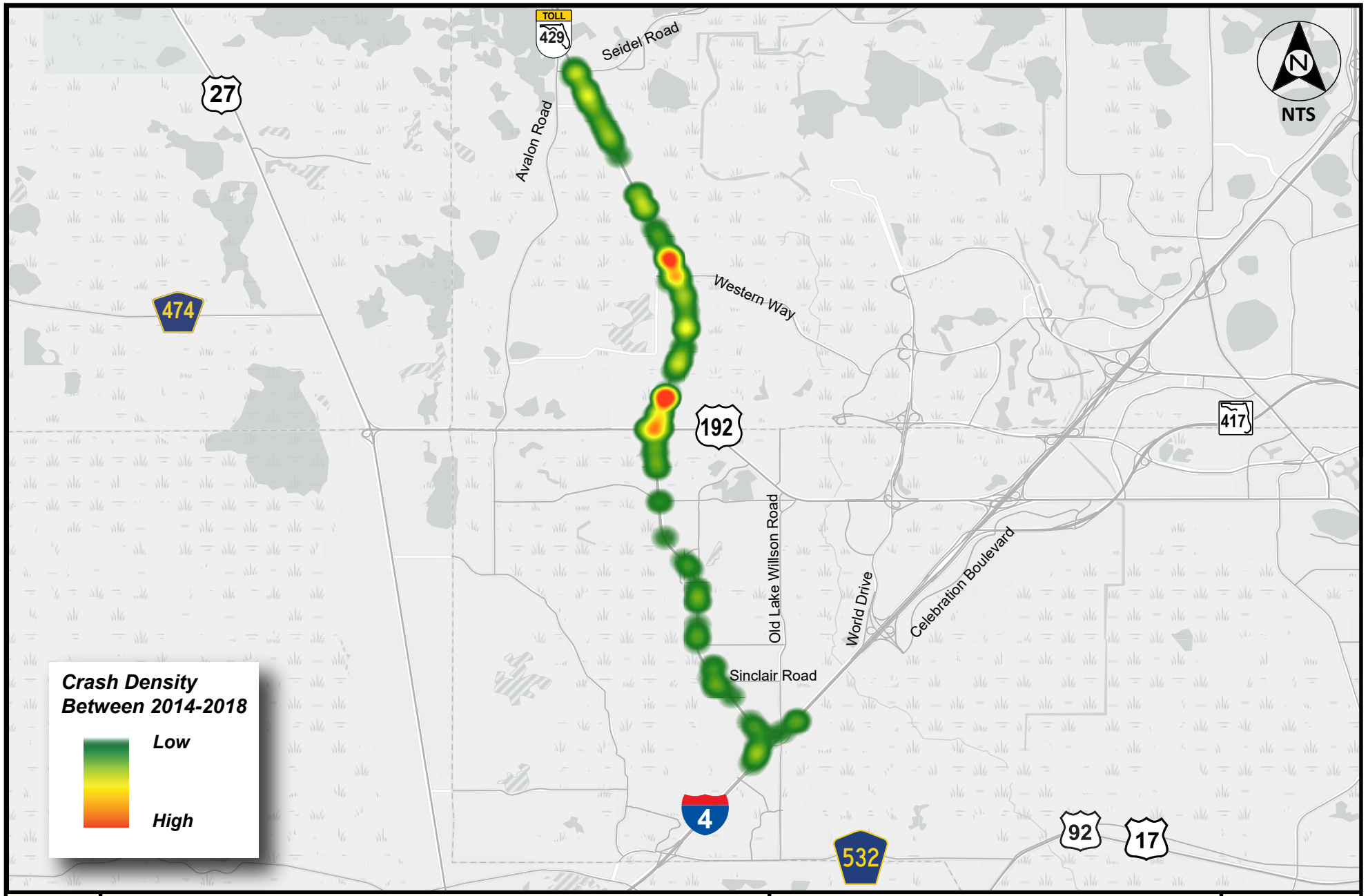


Figure 3.8 shows crash locations heat diagram along the SR 429 mainline and ramps. There is a higher concentration of crashes at the merge/diverge areas of the interchanges. The highest number of crashes are reported close to the US 192 and Western Way interchanges. There is congestion at these two locations during the evening commute.

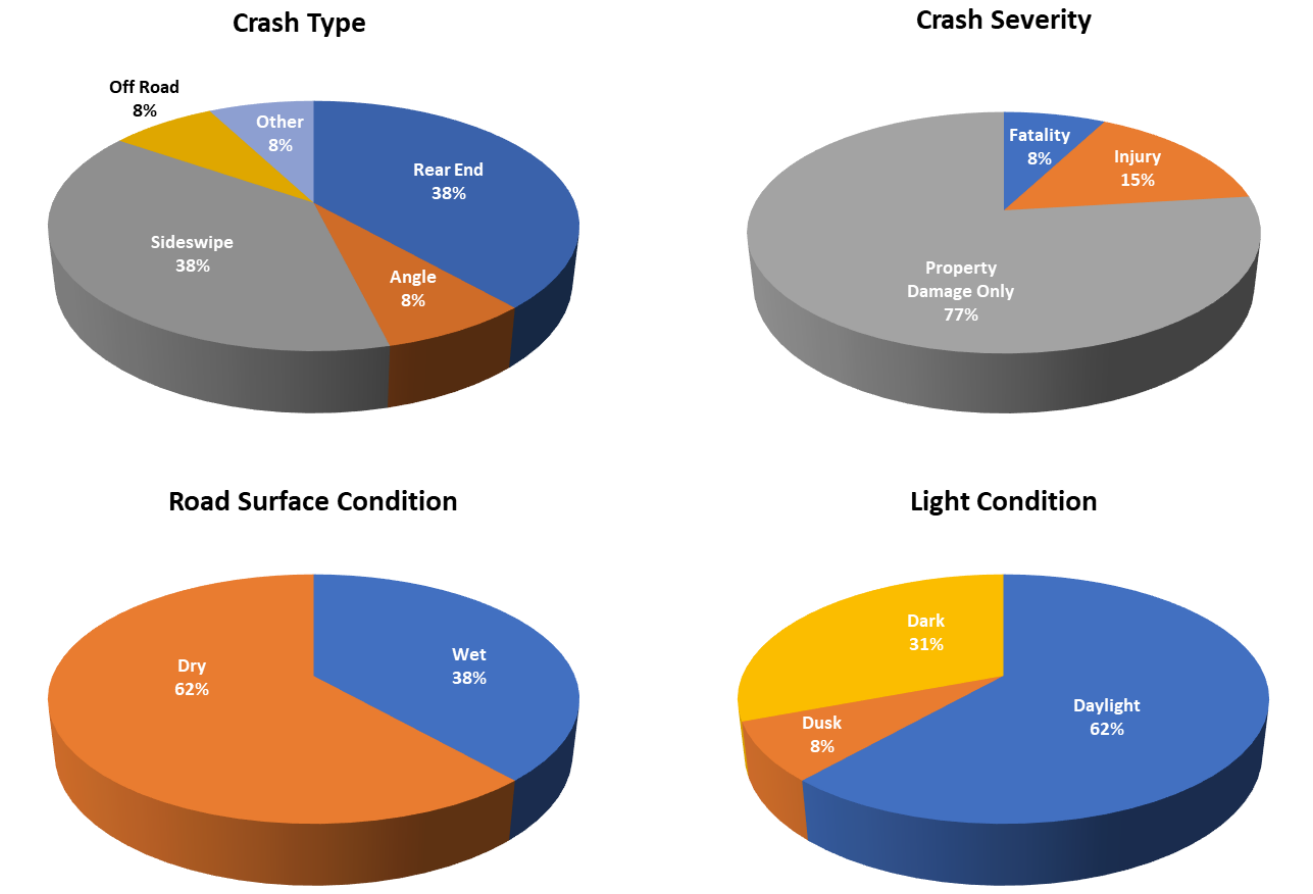


FLORIDA'S TURNPIKE	Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road Systems Interchange Justification Report (SIJR)	SR 429 Mainline and Ramps Historical Crash Heat Map (2014-2018)	Figure 3.8

I-4 and SR 429 System-to-System Interchange Ramps Crashes

A total of 13 crashes were reported along the I-4 ramps during the five-year analysis period. Sideswipe and rear-end are the predominant crash types, each representing 38 percent of the total number of crashes The remaining three crashes were angle, off-road, and other. One fatality was reported on dry surface and dark lighting conditions, which caused an off-road crash at 3:25 AM on a Sunday. Two crashes resulted in injury, and the remaining number of crashes resulted in property damage only. 62 percent of crashes occurred under dry road surface conditions, mostly during the day, as shown on **Figure 3.9**.

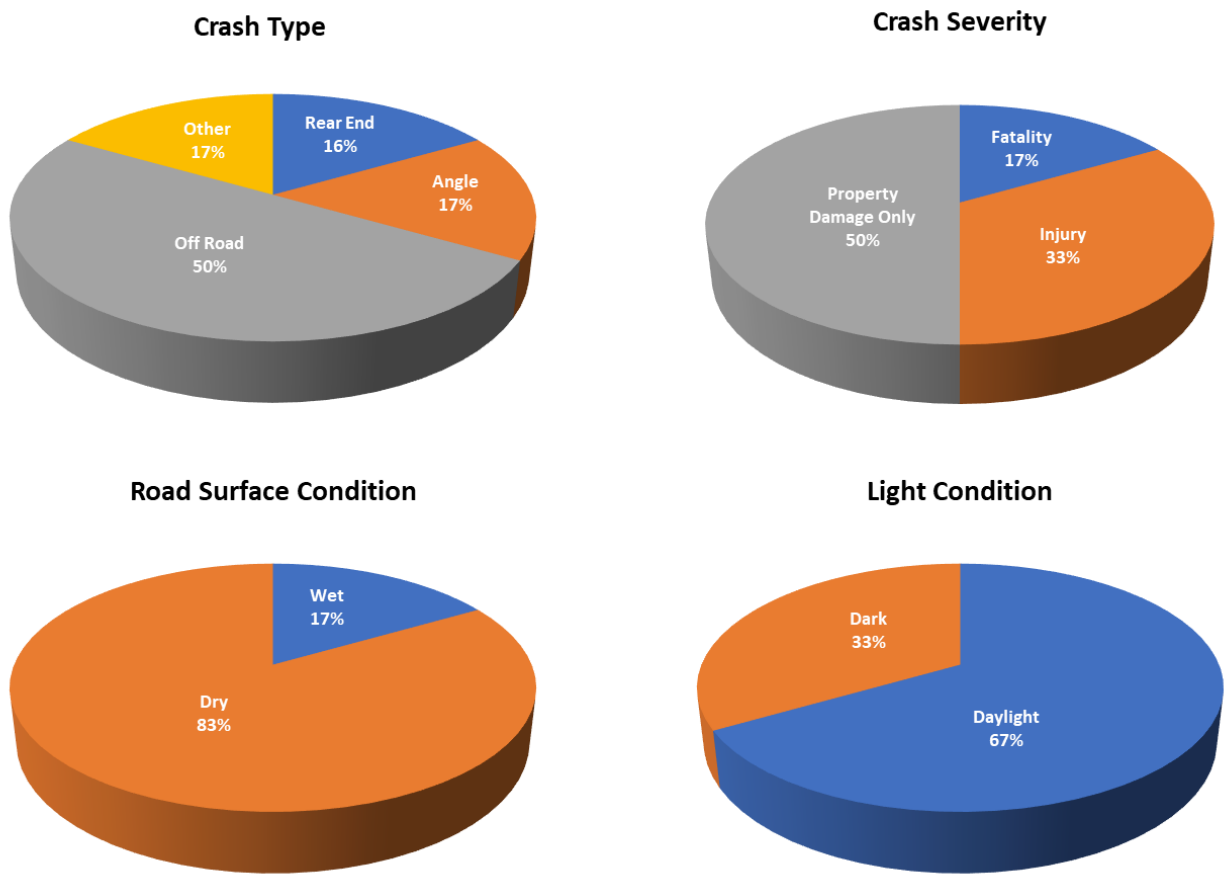
Figure 3.9
I-4 and SR 429, System-to-System Interchange Ramps Crash Data Summary (2014-2018)



Sinclair Road and SR 429 Interchange Ramps (MP 1) Crashes

A total of six crashes were reported along the Sinclair Road interchange ramps during the five-year analysis period. Three out of the six crashes were off-road and the remaining three were angle, rear-end, and other. One fatality was reported, which was caused by an off-road motorcycle crash at 5:40 PM on a Saturday. The crash forms show that the motorcycle was travelling in the wrong direction on the northbound off-ramp. The rest of the crashes resulted in injury or property damage only and occurred on either a Thursday or a Friday. The crashes occurred under dry road surface conditions, mostly during the day, as shown on **Figure 3.10**.

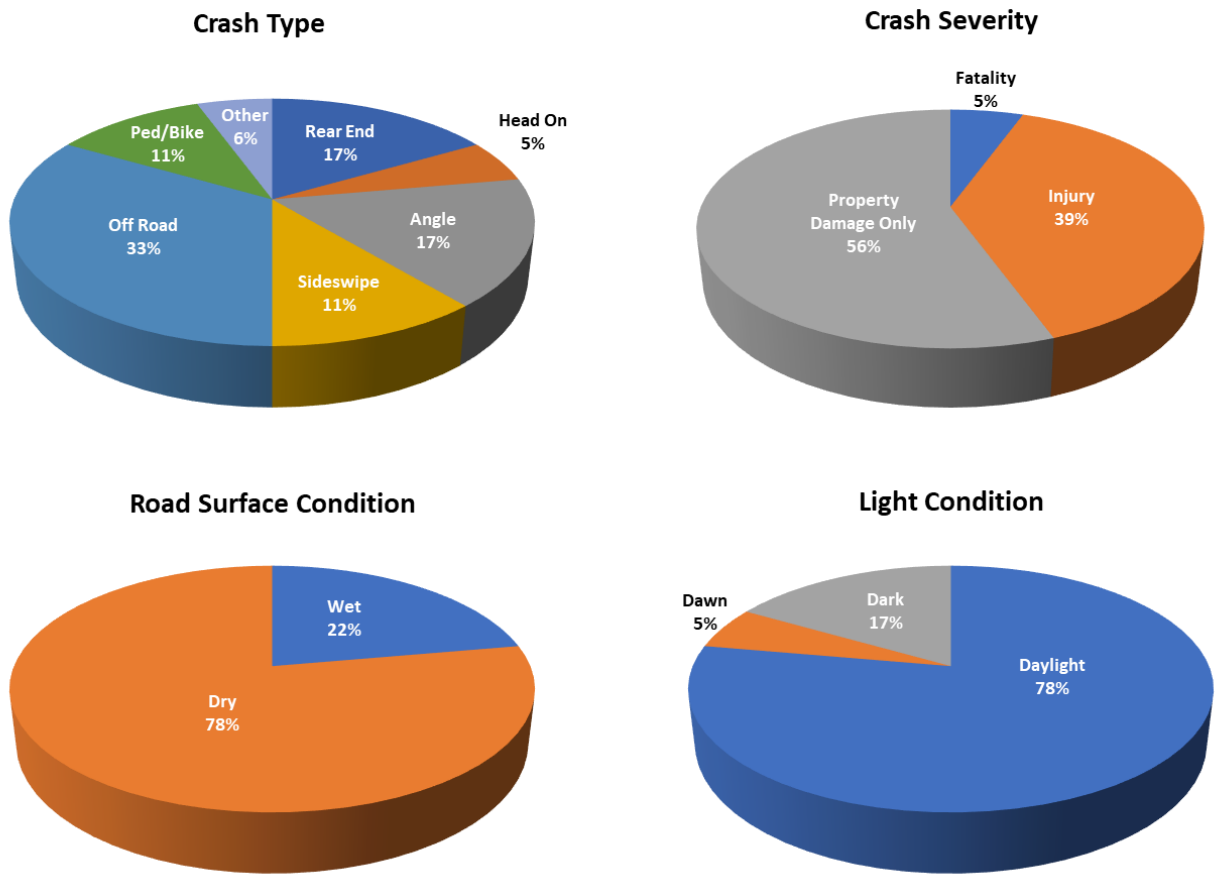
Figure 3.10
Sinclair Road and SR 429 Interchange Ramps Crash Data Summary (2014-2018)



US 192 and SR 429 Interchange Ramps (MP 6) Crashes

A total of 18 crashes were reported along the US 192 interchange ramps during the five-year analysis period. As shown on **Figure 3.11**, most of the crashes were off-road, resulted in property damage only, and occurred on a dry road surface during the day. One fatal crash was reported within the five-year study period, which was caused by an off-road crash. It is noted in the long forms that the vehicle failed to negotiate the right-hand curve on the southbound off-ramp as the roadway was wet. The crash occurred during the day at 1:30 PM on a Thursday. Most of the crashes occurred during the PM peak period and were evenly spread through the days of week.

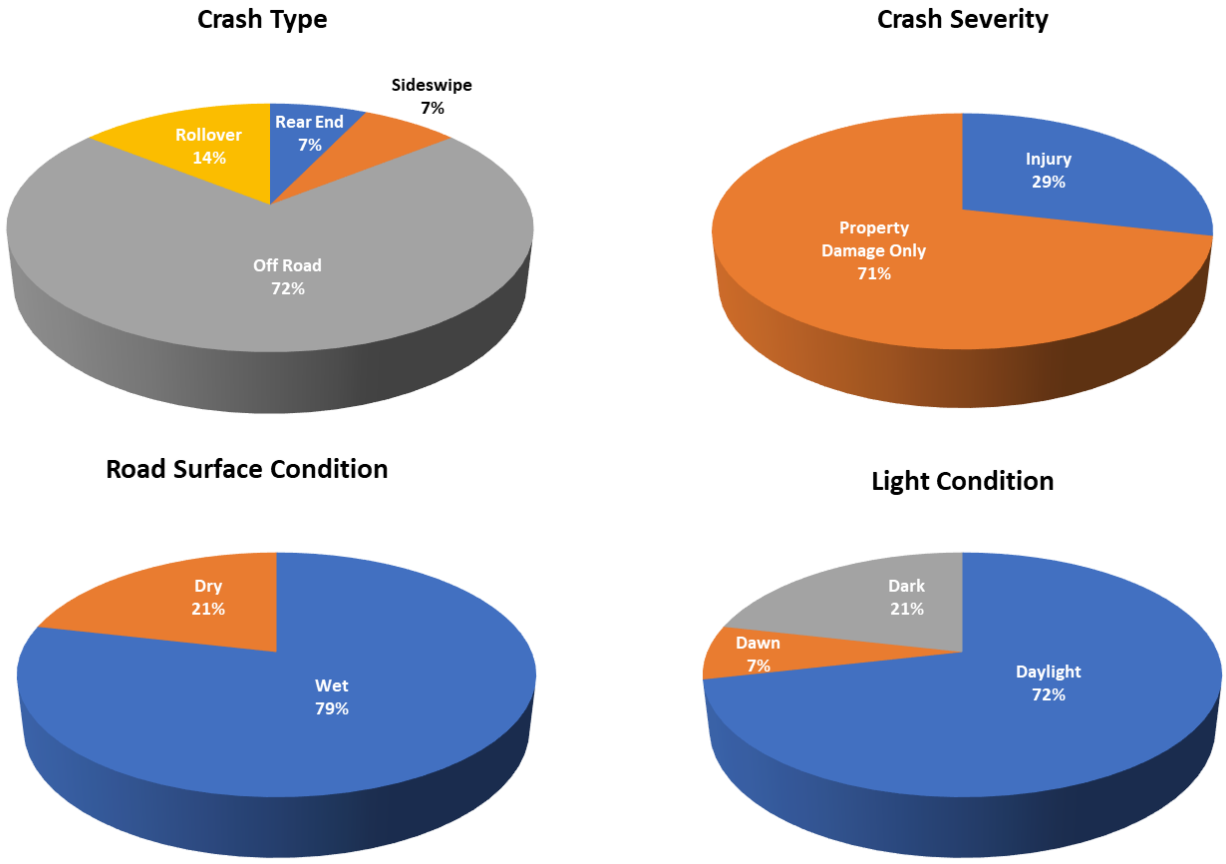
Figure 3.11
US 192 and SR 429 Interchange Ramps Crash Data Summary (2014-2018)



Western Way and SR 429 Interchange Ramps (MP 8) Crashes

A total of 14 crashes were reported along the Western Way interchange ramps from 2014 through 2018. As shown on **Figure 3.12**, most of the crashes were off-road, resulted in property damage only, and occurred on a wet road surface during the day. Most of the crashes occurred between Wednesday and Sunday during the AM peak period. Crash occurrence was more frequent along the ramps to and from the south.

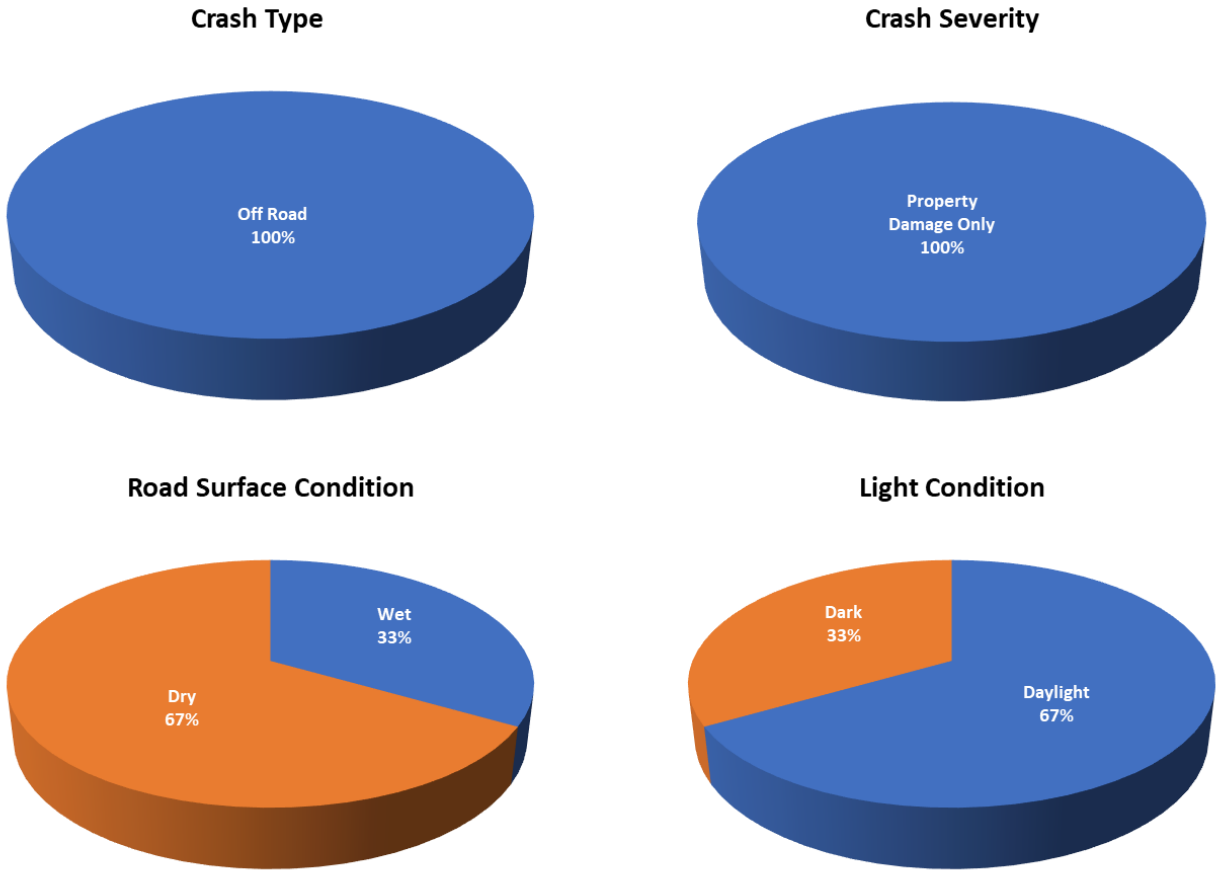
Figure 3.12
Western Way and SR 429 Interchange Ramps Crash Data Summary (2014-2018)



Seidel Road and SR 429 Interchange Ramps (MP 11) Crashes

Three off-road crashes were reported along the Seidel Road interchange ramps during the five-year analysis period. As shown on **Figure 3.13**, the crashes resulted in property damage only under dry road surface conditions and daylight conditions.

Figure 3.13
Seidel Road and SR 429 Interchange Ramps Crash Data Summary (2014-2018)



Actual crash rates were computed and compared with average crash rates for similar facilities within Orange and Osceola Counties to assess the safety condition within the study area. Critical crash rates and safety ratios were also estimated. Crash rates for the freeway mainline and ramps were estimated as crashes per Million Vehicle Miles Traveled (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 3.7**.

Table 3.7
Mainline and Ramps Crash Rates and Safety Ratios (2014-2018)

Description	Total Crashes	Actual Crash Rate	Average Crash Rate*	Critical Crash Rate	Safety Ratio
Freeway Mainline or Ramps					
SR 429 Mainline	156	0.22	0.65	0.81	0.27
I-4 System-to-System Interchange Ramps**	13	0.11	0.76	1.20	0.09
Sinclair Road Ramps**	6	0.80	0.65	2.52	0.32
US 192 Ramps**	18	0.68	0.65	1.55	0.43
Western Way Ramps**	14	0.32	0.65	1.33	0.24
Seidel Road Ramps**	3	0.36	0.65	2.41	0.15

* FDOT CAR Online Osceola and Orange Counties, 5-year Average Crash Rate
Western Beltway Mainline: Toll Road Urban; I-4 Mainline Urban Interstate
** I-4 and SR 429 Ramps: Ramp Urban Crash Rate not available, used rate for mainline

The analysis shows that the SR 429 mainline, interchange ramps, within the study area had actual crash rates lower than the critical crash rates (i.e., safety ratio < 1.0), from 2014 through 2018. Even though the safety ratios are below 1.0 and do not reveal a safety deficiency in the study area, it is important to note that some of the locations had a significantly high number of crashes, such as the US 192 ramps, the ramp terminal, and adjacent intersections. This interchange and the arterial experience severe congestion during peak periods, primarily in the evening. The highest safety ratio (0.43) is reported for the US 192 and SR 429 ramps, followed by the Sinclair Road and SR 429 ramps (0.32).

3.4.2 Intersections Along Cross-Streets

Signal Four Analytics, a FDOT funded database developed in coordination with the State Safety Office (SSO), was used to obtain crash data for side streets that are not included in the FDOT crash database. Intersection crashes were extracted by providing a 250-foot influence area. A brief discussion of the crash analysis for the intersections are provided below.

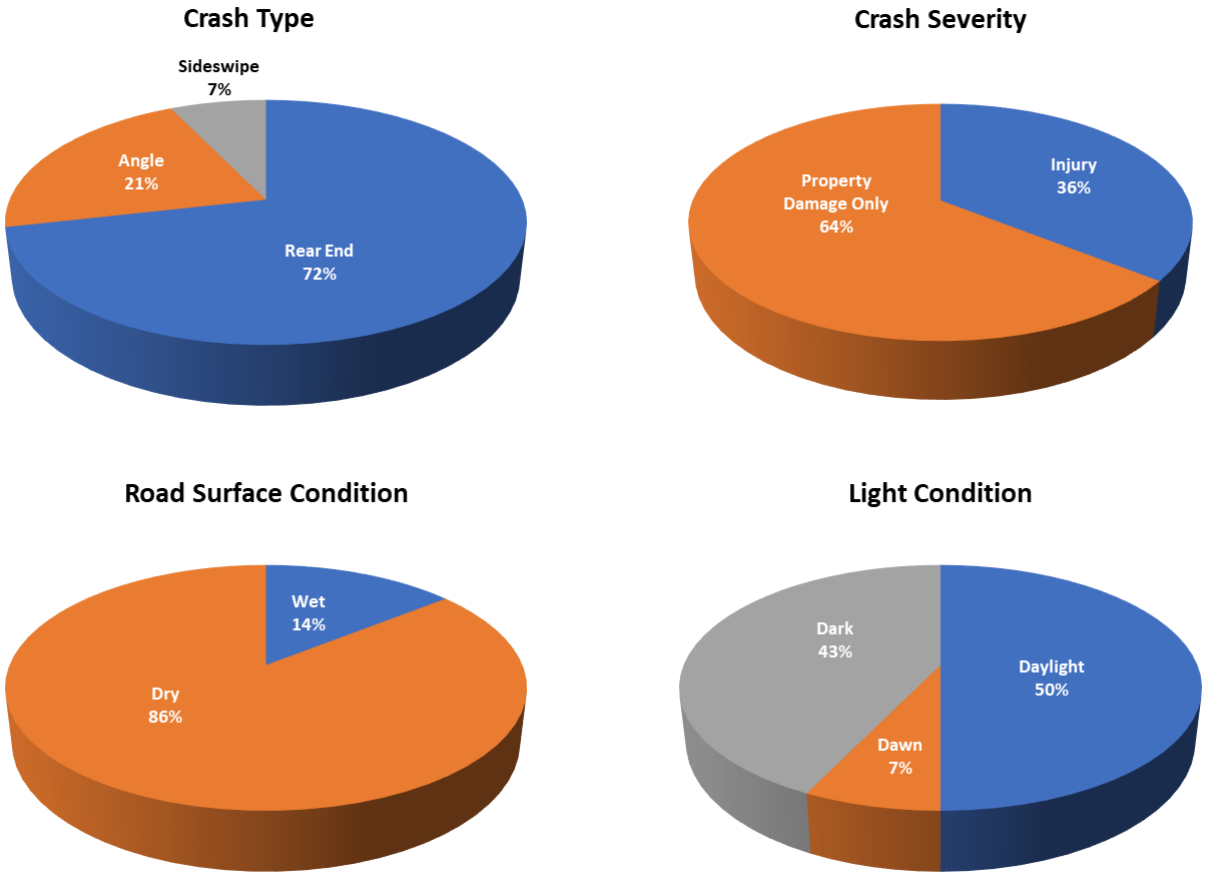
Sinclair Road and SR 429 Ramp Terminal Intersections

At the Sinclair Road and SR 429 ramp terminal intersections, one crash was reported from 2014 through 2018, which was caused by an angle crash. The crash resulted in injury and occurred under dry road surface conditions.

US 192 and West Orange Lake Boulevard Intersection

At the US 192 and West Orange Lake Boulevard intersection, 14 crashes were reported during the five-year analysis period. As shown on **Figure 3.14**, most of the crashes were rear-end collisions. Property damage only was the most common severity types. There were no fatal crashes reported in the five-year period. Most of the crashes occurred under dry road surface conditions during the daylight conditions. Crash occurrence was more frequent during the weekdays.

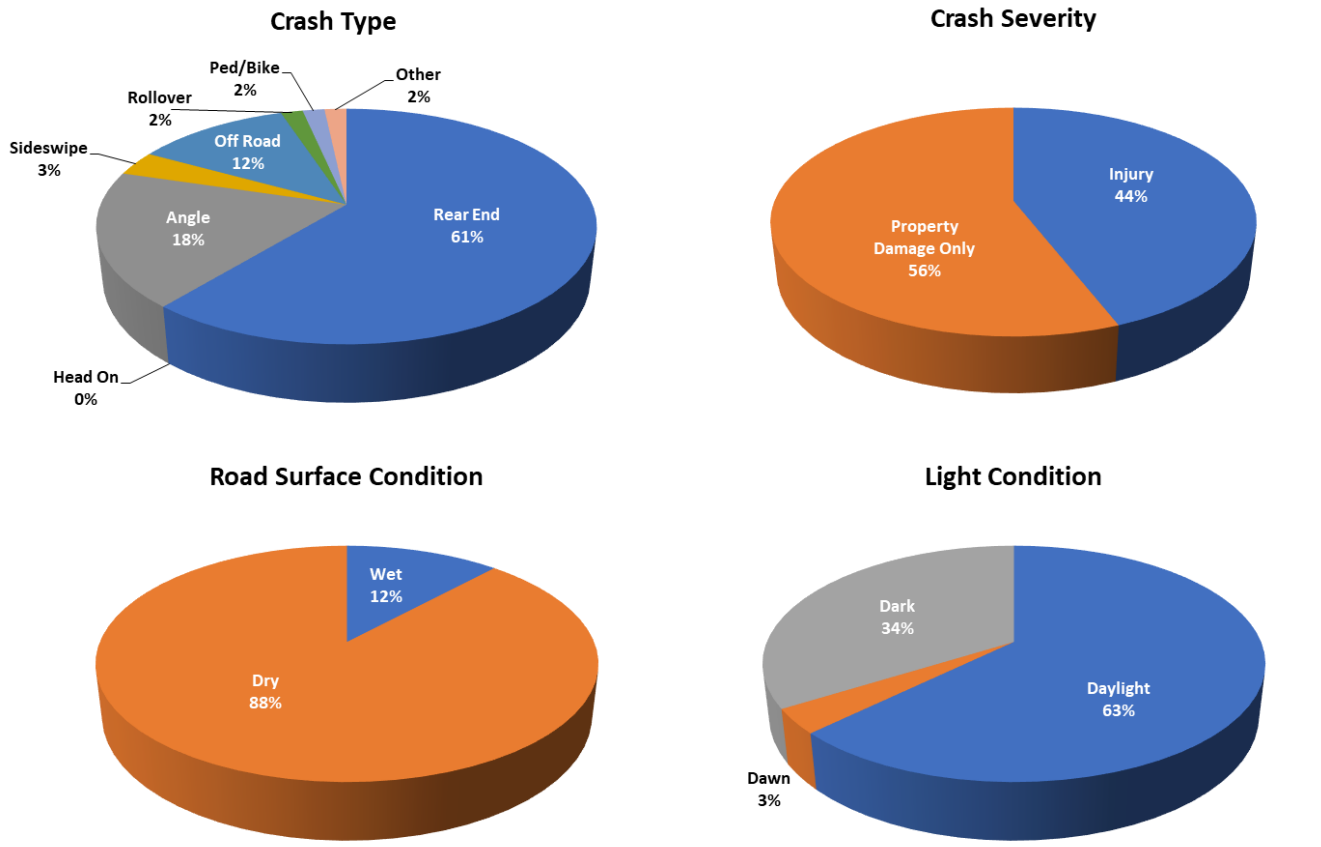
Figure 3.14
US 192 and West Orange Lake Boulevard Intersection Crash Data Summary (2014-2018)



US 192 and SR 429 Ramp Terminal Intersections

A total of 59 crashes were reported at the US 192 and SR 429 ramp terminal intersections during the five-year analysis period. This interchange experiences congestion during the evening commute. As illustrated on **Figure 3.15**, most of the crashes were rear-end collisions. Property damage only was the most common severity type. Most of the crashes occurred under dry road surface conditions during the day. Crash occurrence was somewhat evenly distributed throughout the week.

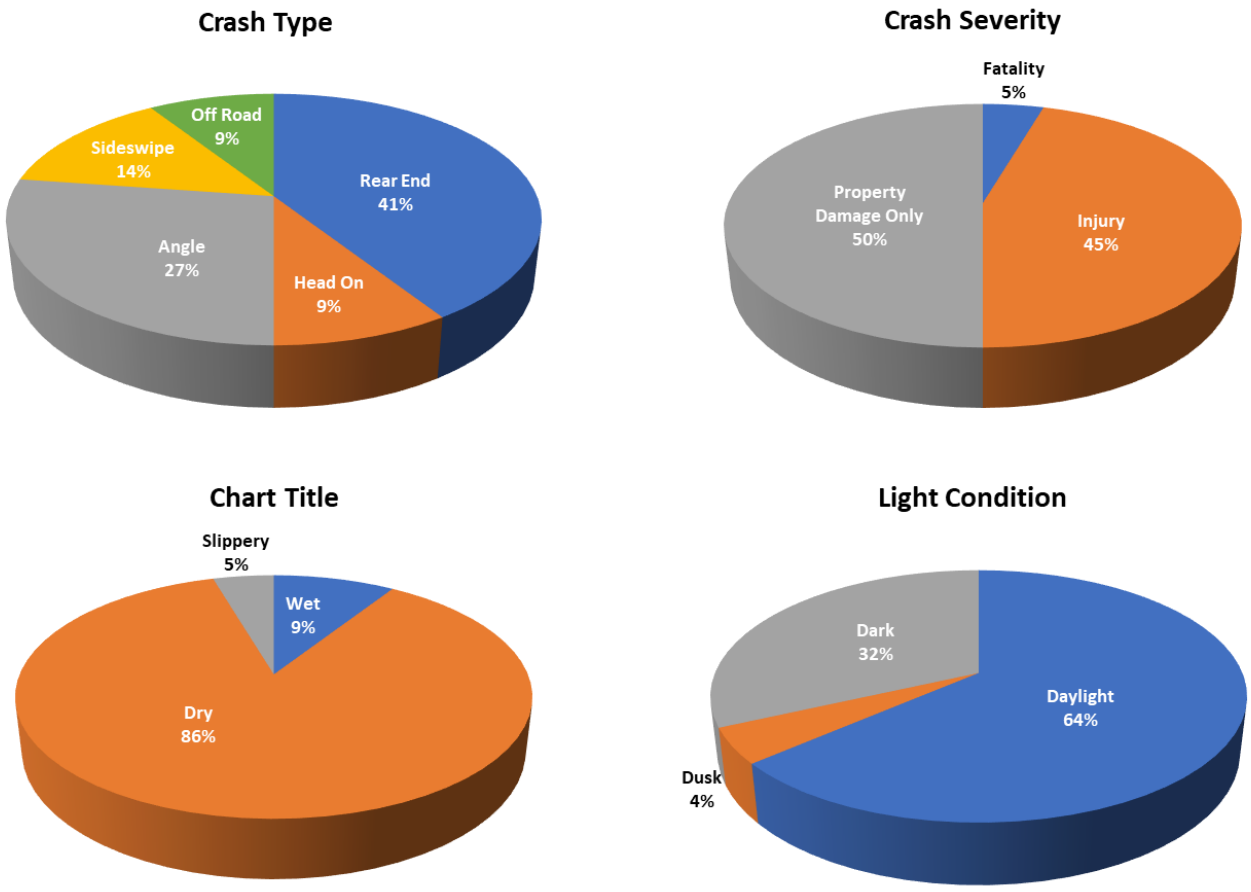
Figure 3.15
US 192 and SR 429 Intersections Crash Data Summary (2014-2018)



US 192 and East Orange Lake Boulevard Intersection

A total of 22 crashes were reported at the US 192 and East Orange Lake Boulevard intersection during the five-year analysis period. One fatal crash was reported during the study period. At least 45 percent of the total crashes resulted in injuries. As shown in **Figure 3.16**, rear-end crashes (approximately 41 percent) and angle crashes (approximately 27 percent) were the prominent crash types at the intersection. Reports indicated that 86 percent of the crashes occurred during dry roadway conditions and 64 percent of the crashes occurred during daylight conditions.

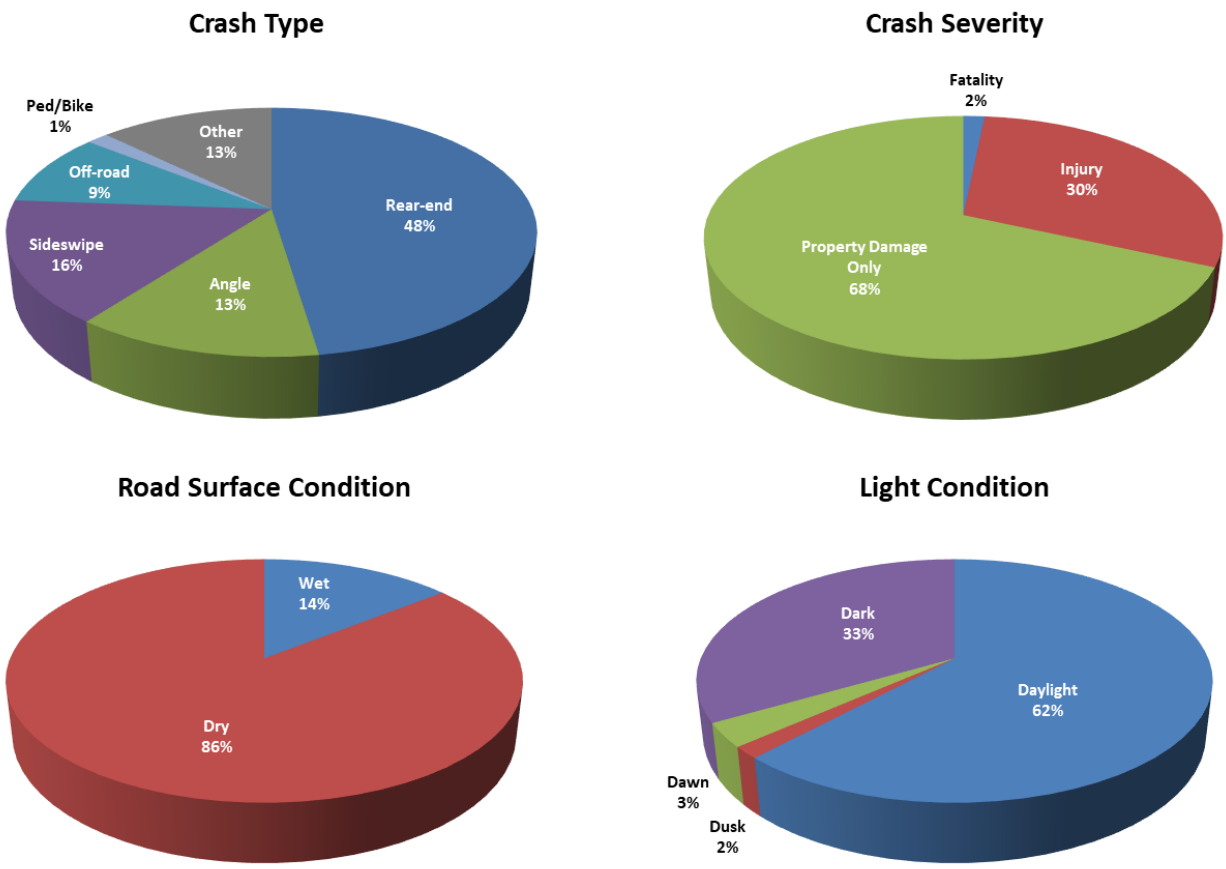
Figure 3.16
US 192 and East Orange Lake Boulevard Intersection Crash Data Summary (2014-2018)



US 192 and Inspiration Road Intersection

A total of 63 crashes were reported at the US 192 and Inspiration Road intersection during the five-year analysis period. One fatal crash was reported during the study period. At least 30 percent of the total crashes resulted in injuries. As shown in **Figure 3.17**, rear-end crashes (approximately 48 percent) and sideswipe crashes (approximately 16 percent) were the prominent crash types at the intersection. Reports indicated that 86 percent of the crashes occurred during dry roadway conditions and 62 percent of the crashes occurred during daylight conditions.

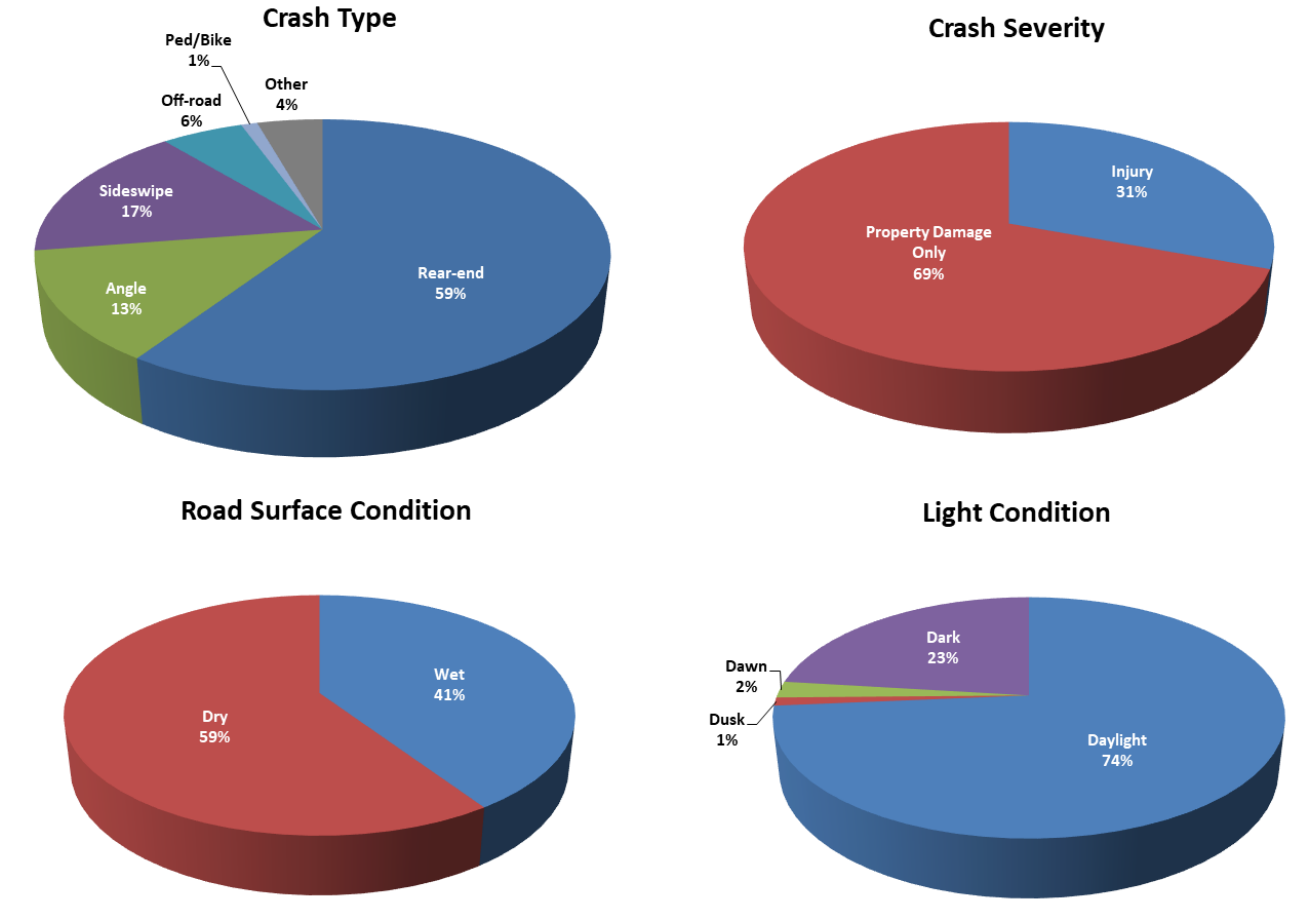
Figure 3.17
US 192 and Inspiration Road Intersection Crash Data Summary (2014-2018)



US 192 and Formosa Gardens Boulevard Intersection

At the US 192 and Formosa Gardens Boulevard intersection, 91 crashes were reported during the five-year analysis period. As shown on **Figure 3.18**, most of the crashes were rear-end collisions (approximately 59 percent). One pedestrian crash was reported during the study period. At least 31 percent of the total crashes resulted in injuries and no fatal crashes were reported in the five-year period. Reports indicated that 59 percent of the crashes occurred during dry roadway conditions and 74 percent of the crashes occurred during daylight conditions. Crash occurrence was more frequent during the weekdays.

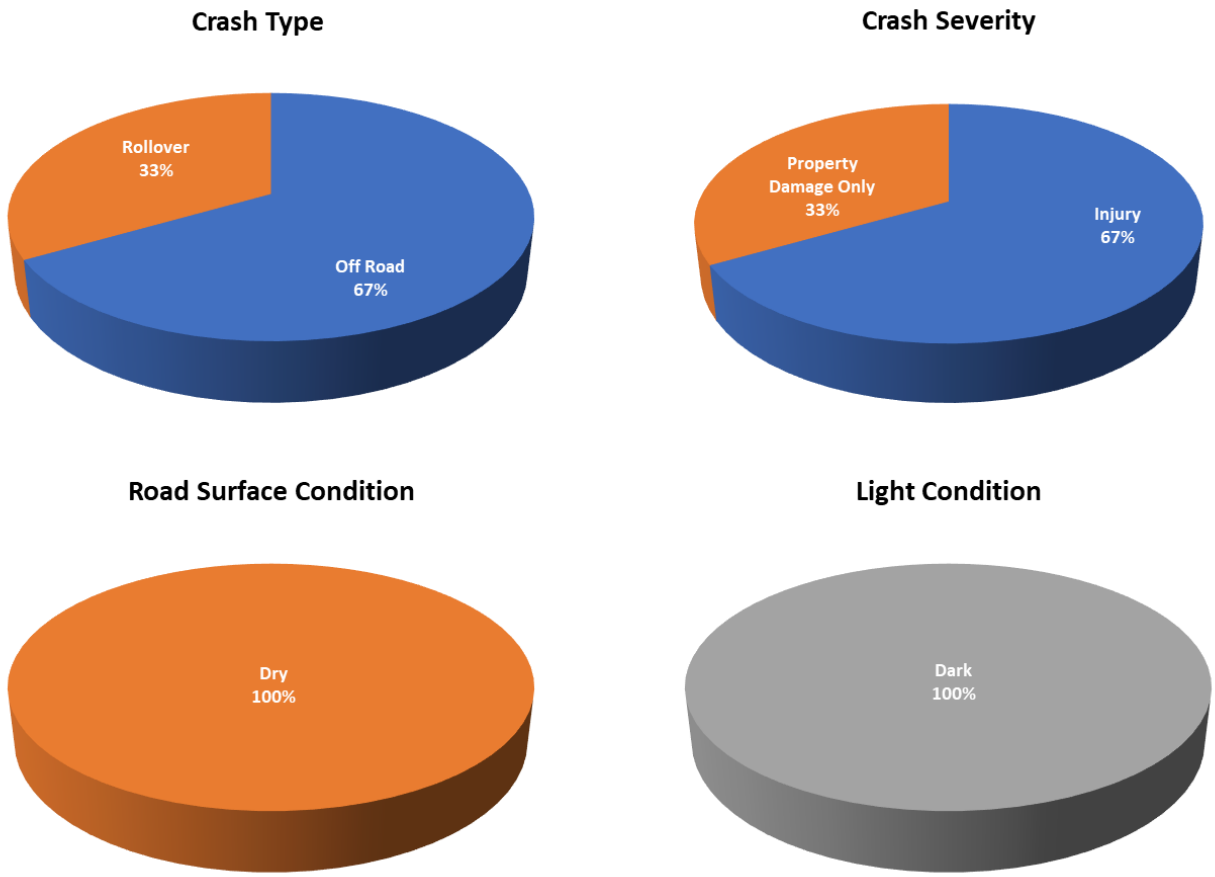
Figure 3.18
US 192 and Formosa Gardens Boulevard Intersection Crash Data Summary (2014-2018)



Western Way and Flamingo Road Intersection

A total of three crashes were reported at the Western Way and Flamingo Road intersection during the five-year analysis period. There were no fatal crashes reported during the study period. At least 67 percent of the total crashes resulted in injuries. As shown in **Figure 3.19**, off-road crashes (approximately 67 percent) and rollover crashes (approximately 33 percent) were the prominent crash types at the intersection. Reports indicated that all of the crashes occurred during dry and dark roadway conditions. Given the low frequency of crashes, a specific crash pattern cannot be confirmed, but rather the atypical crash types are due to chance.

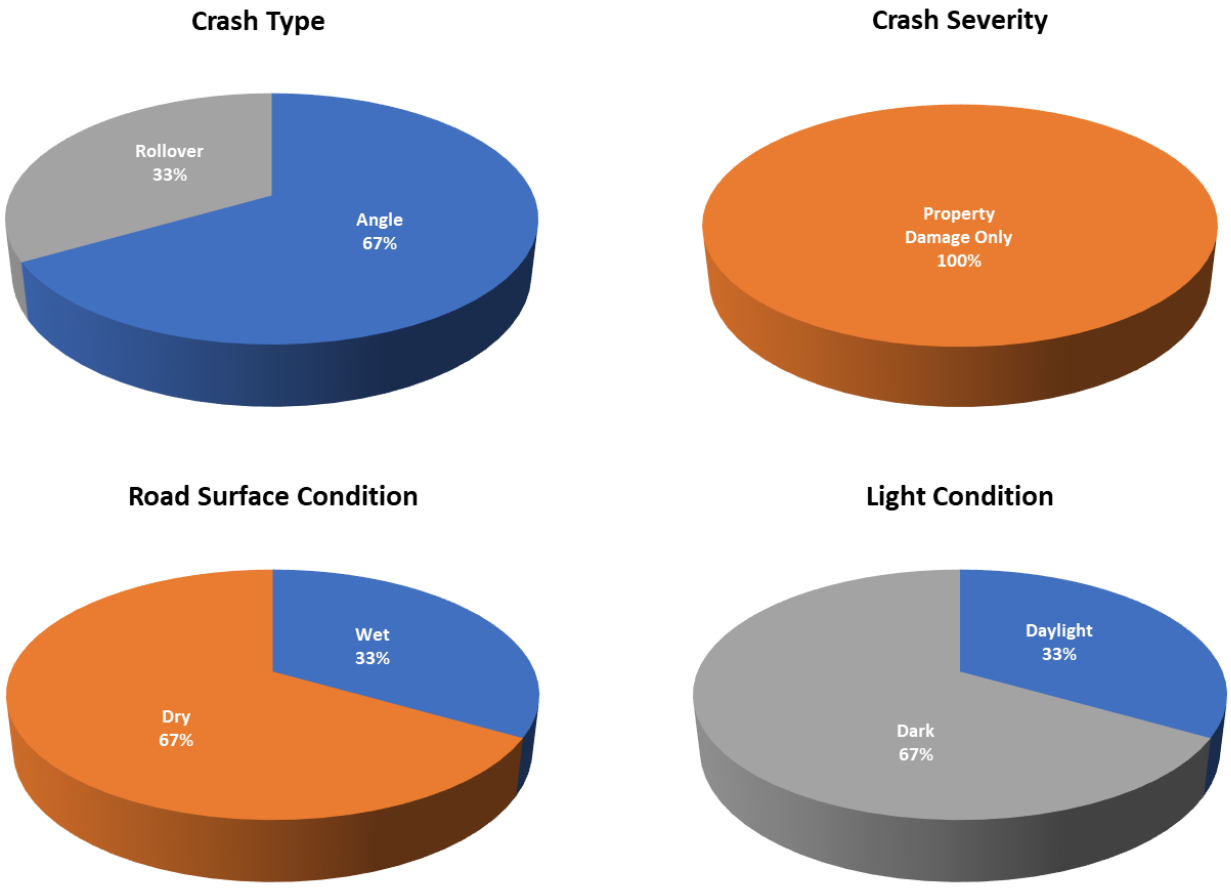
Figure 3.19
Western Way and Flamingo Road Intersection Crash Data Summary (2014-2018)



Western Way and SR 429 Ramp Terminal Intersections

A total of three crashes were reported at the Western Way and the SR 429 ramp terminal intersections during the five-year analysis period. All crashes resulted in property damage only. As shown in **Figure 3.20**, angle crashes (approximately 67 percent) and rollover crashes (approximately 33 percent) were the prominent crash types at the ramp terminal intersections. Reports indicated that 67 percent of the crashes occurred during dry and dark roadway conditions.

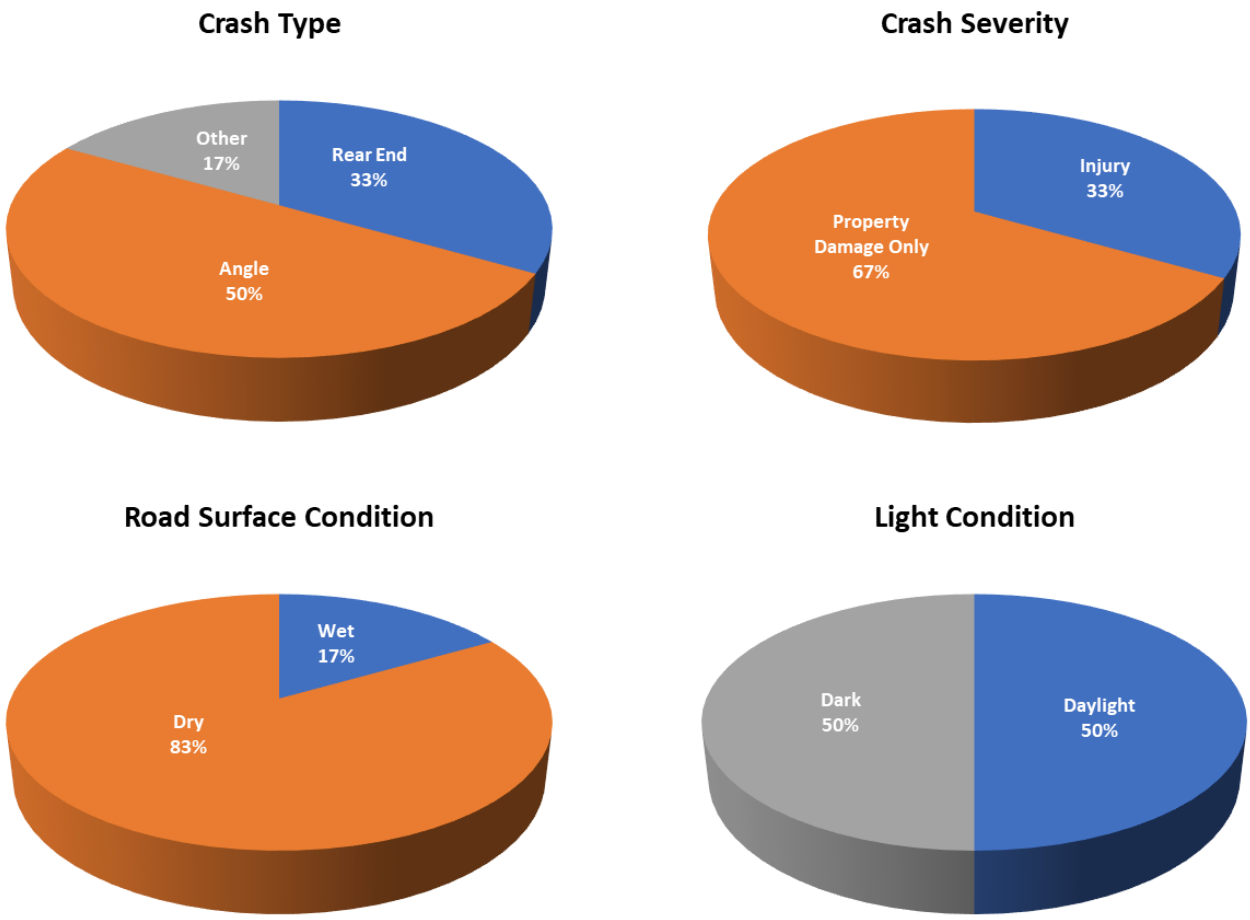
Figure 3.20
Western Way and SR 429 Ramp Terminal Intersections Crash Data Summary (2014-2018)



Seidel Road and Avalon Road Intersection

A total of 6 crashes were reported at the Seidel Road and Avalon Road intersection during the five-year analysis period. There were no fatal crashes reported during the study period. At least 33 percent of the total crashes resulted in injuries. As shown in **Figure 3.21**, angle crashes (approximately 50 percent) and rear-end crashes (approximately 33 percent) were the prominent crash types at the intersection. Reports indicated that 83 percent of the crashes occurred during dry roadway conditions and 50 percent of the crashes occurred during dark conditions.

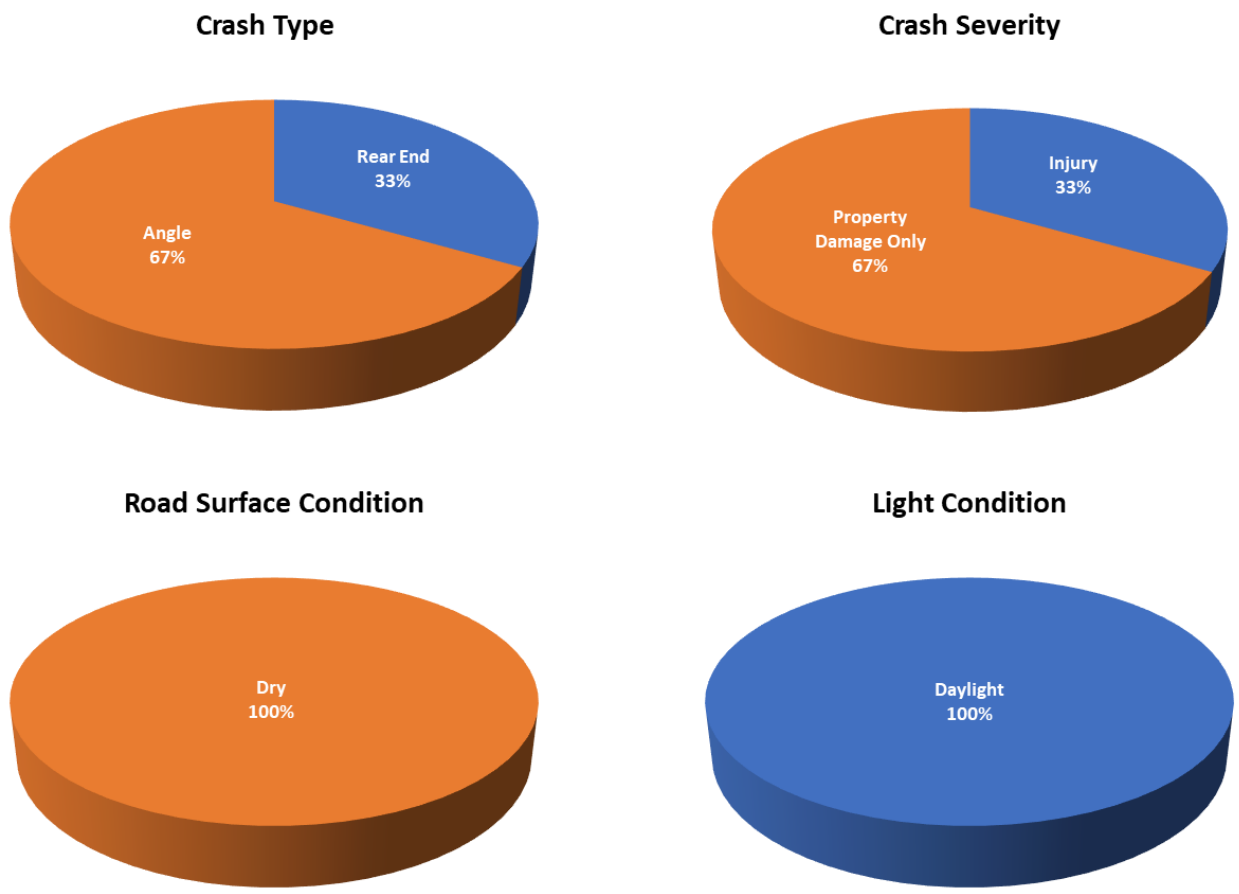
Figure 3.21
Seidel Road and Avalon Road Intersection Crash Data Summary (2014-2018)



Seidel Road and SR 429 Ramp Terminal Intersections

Three crashes were reported at the Seidel Road and SR 429 ramp terminal intersections during the five-year analysis period. There were no fatal crashes reported during the study period. At least 33 percent of the total crashes resulted in injuries. As shown in **Figure 3.22**, angle crashes (approximately 67 percent) and rear-end crashes (approximately 33 percent) were the prominent crash types at the ramp terminal intersections. Reports indicated that all of the crashes occurred during dry roadway and daylight roadway conditions.

Figure 3.22
Seidel Road and SR 429 Intersections Crash Data Summary (2014-2018)



Seidel Road and Lakeshore Point Drive Intersection

At the Seidel Road and Lakeshore Point Drive intersection, one sideswipe crash was reported from 2014 through 2018, which was caused by a sideswipe crash. The crash happened during dry and daylight roadway condition and resulted in property damage only.

Actual crash rates at the intersections were computed and compared with average crash rates for similar roadway facilities across the State utilizing the Statewide five-year average crash rate (2014 – 2018). Critical crash rates and safety ratios were also estimated. Crash rates for the intersections were estimated 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 an intersection 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 presented in **Table 3.8**.

Table 3.8
Intersection Crash Rates and Safety Ratios (2014 – 2018)

Intersection	Total Crashes	Crash Rate			Safety Ratio
		Actual	Average*	Critical	
Sinclair Road and SR 429 Ramp Terminals	1	0.04	0.27	0.92	0.04
West Orange Lake Boulevard and US 192	14	0.17	0.37	0.75	0.23
US 192 and SR 429 Ramp Terminals	59	0.66	0.37	0.73	0.90
East Orange Lake Boulevard and US 192	22	0.47	0.21	0.62	0.76
Inspiration Drive and US 192	63	1.49	0.37	0.92	**1.63**
Formosa Gardens Boulevard and US 192	91	1.37	0.37	0.80	**1.72**
Flamingo Crossings Boulevard and Western Way	3	0.08	0.99	1.89	0.04
Western Way and SR 429 Ramp Terminals	3	0.05	0.37	0.83	0.06
Avalon Road and Seidel Road	6	0.14	0.99	1.84	0.08
Seidel Road and SR 429 Ramp Terminals	3	0.04	0.37	0.77	0.05
Lakeshore Pointe Drive and Seidel Road	1	0.03	0.99	1.91	0.01

* FDOT Osceola and Orange Counties, 5-year Average Crash Rate
Sinclair Road, Western Way, Seidel Road, and SR 429 Intersections: Suburban 4-5LN 2WY Divided Raised (3-legged/4-legged intersection)
US 192 and SR 429 Intersections: Urban 6+LN 2WY Divided Raised (3-legged/4-legged intersection)
Flagler Avenue and Western Way intersection was under construction from 2014-2018. No crash data available.
Note: CAR Online average crash rates for intersections include a 250-foot radius influence area.

Rear-end crashes were prominent at the intersections listed in **Table 3.8**, with two intersections exhibiting safety ratios > 1.0. Congestion and long queues contributed to the high number of crashes at those locations. The highest safety ratio (1.72) is reported for the US 192 and Formosa Gardens Boulevard intersection, followed by the US 192 and Inspiration Drive intersection (1.63).

3.4.3 Arterials Mid-block

Crashes along the arterials at mid-block locations (i.e., outside the intersection influence areas) were also evaluated and discussion is provided.

Sinclair Road

Study area within this corridor does not include any midblock section.

Connector Road Mid-block

A total of two crashes were reported along the mid-block section of Connector Road between Sinclair Road and the northbound SR 429 on-ramp from 2014 through 2018. A crash occurred when a vehicle traveling northbound hit a utility pole at the intersection of Connector Road and the northbound SR 429 on-ramp. Another crash occurred that involved a vehicle turning left from the Connector Road onto the SR 429 northbound on-ramp.

US 192 Mid-block

A total of 171 crashes were reported along the mid-block sections of US 192 within the study area from 2014 through 2018. There were no fatal crashes reported. Rear-end (62 percent) and sideswipe (18 percent) crashes constituted the majority of the crashes. Approximately 32 percent of the crashes resulted in injuries.

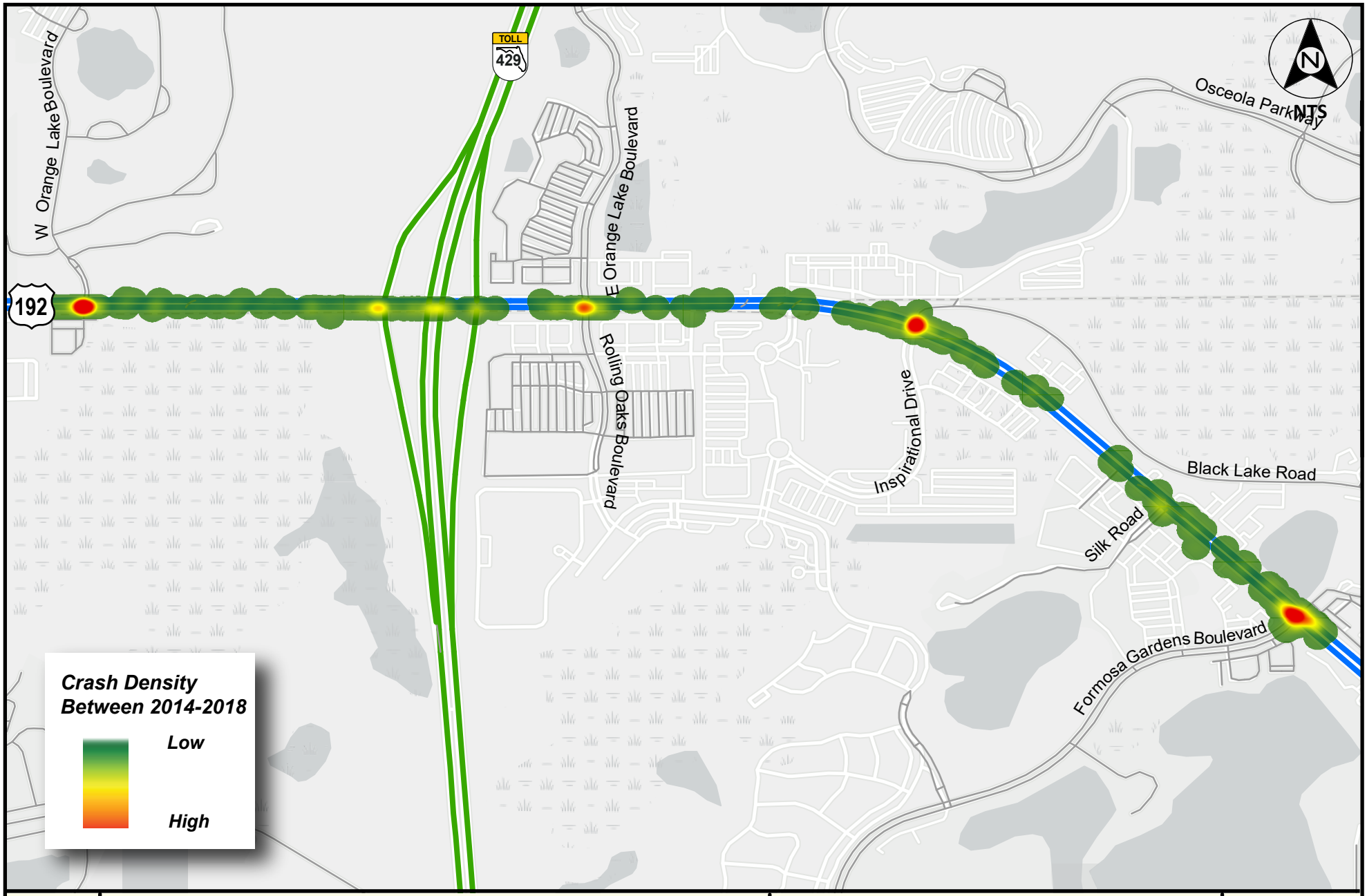
Western Way Mid-block

One crash was reported along the mid-block sections of Western Way within the study area from 2014 through 2018. There were no fatal or injury crashes reported. The one sideswipe crash occurred during daylight and dry conditions.

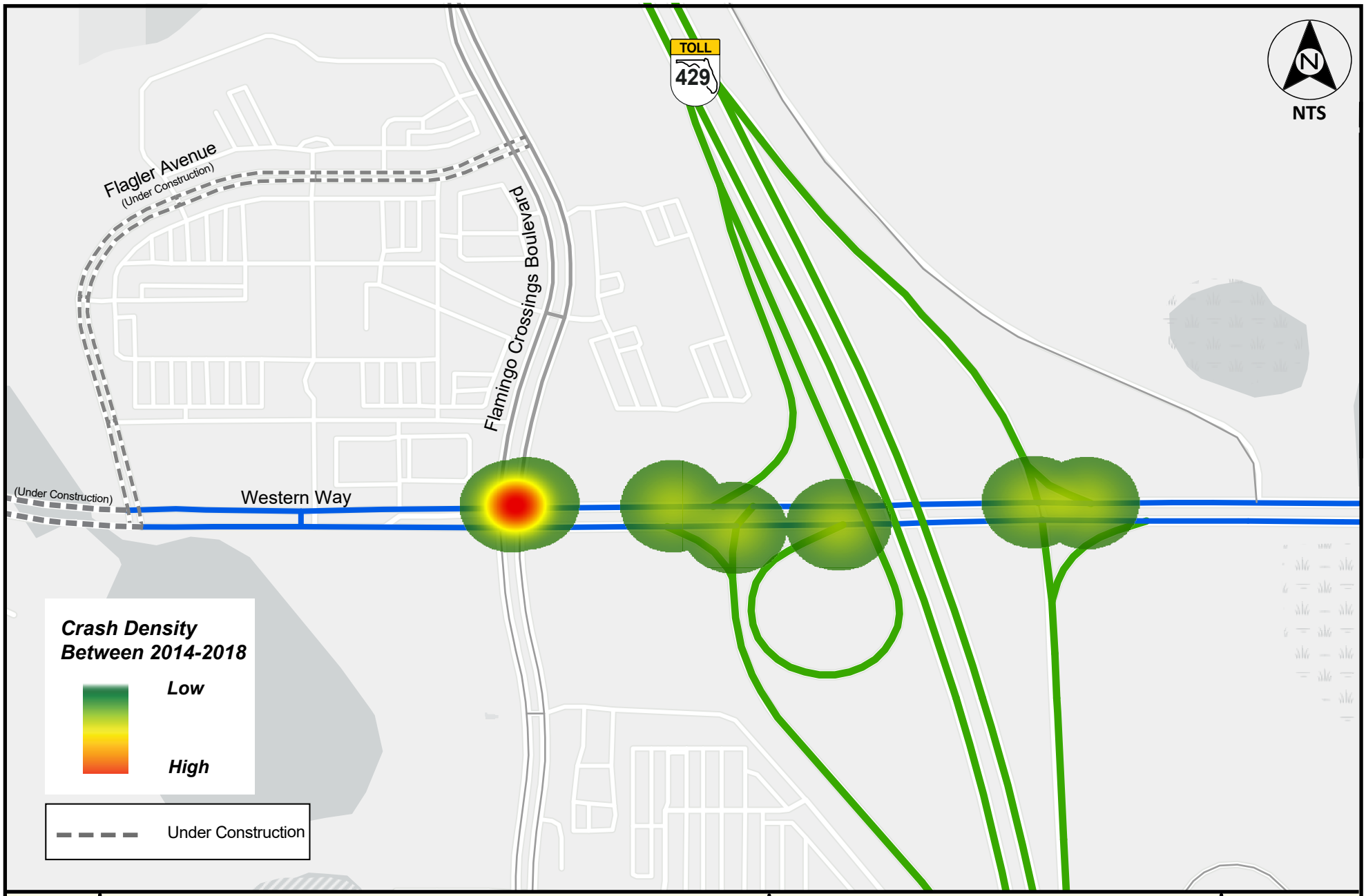
Seidel Road Mid-block

No mid-block crashes were reported along Seidel Road within the study area from 2014 through 2018.

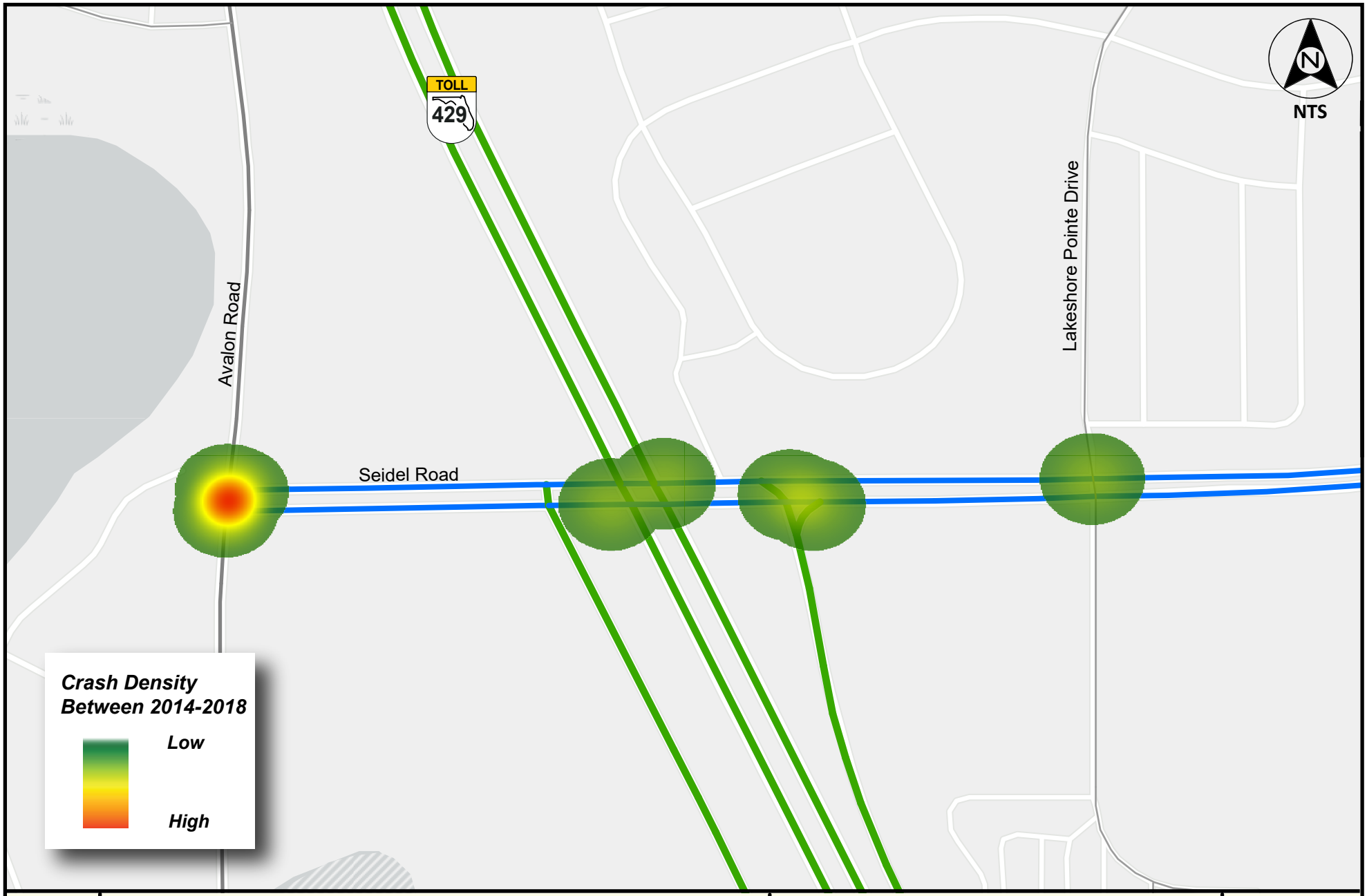
Figures 3.23 through **3.25** graphically depicts the historical crash heat maps along the arterial corridors.



FLORIDA'S TURNPIKE	**Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road Systems Interchange Justification Report (SIJR)**	**US 192 Arterial Historical Crash Heat Map (2014-2018)**	**Figure 3.23**



FLORIDA'S TURNPIKE	**Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road Systems Interchange Justification Report (SIJR)**	**Western Way Arterial Historical Crash Heat Map (2014-2018)**	**Figure 3.24**



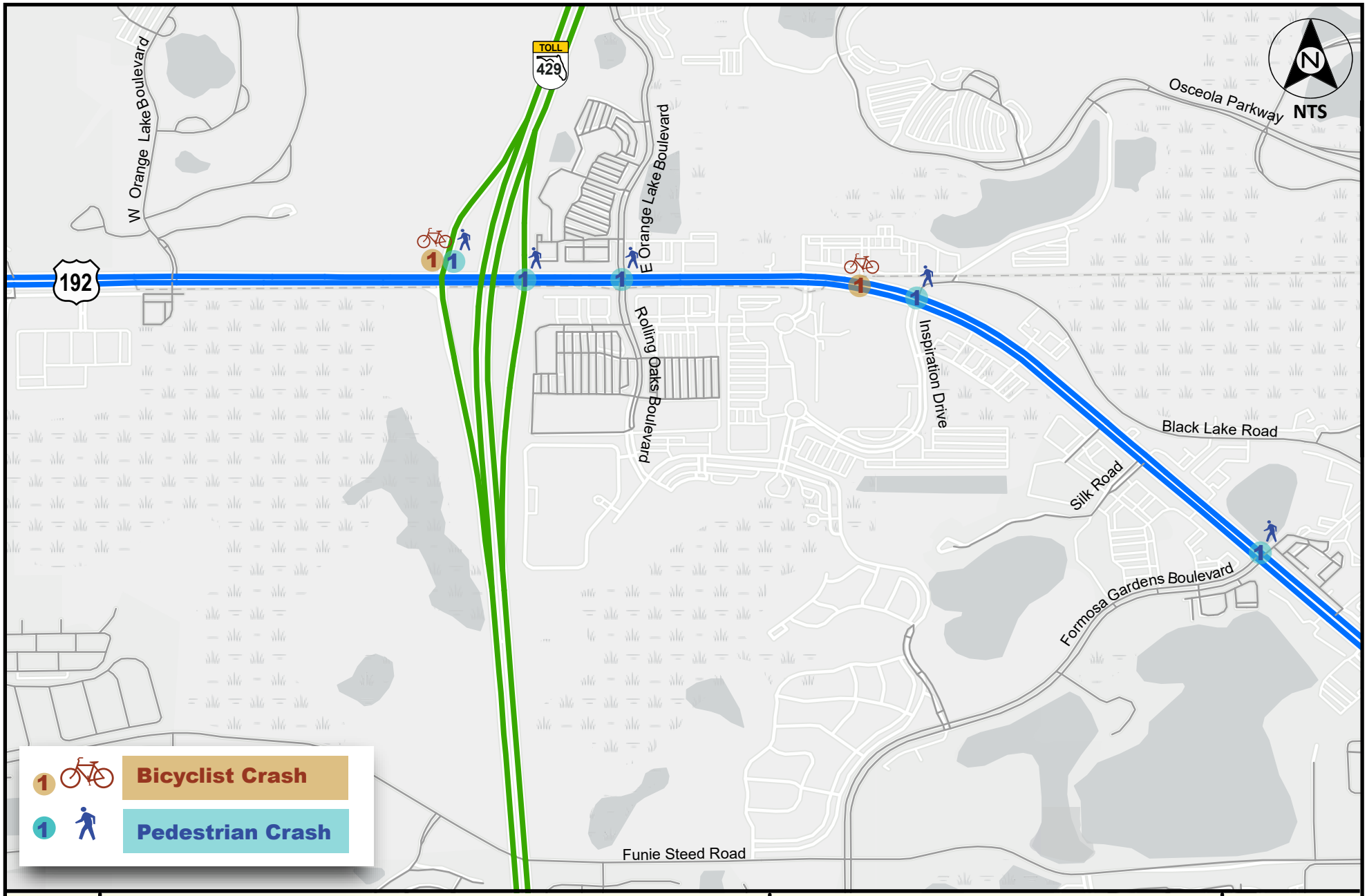
FLORIDA'S TURNPIKE	Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road Systems Interchange Justification Report (SIJR)	Seidel Road Arterial Historical Crash Heat Map (2014-2018)	Figure 3.25

3.4.4 Pedestrian and Bicyclist Safety Analysis

Bicyclist and pedestrian crash data were extracted from the CAR Online data and the Signal Four Analytics tool for the study area. A total of seven pedestrian and bicyclist crashes were reported along the arterials from 2014 through 2018. Crash severity for each year is depicted in **Table 3.9**. As shown on **Figure 3.26**, all seven crashes occurred along US 192 with five pedestrian and two bicyclist crashes resulting in one fatality, four injuries, and two property damage only. The fatal pedestrian crash occurred at the East Orange Lake Boulevard and US 192 intersection during dark (not lighted), and wet surface condition. 43 percent of the total reported crashes occurred during dark conditions. No pedestrian or bicyclist crashes were reported along Sinclair Road, Western Way, or Seidel Road.

Table 3.9
2014 through 2018 Pedestrian and Bicycle Crash Severity

Crash Severity	2014	2015	2016	2017	2018	Total	Proportion
Fatality	0	1	0	0	0	1	14.2%
Incapacitating Injury	0	0	1	0	1	2	28.6%
Non-Incapacitating Injury	1	0	1	0	0	2	28.6%
Possible Injury	0	0	0	0	0	0	0.0%
Property Damage Only (PDO)	1	0	0	0	1	2	28.6%
Total	**2**	**1**	**2**	**0**	**2**	**7**	**100.0%**



FLORIDA'S TURNPIKE	**Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road** **Systems Interchange Justification Report (SIJR)**	**US 192 Pedestrian and Bicycle Crash Location Map (2014-2018)**	**Figure 3.26**

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

4.1 EXISTING TRAFFIC DATA

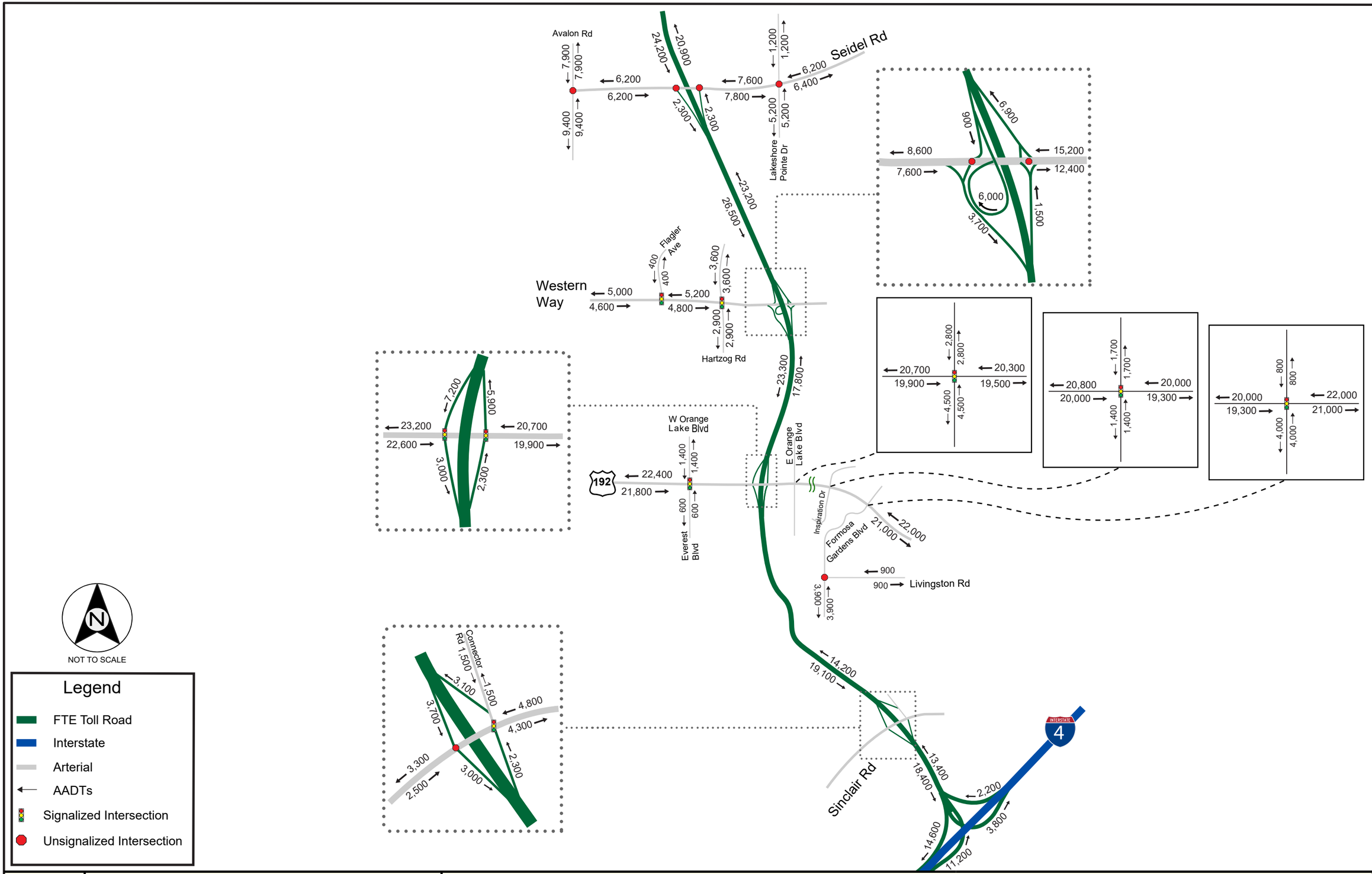
To calculate the 2020 existing AADT and peak hour volumes, an analysis was conducted for the daily counts and the four highest consecutive 15-minute periods in the morning and evening. Seasonal and axle adjustment factors were applied to the data where necessary. Growth rates estimated from historical data were used where applicable (See **Appendix C**). The data were then aggregated and balanced for continuity of flow and consistency. The final 2020 AADT volumes are summarized in **Table 4.1** and on **Figure 4.1**. The data show that daily traffic on the SR 429 mainline peaks in the southbound direction within the study limits. The directional split increases from north to south; it ranges from 53 percent south of Seidel Road to 57 percent south of US 192. Typically, the daily traffic split is close to 50/50 for most roadways. The uneven directional split in daily traffic, especially close to I-4, reveals the unique travel characteristics on this portion of SR 429. The total traffic ranges from a low 31,800 vehicles per day (vpd) between I-4 and Sinclair Road to a high of 49,700 vpd between Western Way and Seidel Road.

Table 4.1
2020 (Existing) Annual Average Daily Traffic (AADT)

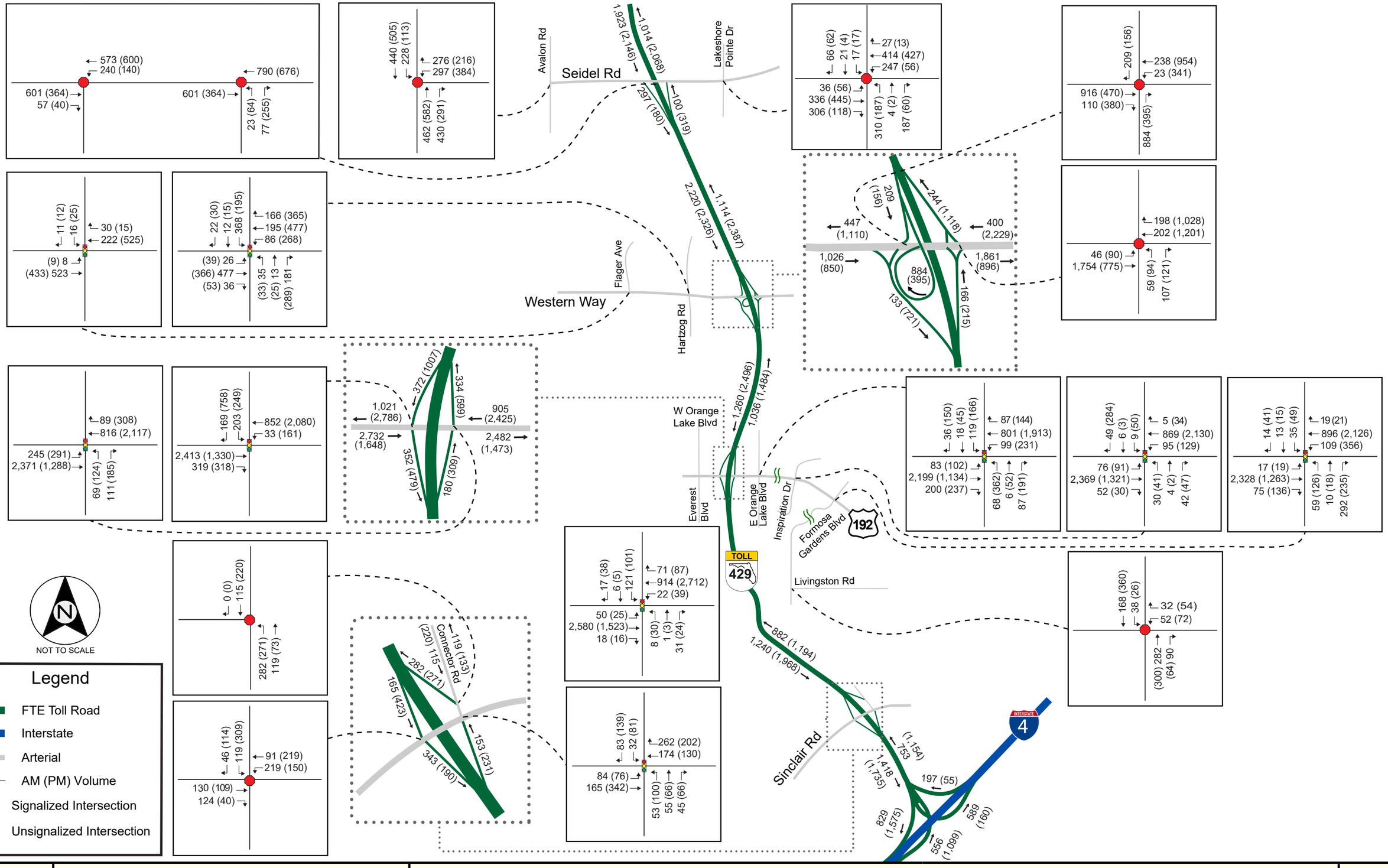
MP-Location	Western Beltway	Southbound (vpd)	Northbound (vpd)	Total (vpd)
		24,200	**20,900**	**45,100**
11 – Seidel Road		2,300	2,300	4,600
		26,500	**23,200**	**49,700**
8 – Western Way		6,900	6,900	13,800
		3,700	1,500	5,200
7 – Toll Plaza		**23,300**	**17,800**	**41,100**
6 – US 192		7,200	5,900	13,100
		3,000	2,300	5,300
		19,100	**14,200**	**33,300**
1 – Sinclair Road		3,700	3,100	6,800
		3,000	2,300	5,300
		18,400	**13,400**	**31,800**

X,XXX = Mainline volume X,XXX = Ramp volume Legend ▬ Ramp Toll Plaza

Figure 4.2 summarizes the final 2020 AM and PM peak hour volumes. The volumes show a southbound peak direction of traffic flow in the AM throughout the SR 429 mainline within the study limits. In the PM, traffic also peaks in the southbound direction south of the toll plaza but there is slightly more traffic in the northbound direction, north of the toll plaza. Field observations and high-resolution aerial maps were used to verify the lane geometry within the study limits. The existing lane geometry is depicted on **Figure 4.3**.



FLORIDA'S TURNPIKE	**Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road Systems Interchange Justification Report (SIJR)**	**2020 (Existing) One-Way AADTs**	**Figure 4.1**

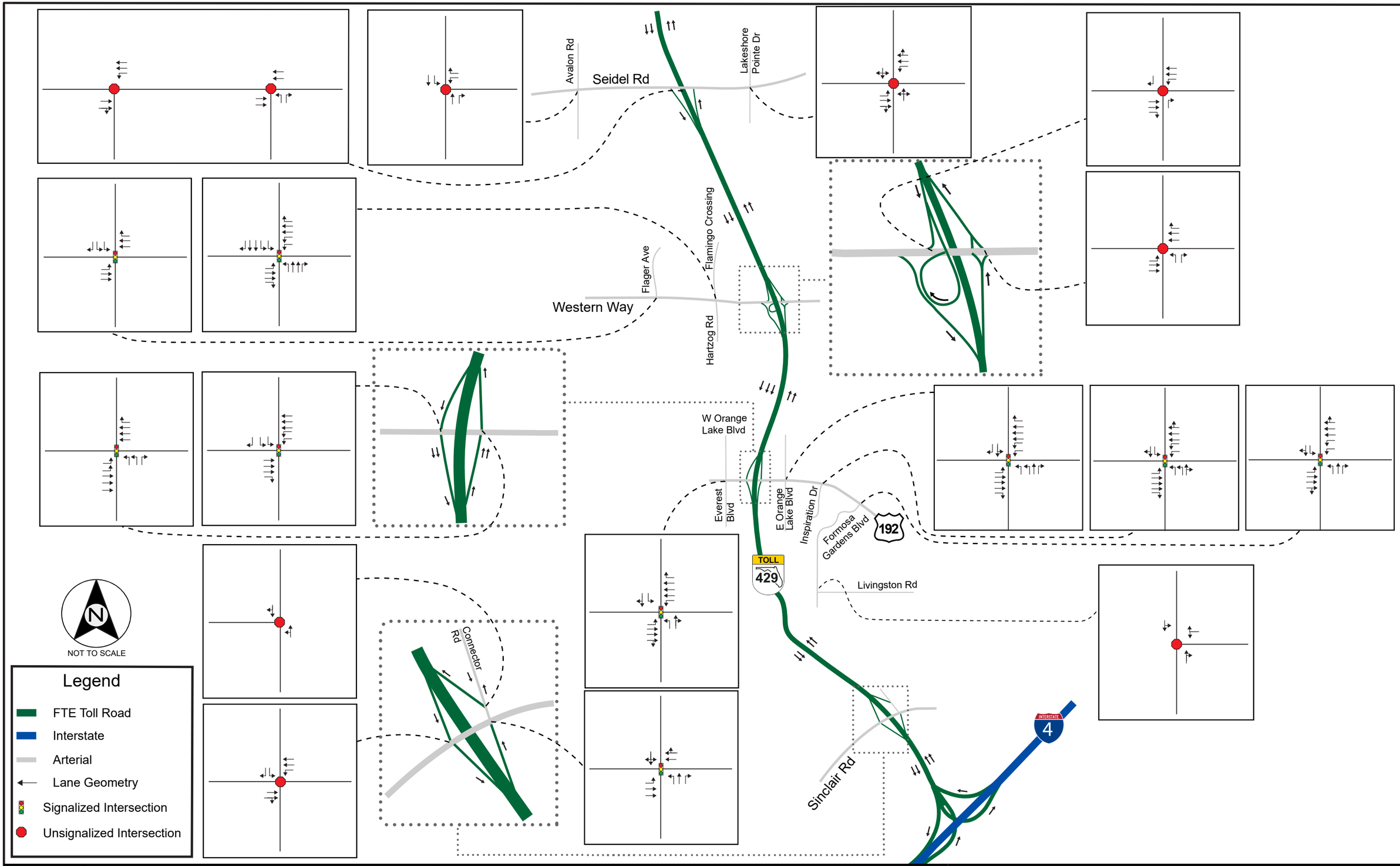


FLORIDA'S TURNPIKE

Western Beltway (SR 429) Widening PD&E Study
from I-4 to Seidel Road
Systems Interchange Justification Report (SIJR)

2020 (Existing) Peak Hour Volumes

Figure 4.2



FLORIDA'S TURNPIKE

Western Beltway (SR 429) Widening PD&E Study
from I-4 to Seidel Road
Systems Interchange Justification Report (SIJR)

2020 (Existing) Lane Geometry

Figure 4.3

4.2 EXISTING OPERATIONAL PERFORMANCE

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

4.2.1 Freeway Segment Analysis

The SR 429 mainline segments (basic, merge/diverge, and weave) within the study limits were evaluated using HCS, Version 7.9. HCS does not analyze junctions with Lane-add, Lane-drop, Major Merge, and Major Diverge. For those cases, the HCM methodology recommends calculating the volume to capacity ratios on the segments upstream and downstream of the junction to determine whether they are over or under capacity. For diverge junctions, density and level of service can be determined where all the entry and exit segments are not over capacity. Customized spreadsheets were used to calculate the volume to capacity ratios. Weaving volumes were calculated utilizing the existing proportion of traffic that exits the downstream off-ramp and the traffic that travels through the downstream freeway segment. The origin of the exiting traffic volume was calculated by applying the calculated ratio to the entrance ramp volume and the upstream freeway volume, considering a lesser portion of traffic executing the on-ramp to off-ramp movement.

As shown in **Table 4.2**, the freeway segments under existing condition (2020) operate at an acceptable LOS C or better during both the AM and PM peak hours. Queue backups have been observed at the southbound off-ramp to US 192 due to congestion along the arterial and adjacent intersections. The HCS software does not report congestion effects resulting from upstream/downstream queue backups due to its isolate location.

Table 4.2
2020 (Existing) Peak Hour Freeway Mainline Segment Operations

Segment	Segment	Lanes	Volume (vph)		LOS/Density	
			AM	PM	AM	PM
SR 429 Southbound						
Upstream of Seidel Road on-ramp	Basic	2	1,923	2,146	B/15.3	B/17.2
Seidel Road on-ramp to Western Way off-ramp	Merge	2	2,220	2,326	C/21.7	C/22.8
Seidel Road on-ramp to Western Way off-ramp	Basic	2	2,220	2,326	B/17.8	C/18.8
Seidel Road on-ramp to Western Way off-ramp	Diverge	2	2,220	2,326	C/23.7	C/24.8
Western Way off-ramp to on-ramp	Basic	2	1,127	1,775	A/8.9	B/14.1
Western Way on-ramp to US 192 off-ramp	Merge	2	1,260	2,496	A/6.6	B/13.0
Western Way on-ramp to US 192 off-ramp	Basic	3	1,260	2,496	A/6.7	B/13.2
Western Way on-ramp to US 192 off-ramp	Diverge	2	1,260	2,496	A/6.7	B/13.2
US 192 off-ramp to on-ramp	Basic	2	888	1,489	A/7.0	B/11.8
US 192 on-ramp to Sinclair Road off-ramp	Merge	2	1,240	1,968	A/6.8	B/13.0
US 192 on-ramp to Sinclair Road off-ramp	Basic	2	1,240	1,968	A/9.8	B/15.6
US 192 on-ramp to Sinclair Road off-ramp	Diverge	2	1,240	1,968	B/14.6	C/22.0
Sinclair Road off-ramp to on-ramp	Basic	2	1,075	1,545	A/8.5	B/12.2
Sinclair Road on-ramp to I-4 off-ramp	Merge	2	1,418	1,735	B/16.1	B/19.2
Sinclair Road on-ramp to I-4 off-ramp	Basic	2	1,418	1,735	B/11.2	B/13.7
Sinclair Road on-ramp to I-4 off-ramp	Major Diverge	2	1,418	1,735	B/13.4	B/16.4
Additional weaving analysis between Sinclair Road on-ramp and I-4 off-ramp	Weaving	2	1,418	1,735	B/12.0	B/14.8
SR 429 Northbound						
Additional weaving analysis between I-4 on-ramp and Sinclair Road off-ramp	Weaving	2	753	1,154	A/6.2	A/9.7
I-4 on-ramp to Sinclair off-ramp	Major Merge	2	753	1,154	U/C	U/C
I-4 on-ramp to Sinclair off-ramp	Basic	2	753	1,154	A/6.0	A/8.8
I-4 on-ramp to Sinclair off-ramp	Diverge	2	753	1,154	A/10.0	B/13.7
Sinclair Road off-ramp to on-ramp	Basic	2	600	923	A/4.7	A/7.1
Sinclair Road on-ramp to US 192 off-ramp	Merge	2	882	1,194	A/8.9	B/11.5
Sinclair Road on-ramp to US 192 off-ramp	Basic	2	882	1,194	A/7.0	A/9.2
Sinclair Road on-ramp to US 192 off-ramp	Diverge	2	882	1,194	B/10.9	B/13.7
US 192 off-ramp to on-ramp	Basic	2	702	1,006	A/5.6	A/6.8
US 192 on-ramp to Western Way off-ramp	Merge	2	1,036	1,484	A/5.3	A/8.7
US 192 on-ramp to Western Way off-ramp	Basic	2	1,036	1,484	A/8.2	B/11.4
US 192 on-ramp to Western Way off-ramp	Diverge	2	1,036	1,484	B/12.4	B/16.4
Western Way off-ramp to on-ramp	Basic	2	870	1,269	A/6.9	A/9.7
Western Way on-ramp to Seidel Road off-ramp	Merge	2	1,114	2,387	B/12.6	C/22.9
Western Way on-ramp to Seidel Road off-ramp	Basic	2	1,114	2,387	A/8.8	C/18.7
Western Way on-ramp to Seidel Road off-ramp	Diverge	2	1,114	2,387	B/12.5	C/24.6
Downstream of Seidel Road off-ramp	Basic	2	1,014	2,068	A/8.0	B/15.9

Density – passenger cars/mile/lane
Results based on HCS 7.9; Truck = 7%; U/C = Under Capacity; NB on-ramp is connected to SR 429 from Sinclair Rd by a Connector Rd.

4.2.2 Ramp Roadway Capacity Analysis

Capacity on the ramp roadways was assessed by comparing it with existing demand. The ramp Volume to Capacity (V/C) analysis is summarized in **Table 4.3**. Results show that the highest V/C is 0.6, indicating that the ramps have a considerable amount of unused capacity during both the 2020 AM and PM peak hours.

Table 4.3
2020 (Existing) Peak Hour Ramp Roadway Capacity Analysis

Interchange	Ramp	Lanes	Volume (vph)		Capacity (vph)	V/C	
			AM	PM		AM	PM
I-4 and SR 429 system-to-system ramps	Eastbound off-ramp	1	556	1,099	1,850	0.30	0.59
	Westbound on-ramp	1	829	1,575	1,850	0.45	0.85
	Eastbound on-ramp	1	589	160	1,850	0.32	0.09
	Westbound off-ramp	1	55	197	1,850	0.03	0.11
Sinclair Road	Southbound off-ramp	1	165	423	1,850	0.1	0.2
	Northbound on-ramp	1	282	271	1,850	0.2	0.1
	Southbound on-ramp	1	343	190	1,850	0.2	0.1
	Northbound off-ramp	1	153	231	1,850	0.1	0.1
US 192	Southbound off-ramp	1	372	1,007	1,850	0.2	0.5
	Northbound on-ramp	1	334	599	1,850	0.2	0.3
	Southbound on-ramp	1	352	479	1,850	0.2	0.3
	Northbound off-ramp	1	180	309	1,850	0.1	0.2
Western Way	Southbound off-ramp	1	1,093	551	1,850	0.6	0.3
	Northbound on-ramp	1	244	1,118	1,850	0.1	0.6
	Southbound on-ramp	1	133	721	1,850	0.1	0.4
	Northbound off-ramp	1	166	215	1,850	0.1	0.1
Seidel Road	Southbound on-ramp	1	297	180	1,850	0.2	0.1
	Northbound off-ramp	1	100	319	1,850	0.1	0.2

4.2.3 Intersection Analysis

Signalized intersections were analyzed using Synchro Version 11 and unsignalized intersections were analyzed using HCS Version 7.9. The analysis output summary for AM and PM peak hours are presented in **Table 4.4**. For the unsignalized intersections, output is reported for the worst movement. Several intersections within the AOI are operating at LOS E or F in one or both AM and PM peak hours in year 2020. These intersections include:

- US 192 and West Orange Lake Boulevard
- Western Way and SR 429 northbound ramps terminal
- Seidel Road and Avalon Road (Note that both intersections have been signalized recent years and are anticipated to experience reduced delays. Future No-Build Alternative has been analyzed with traffic signals.)
- Seidel Road and Lakeshore Point Drive

Several turning movements at the intersections along US 192 exhibit unacceptable LOS F due to the heavy through traffic volumes on US 192 during the peak hours.

Table 4.4

2020 (Existing) Peak Hour Intersection Level of Service/Delay

Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection
			Eastbound			Westbound			Northbound			Southbound			AM LOS (Delay)
			Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
*Sinclair Road & SR 429 Southbound	Volume			130	124	219	91					119		46	C (16.0)
	LOS (Delay)	Movement		A (0.0)	A (0.0)	A (8.4)	A (0.0)					C (18.8)		A (8.8)	
		Approach		A (0.0)			A (6.0)						C (16.0)		
	Queue Length 95th (ft)	Movement		*0*	*0*	*25*	*0*					*50*		*25*	
Sinclair Road & SR 429 Northbound	Volume		84	165			174	262	53	55	45	32	0	83	A (7.6)
	LOS (Delay)	Movement	B (12.1)	A (9.6)			A (4.9)		A (9.5)	A (9.3)	A (3.7)		B (11.2)		
		Approach		B (10.5)			A (4.9)			A (7.7)			B (11.2)		
	Queue Length 95th (ft)	Movement	*47*	*37*			*47*		*23*	*24*	*13*		*44*		
*SR 429 Northbound Ramp & Connector Road	Volume								282	119			115		A (8.1)
	LOS (Delay)	Movement							A (8.1)	A (0.0)			A (0.0)		
		Approach								A (8.1)			A (0.0)		
	Queue Length 95th (ft)	Movement							*25*	*0*			*0*		
US 192 & West Orange Lake Boulevard	Volume		50	2580	18	22	914	71	8	1	31	121	6	17	C (24.0)
	LOS (Delay)	Movement	**F (92.2)**	C (21.6)		**F (143.7)**	B (10.3)	A (0.1)	**F (117.9)**	D (40.2)		**F (130.8)**	D (39.3)		
		Approach		C (22.9)			B (12.4)			**E (55.3)**			**F (115.8)**		
	Queue Length 95th (ft)	Movement	*125*	*1187*		*74*	*91*	*0*	*36*	*46*		*270*	*43*		
US 192 & SR 429 Southbound	Volume			2413	319	33	852					203		169	B (15.8)
	LOS (Delay)	Movement		B (14.1)	A (0.2)	**F (144.1)**	A (8.8)					**E (75.1)**		A (9.6)	
		Approach		B (12.5)			B (13.9)						D (45.3)		
	Queue Length 95th (ft)	*Movement*		*m131*	*m0*	*44*	*48*					*190*		*75*	
US 192 & SR 429 Northbound	Volume		245	2371			816	89	69		111				B (13.1)
	LOS (Delay)	Movement	C (22.5)	A (1.7)			C (26.4)	A (5.5)	**F (107.3)**		**F (86.7)**				
		Approach		A (3.6)			C (24.3)			**F (94.6)**					
	Queue Length 95th (ft)	Movement	*142*	*85*			*232*	*48*	*87*		*178*				
US 192 & East Orange Lake Boulevard	Volume		83	2199	200	99	801	87	68	6	87	119	18	36	C (22.9)
	LOS (Delay)	Movement	**E (66.9)**	B (14.6)	A (1.8)	**F (121.3)**	B (14.1)	A (1.0)	**F (121.8)**	**F (109.2)**	A (8.0)		**F (117.0)**	A (0.8)	
		Approach		B (15.3)			C (23.6)			**E (59.6)**			**F (93.1)**		
	Queue Length 95th (ft)	Movement	*183*	*675*	*29*	*108*	*90*	*2*	*92*	*31*	*0*		*291*	*0*	
US 192 & Inspiration Drive	Volume		76	2369	52	95	869	5	30	4	42	9	6	49	C (28.0)
	LOS (Delay)	Movement	**F (89.2)**	C (24.6)	A (0.5)	**F (123.8)**	B (18.4)		**F (131.6)**	C (27.9)		**F (120.3)**	C (31.9)		
		Approach		C (26.1)			C (28.8)			**E (68.6)**			D (43.9)		
	Queue Length 95th (ft)	Movement	*m139*	*827*	*m0*	*123*	*264*		*48*	*54*		*39*	*59*		
US 192 & Formosa Gardens Boulevard	Volume		17	2328	75	109	896	19	59	10	292	35	13	14	C (34.0)
	LOS (Delay)	Movement	**F (106.7)**	C (29.1)		**F (116.1)**	B (11.5)		**F (89.6)**	**E (79.7)**	**F (90.5)**	**F (84.9)**	D (45.6)		
		Approach		C (29.7)			C (22.6)			**F (90.0)**			**E (67.4)**		
	Queue Length 95th (ft)	Movement	*m42*	*665*		*128*	*247*		*134*	*34*	*412*	*87*	*53*		
*Livingstone Road & Formosa Gardens Boulevard	Volume					52	0	32		282	90	38	168		B (13.5)
	LOS (Delay)	Movement					*B (13.5)*			A (0.0)	A (0.0)	A (9.4)	A (0.0)		
		Approach					B (13.5)			A (0.0)			A (9.4)		
	Queue Length 95th (ft)	Movement					*25*			*0*	*0*	*25*	*0*		
Western Way & Flagler Avenue	Volume		8	523			222	30				16		11	A (4.6)
	LOS (Delay)	Movement	A (1.8)	A (1.2)			A (8.5)	A (9.4)				**E (56.6)**		A (2.4)	
		Approach		A (1.2)			A (8.6)						C (34.5)		
	Queue Length 95th (ft)	Movement	*3*	*48*			*113*	*36*				*19*		*6*	
Western Way & Flamingo Crossing Boulevard	Volume		26	477	37	86	195	166	35	13	181	368	12	22	C (32.5)
	LOS (Delay)	Movement	**E (59.0)**	C (26.6)	A (0.4)	**E (59.7)**	C (20.4)	A (3.2)	D (54.1)	D (51.7)	C (21.2)	**E (59.1)**	D (40.6)	A (0.4)	
		Approach		C (26.4)			C (21.6)			C (28.0)			**E (55.2)**		
	Queue Length 95th (ft)	Movement	*53*	*224*	*0*	*64*	*92*	*34*	*64*	*16*	*66*	*204*	*13*	*0*	
*Western Way & SR 429 Southbound	Volume			916	110	23	238							209	B (10.3)
	LOS (Delay)	Movement		A (0.0)	A (0.0)	B (10.3)	A (0.0)							B (10.3)	
		Approach		A (0.0)			A (0.9)						B (10.3)		
	Queue Length 95th (ft)	Movement		*0*	*0*	*25*	*0*							*25*	
*Western Way & SR 429 Northbound	Volume		46	1754			202	198	59		107				**F (258.9)**
	LOS (Delay)	Movement	A (7.8)	A (0.0)			A (0.0)	A (0.0)	**F (258.9)**		D (27.3)				
		Approach		A (0.2)			0			**F (258.9)**					
	Queue Length 95th (ft)	Movement	*25*	*0*			*0*	*0*	*150*		*50*				
*Seidel Road & Avalon Road	Volume					297		276		462	430	228	440		**F (>999)**
	LOS (Delay)	Movement				**F (>999)**		C (21.4)		A (0.0)	A (0.0)	**F (69.1)**	A (0.0)		
		Approach					**F (>999)**			A (0.0)			**F (69.1)**		
	Queue Length 95th (ft)	Movement				*1125*		*100*		*0*	*0*	*225*	*0*		
*Seidel Road & SR 429 Southbound	Volume			601	57	240	573								B (10.6)
	LOS (Delay)	Movement		A (0.0)	A (0.0)	B (10.6)	A (0.0)								
		Approach		A (0.0)			B (10.6)								
	Queue Length 95th (ft)	Movement		0	0	50	0								
*Seidel Road & SR 429 Northbound	Volume			601			790		23		77				B (12.2)
	LOS (Delay)	Movement		A (0.0)			A (0.0)		C (16.1)		B (11.1)				
		Approach		A (0.0)			A (0.0)			B (12.2)					
	Queue Length 95th (ft)	Movement		0			0		25		25				
*Seidel Road & Lakeshore Point Drive	Volume		36	336	306	247	414	27	310	4	187	17	21	66	**F (>999)**
	LOS (Delay)	Movement	A (8.9)	A (0.0)	A (0.0)	B (13.2)	A (0.0)	A (0.0)		**F (>999)**			**F (>999)**		
		Approach		A (8.9)			B (13.2)			**F (>999)**			**F (>999)**		
	Queue Length 95th (ft)	Movement	25	0	0	75	0	0		N/A			N/A		

Synchro Version 11 Build 168; *Unsignalized intersection analyzed using HCS v7.9; N/A - queue not reported

LOS notes:

Delay is in sec/veh units

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

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

Queue notes:

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 4.4
2020 (Existing) Peak Hour Intersection Level of Service/Delay

Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection
			Eastbound			Westbound			Northbound			Southbound			AM LOS (Delay)
			Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
*Sinclair Road & SR 429 Southbound	Volume			130	124	219	91					119		46	C (16.0)
	LOS (Delay)	Movement		A (0.0)	A (0.0)	A (8.4)	A (0.0)					C (18.8)		A (8.8)	
		Approach		A (0.0)			A (6.0)						C (16.0)		
	Queue Length 95th (ft)	Movement		*0*	*0*	*25*	*0*					*50*		*25*	
Sinclair Road & SR 429 Northbound	Volume		84	165			174	262	53	55	45	32	0	83	A (7.6)
	LOS (Delay)	Movement	B (12.1)	A (9.6)			A (4.9)		A (9.5)	A (9.3)	A (3.7)		B (11.2)		
		Approach		B (10.5)			A (4.9)			A (7.7)			B (11.2)		
	Queue Length 95th (ft)	Movement	*47*	*37*			*47*		*23*	*24*	*13*		*44*		
*SR 429 Northbound Ramp & Connector Road	Volume								282	119			115		A (8.1)
	LOS (Delay)	Movement							A (8.1)	A (0.0)			A (0.0)		
		Approach								A (8.1)			A (0.0)		
	Queue Length 95th (ft)	Movement							*25*	*0*			*0*		
US 192 & West Orange Lake Boulevard	Volume		50	2580	18	22	914	71	8	1	31	121	6	17	C (33.6)
	LOS (Delay)	Movement	**F (92.2)**	C (31.6)		**F (155.6)**	B (12.6)	A (0.2)		**F (270.6)**		**F (130.8)**	C (28.9)		
		Approach		C (32.8)			B (14.8)			**F (270.6)**			**F (114.1)**		
	Queue Length 95th (ft)	Movement	*125*	*1313*		*75*	*113*	*0*		*#135*		*270*	*38*		
US 192 & SR 429 Southbound	Volume			2413	319	33	852					203		169	B (15.8)
	LOS (Delay)	Movement		B (14.1)	A (0.2)	**F (144.1)**	A (8.8)					**E (75.1)**		A (9.6)	
		Approach		B (12.5)			B (13.9)						D (45.3)		
	Queue Length 95th (ft)	*Movement*		*m131*	*m0*	*44*	*48*					*190*		*75*	
US 192 & SR 429 Northbound	Volume		245	2371			816	89	69		111				B (13.1)
	LOS (Delay)	Movement	C (22.5)	A (1.7)			C (26.4)	A (5.5)	**F (107.3)**		**F (86.7)**				
		Approach		A (3.6)			C (24.3)			**F (94.6)**					
	Queue Length 95th (ft)	Movement	*142*	*85*			*232*	*48*	*87*		*178*				
US 192 & East Orange Lake Boulevard	Volume		83	2199	200	99	801	87	68	6	87	119	18	36	C (22.9)
	LOS (Delay)	Movement	**E (66.9)**	B (14.6)	A (1.8)	**F (121.3)**	B (14.1)	A (1.0)	**F (121.8)**	**F (109.2)**	A (8.0)		**F (117.0)**	A (0.8)	
		Approach		B (15.3)			C (23.6)			**E (59.6)**			**F (93.1)**		
	Queue Length 95th (ft)	Movement	*183*	*675*	*29*	*108*	*90*	*2*	*92*	*31*	*0*		*291*	*0*	
US 192 & Inspiration Drive	Volume		76	2369	52	95	869	5	30	4	42	9	6	49	C (28.0)
	LOS (Delay)	Movement	**F (89.2)**	C (24.6)	A (0.5)	**F (123.8)**	B (18.4)		**F (131.6)**	C (27.9)		**F (120.3)**	C (31.9)		
		Approach		C (26.1)			C (28.8)			**E (68.6)**			D (43.9)		
	Queue Length 95th (ft)	Movement	*m139*	*827*	*m0*	*123*	*264*		*48*	*54*		*39*	*59*		
US 192 & Formosa Gardens Boulevard	Volume		17	2328	75	109	896	19	59	10	292	35	13	14	C (34.0)
	LOS (Delay)	Movement	**F (106.7)**	C (29.1)		**F (116.1)**	B (11.5)		**F (89.6)**	**E (79.7)**	**F (90.5)**	**F (84.9)**	D (45.6)		
		Approach		C (29.7)			C (22.6)			**F (90.0)**			**E (67.4)**		
	Queue Length 95th (ft)	Movement	*m42*	*665*		*128*	*247*		*134*	*34*	*412*	*87*	*53*		
*Livingston Road & Formosa Gardens Boulevard	Volume					52	0	32		282	90	38	168		B (13.5)
	LOS (Delay)	Movement					*B (13.5)*			A (0.0)	A (0.0)	A (9.4)	A (0.0)		
		Approach					B (13.5)			A (0.0)			A (9.4)		
	Queue Length 95th (ft)	Movement					*25*			*0*	*0*	*25*	*0*		
Western Way & Flagler Avenue	Volume		8	523			222	30				16		11	A (4.6)
	LOS (Delay)	Movement	A (1.8)	A (1.2)			A (8.5)	A (9.4)				**E (56.6)**		A (2.4)	
		Approach		A (1.2)			A (8.6)						C (34.5)		
	Queue Length 95th (ft)	Movement	*3*	*48*			*113*	*36*				*19*		*6*	
Western Way & Flamingo Crossing Boulevard	Volume		26	477	37	86	195	166	35	13	181	368	12	22	C (32.5)
	LOS (Delay)	Movement	**E (59.0)**	C (26.6)	A (0.4)	**E (59.7)**	C (20.4)	A (3.2)	D (54.1)	D (51.7)	C (21.2)	**E (59.1)**	D (40.6)	A (0.4)	
		Approach		C (26.4)			C (21.6)			C (28.0)			**E (55.2)**		
	Queue Length 95th (ft)	Movement	*53*	*224*	*0*	*64*	*92*	*34*	*64*	*16*	*66*	*204*	*13*	*0*	
*Western Way & SR 429 Southbound	Volume			916	110	23	238							209	B (10.3)
	LOS (Delay)	Movement		A (0.0)	A (0.0)	B (10.3)	A (0.0)							B (10.3)	
		Approach		A (0.0)			A (0.9)						B (10.3)		
	Queue Length 95th (ft)	Movement		*0*	*0*	*25*	*0*							*25*	
*Western Way & SR 429 Northbound	Volume		46	1754			202	198	59		107				**F (258.9)**
	LOS (Delay)	Movement	A (7.8)	A (0.0)			A (0.0)	A (0.0)	**F (258.9)**		D (27.3)				
		Approach		A (0.2)			0			**F (258.9)**					
	Queue Length 95th (ft)	Movement	*25*	*0*			*0*	*0*	*150*		*50*				
*Seidel Road & Avalon Road	Volume					297		276		462	430	228	440		**F (>999)**
	LOS (Delay)	Movement				**F (>999)**		C (21.4)		A (0.0)	A (0.0)	**F (69.1)**	A (0.0)		
		Approach					**F (>999)**			A (0.0)			**F (69.1)**		
	Queue Length 95th (ft)	Movement				*1125*		*100*		*0*	*0*	*225*	*0*		
*Seidel Road & SR 429 Southbound	Volume			601	57	240	573								B (10.6)
	LOS (Delay)	Movement		A (0.0)	A (0.0)	B (10.6)	A (0.0)								
		Approach		A (0.0)			B (10.6)								
	Queue Length 95th (ft)	Movement		0	0	50	0								
*Seidel Road & SR 429 Northbound	Volume			601			790		23		77				B (12.2)
	LOS (Delay)	Movement		A (0.0)			A (0.0)		C (16.1)		B (11.1)				
		Approach		A (0.0)			A (0.0)			B (12.2)					
	Queue Length 95th (ft)	Movement		0			0		25		25				
*Seidel Road & Lakeshore Point Drive	Volume		36	336	306	247	414	27	310	4	187	17	21	66	**F (>999)**
	LOS (Delay)	Movement	A (8.9)	A (0.0)	A (0.0)	B (13.2)	A (0.0)	A (0.0)		**F (>999)**			**F (>999)**		
		Approach		A (8.9)			B (13.2)			**F (>999)**			**F (>999)**		
	Queue Length 95th (ft)	Movement	25	0	0	75	0	0		N/A			N/A		

Synchro Version 11 Build 168; *Unsignalized intersection analyzed using HCS v7.9; N/A - queue not reported

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

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

4.3 MICROSIMULATION EVALUATION

This section provides a summary of traffic performance results for year 2020 existing conditions. The existing conditions VISSIM model development and calibration documentation is provided in **Appendix D**. The VISSIM microsimulation software was used to analyze US 192 from West Orange Lake Boulevard to the west and Formosa Gardens Boulevard to the east as well as the adjacent SR 429 mainline segments and on- and off-ramps to/from US 192. The model was calibrated for 2020 AM and PM peak period conditions: four hours of simulation with a 30-minute seeding time. Calibration of the model was based on traffic volumes and observed congestions at selected critical locations to accurately represent field conditions. The model was calibrated based on field visit observations, as well as the County and TMC camera conditions observed. The calibration documentation includes model development inputs, existing peak hour traffic, hourly distributions used in generating volumes for each of the four analysis hours, and calibration output for both 2020 AM and PM. Analysis was based on the average of 10 random seed runs to account for the stochasticity of the microsimulation mode.

4.3.1 Freeway Segment Analysis

Tables 4.5 and **4.6** highlight the MOEs for the SR429 mainline segments for the 2020 AM and PM peak hour conditions derived from the VISSIM calibrated model. The output for each of the four hours during the AM and PM peak periods is presented in the calibration documentation in **Appendix D**. As shown in **Table 4.5**, the SR429 freeway segments operated at or just below the posted speeds during the AM peak hour. **Table 4.6** indicates that the southbound diverge area located immediately upstream of the off-ramp to US192 operated at a speed of 30 mph during the PM peak hour. This operating speed is consistent with field observations and is substantially less than the posted speed on SR 429. During the PM peak hour, the queue at the southbound SR 429 off-ramp to US 192 frequently spills back and causes severe congestion on the mainline.

The tables show that most of the existing demand is served during the peak hours. The unmet demand in the southbound direction along SR429 is due to the queue spillback from the off-ramp to US192. All demand is served by the end of both the AM and PM four-hour simulation periods.

Table 4.5
2020 (Existing) AM Peak Hour VISSIM Freeway Segment Performance

Segment	Demand	Processed	% Served	Speed	Density pc/mi/ln
SR 429 Southbound					
Upstream of US 192 off-ramp	1,260	1,255	100%	71	6
Downstream of US 192 off-ramp	888	877	99%	72	5
Downstream of US 192 on-ramp	1,240	1,215	98%	69	6
SR 429 Northbound					
Downstream of US 192	1,036	836	92%	71	7
Downstream of US 192 on-ramp	1,036	830	92%	68	5
Upstream of US 192 on-ramp	702	554	90%	72	5
Upstream of US 192 off-ramp	882	698	91%	69	6

Table 4.6
2020 (Existing) PM Peak Hour VISSIM Freeway Segment Performance

Segment	Demand	Processed	% Served	Speed	Density pc/mi/ln
SR 429 Southbound					
Upstream of US 192 off-ramp	2,496	2,285	92%	30	63
Downstream of US 192 off-ramp	1,489	1,281	86%	70	7
Downstream of US 192 on-ramp	1,968	1,741	88%	67	8
SR 429 Northbound					
Downstream of US 192	1,484	1,496	101%	71	9
Downstream of US 192 on-ramp	1,484	1,497	101%	67	7
Upstream of US 192 on-ramp	885	885	100%	71	6
Upstream of US 192 off-ramp	1,194	1,187	99%	68	8

4.3.2 Roadway Ramp Analysis

The VISSIM ramp roadway output for on/off-ramps to/from US192 is summarized in **Tables 4.7** and **4.8**. The results show that all the existing demand is served during the AM peak hour. During the PM peak hour, there is severe congestion on the southbound off-ramp to US192 and only 75 percent of the traffic demand can be served. The extremely long queue along the southbound off-ramp is observed in the field to frequently spill back to the mainline. All demand is served by the end of both the AM and PM four-hour simulation periods.

Table 4.7
2020 (Existing) AM Peak Hour VISSIM Ramp Roadway Performance

Ramp	Demand vph	Processed mph	% Served	Speed	Density pc/mi/ln
Southbound off-ramp	372	379	102%	26	11
Southbound on-ramp	352	338	96%	41	4
Northbound on-ramp	334	335	100%	35	7
Northbound off-ramp	180	170	94%	28	4

Table 4.8
2020 (Existing) PM Peak Hour VISSIM Ramp Roadway Performance

Ramp	Demand vph	Processed mph	% Served	Speed	Density pc/mi/ln
Southbound off-ramp	1,007	760	75%	6	108
Southbound on-ramp	479	465	97%	40	5
Northbound on-ramp	599	614	102%	35	13
Northbound off-ramp	309	301	97%	27	7

4.3.3 Intersection Analysis

The signalized intersections along US 192 were analyzed using Vissim microsimulation to assess operations at a detailed level. The 2020 intersection output from Vissim is presented in **Tables 4.9** and **4.10**.

During the AM peak hour, the peak direction of traffic flow is eastbound along US192. During the PM peak hour, the peak direction is westbound. Some of the turning movements along US 192 and some movements from the side streets are operating at LOS E or F. In general, US192 is experiencing moderate congestion during the AM peak hour and more severe congestion during the PM peak hour. The maximum queue length from the VISSIM analysis at the SR 429 southbound ramp terminal extends up to 9,900 feet, which spills back onto the SR 429 mainline. As a comparison, the distance from the stop bar at the ramp terminal to the SR 429 exit gore is 1,600 feet. This finding matches field observations of queues at the southbound ramp terminal frequently extending to the freeway mainline during the PM peak period.

Table 4.9
2020 (Existing) AM Peak Hour Calibration Results – US 192 Signalized Intersections

Intersection	Movement	AM Volume (VPH)	Delay (sec/veh)	LOS	Max Queue Length (feet)
US 192 at West Orange Lake Boulevard	**Overall**	**3,853**	**18**	**B**	
	EBLT	50	95	F	775
	EBTH	2,580	17	B	775
	EBRT	18	14	B	818
	NBLT	8	74	E	67
	NBTH	1	87	F	67
	NBRT	31	9	A	103
	WBLT	36	84	F	199
	WBTH	914	8	A	199
	WBRT	71	2	A	199
	SBLT	121	88	F	290
	SBTH	6	73	E	290
	SBRT	17	8	A	319
US 192 at SB SR 429	**Overall**	**3,989**	**6**	**A**	
	EBTH	2,413	5	A	282
	EBRT	319	3	A	186
	WBLT	33	70	E	140
	WBTH	852	2	A	140
	SBLT	203	18	B	128
	SBRT	169	19	B	115
US 192 at NB SR 429	**Overall**	**3,701**	**13**	**B**	
	EBLT	245	104	F	377
	EBTH	2,371	3	A	377
	NBLT	69	94	F	114
	NBRT	111	14	B	114
	WBTH	816	6	A	254

	WBRT	89	2	A	128

Table 4.9 (continued)
2020 (Existing) AM Peak Hour Calibration Results – US 192 Signalized Intersections

Intersection	Movement	AM Volume (VPH)	Delay (sec/veh)	LOS	Max Queue Length (feet)
US 192 at East Orange Lake Boulevard	**Overall**	**3,803**	**19**	**B**	
	EBLT	83	109	F	521
	EBTH	2,199	8	A	521
	EBRT	200	3	A	521
	NBLT	68	90	F	114
	NBTH	6	83	F	114
	NBRT	87	12	B	114
	WBLT	99	91	F	280
	WBTH	801	17	B	280
	WBRT	87	5	A	280
	SBLT	119	102	F	317
	SBTH	18	101	F	317
	SBRT	36	7	A	317
US 192 at Inspiration Drive	**Overall**	**3,606**	**13**	**B**	
	EBLT	76	73	E	1,004
	EBTH	2,369	10	A	1,004
	EBRT	52	6	A	1,004
	NBLT	30	75	E	80
	NBTH	4	64	E	80
	NBRT	42	11	B	127
	WBLT	95	67	E	241
	WBTH	869	9	A	241
	WBRT	5	5	A	241
	SBLT	9	69	E	105
	SBTH	6	72	E	105
	SBRT	49	9	A	130
US 192 at Formosa Gardens Boulevard	**Overall**	**3,867**	**31**	**C**	
	EBLT	17	81	F	1,244
	EBTH	2,328	37	D	1,244
	EBRT	75	37	D	1,245
	NBLT	59	54	D	287
	NBTH	10	56	E	287
	NBRT	292	22	C	287
	WBLT	109	56	E	238
	WBTH	896	12	B	238
	WBRT	19	10	A	239
	SBLT	35	56	E	110
	SBTH	13	49	D	110
	SBRT	14	14	B	132

Table 4.10
2020 (Existing) PM Peak Hour Calibration Results – US 192 Signalized Intersections

Intersection	Movement	AM Volume (VPH)	Delay (sec/veh)	LOS	Max Queue Length (feet)
US 192 at West Orange Lake Boulevard	**Overall**	**4603**	**12**	**B**	
	EBLT	25	109	F	369
	EBTH	1,523	11	B	369
	EBRT	16	9	A	412
	NBLT	30	102	F	103
	NBTH	3	90	F	103
	NBRT	24	7	A	139
	WBLT	39	108	F	281
	WBTH	2,712	6	A	281
	WBRT	87	2	A	281
	SBLT	101	108	F	251
	SBTH	5	93	F	251
	SBRT	38	19	B	280
US 192 at SB SR 429	**Overall**	**4896**	**198**	**F**	
	EBTH	1,330	26	C	697
	EBRT	318	6	A	600
	WBLT	161	122	F	445
	WBTH	2,080	8	A	445
	SBLT	249	873	F	9,917
	SBRT	758	896	F	9,898
US 192 at NB SR 429	**Overall**	**4,313**	**16**	**B**	
	EBLT	291	115	F	392
	EBTH	1,288	4	A	392
	NBLT	124	111	F	181
	NBRT	185	12	B	181
	WBTH	2,117	7	A	262
	WBRT	308	1	A	211
US 192 at East Orange Lake Boulevard	**Overall**	**4,727**	**51**	**D**	
	EBLT	102	214	F	462
	EBTH	1,134	19	B	462
	EBRT	237	4	A	462
	NBLT	362	122	F	642
	NBTH	52	96	F	642
	NBRT	191	10	B	642
	WBLT	231	120	F	1,472
	WBTH	1,913	48	D	1,472
	WBRT	144	25	C	1,472
	SBLT	166	90	F	448
	SBTH	45	93	F	448
	SBRT	150	20	C	448

Table 4.10 (continued)
2020 (Existing) PM Peak Hour Calibration Results – US-192 Signalized Intersections

Intersection	Movement	AM Volume (VPH)	Delay (sec/veh)	LOS	Max Queue Length (feet)
US 192 at Inspiration Drive	**Overall**	**4,162**	**28**	**C**	
	EBLT	91	85	F	583
	EBTH	1,321	14	B	583
	EBRT	30	4	A	583
	NBLT	41	74	E	77
	NBTH	2	87	F	77
	NBRT	47	5	A	115
	WBLT	129	71	E	932
	WBTH	2,130	32	C	932
	WBRT	34	31	C	932
	SBLT	50	75	E	263
	SBTH	3	54	D	263
	SBRT	284	15	B	288
US 192 at Formosa Gardens Boulevard	**Overall**	**4,405**	**27**	**C**	
	EBLT	19	85	F	685
	EBTH	1,263	20	C	685
	EBRT	136	18	B	687
	NBLT	126	75	E	262
	NBTH	18	74	E	262
	NBRT	235	11	B	262
	WBLT	356	81	F	701
	WBTH	2,126	19	B	701
	WBRT	21	15	B	702
	SBLT	49	73	E	145
	SBTH	15	69	E	145
	SBRT	41	23	C	167

This section provides information on the development of future traffic daily forecasts, design hour volumes, and future lane requirements (see **Appendix E** for the Travel Demand Model Report).

5.1 TRAVEL DEMAND MODEL DEVELOPMENT

5.1.1 Travel Demand Model

The Central Florida Regional Planning Model (CFRPM) developed by FDOT District 5, CFRPMv6.1, was used as the basis for this project. The CFRPMv6.1 was developed in two versions, a Daily model, and a Time-of-Day (ToD) model. The CFRPMv6.1 ToD was released in November of 2016 with a 2010 base year and cost feasible scenarios for years 2015 through 2045 in 5-year increments. FTE revalidated the ToD version of the model, CFRPMv6.1 ToD FTE, for the year 2015 which included the most recent available Socioeconomic (SE) data from MetroPlan Orlando and adopted the CFRPMv6.1 ToD FTE for use in this study. The model was updated and revalidated to 2017 based on existing land use and traffic counts. The updated CFRPMv6.1 FTE has been applied for several projects in the region. The latest CFRPM7 was not used as it was released in March 2021 and was not available when the modeling effort started in early 2020. In addition, the CFRPMv7 was not calibrated for official toll and revenue forecasting.

5.1.2 Base Year Validation

The CFRPMv6.1 ToD FTE is a Peak Season Weekday Average Daily Traffic (PSWADT) model. The 2015 cost feasible scenario was updated with 2015 daily and ToD period counts, land use for the study area, and toll data. The model was then revalidated based on year 2015 conditions. During validation, the Root Mean Square Error (RMSE) statistic was reviewed for daily and by ToD periods to verify the accuracy of the model validation. **Table 5.1** summarizes the results of the RMSE statistic for the regional model for 2015 Daily, AM, Midday (MD), PM, and Night (NT). The RMSE results for the regional model as shown in the table for some daily and ToD periods and count ranges are not within an acceptable range. A RMSE greater than the acceptable range indicates that the model is not well validated for the 2015 base year. However, the focus was on the project study area validation and on the project corridor itself. Therefore, the regional model was further refined for 2017 at the project subarea level to better account for the local changes in land use and traffic since the 2015 base year. An additional model validation for the subarea for the Western Beltway and Poinciana Parkway Extension Connector linear corridor was performed by extracting the subarea from the regional model with the corresponding trip tables. Subsequently, the subarea trip tables were adjusted through an Origin Destination Matrix Estimation (ODME) process to improve the subarea adjustment.

An assessment was done regarding the quality of the subarea trip tables by period before and after applying the ODME process. This was performed through a comparison of the RMSE of assigned model traffic volumes to traffic counts by volume group by ToD period. The Volume to Count (V/C) ratio was also assessed. **Tables 5.2** and **5.3** display key statistics for 2017 before and after applying the ODME process. As compared with the pre-ODME results, the post-ODME results show a significant improvement. The post-ODME results show that all the volume group RMSE is in the acceptable range. However, most of the volume groups for each time period performed within range. Also, the overall results surpass the acceptable range, which suggests that the model is reliable to replicate real world conditions. With the subarea validation using the ODME process, the RMSE statistics for the subarea provide a very low RMSE. Therefore, the model can be used with confidence for forecasting future traffic in the subarea.

Table 5.1
2015 Regional Time-of-Day Model Validation

Volume Group	RMSE (%)	Acceptable RMSE (%)	Volume/Count	Number of Counts
Daily				
1 - 5,000	97.3	45 - 55	1.06	5,470
5,000 - 10,000	53.1	35 - 45	0.94	2,786
10,000 - 20,000	34.6	27 - 35	0.95	2,570
20,000 - 30,000	29.8	24 - 27	0.98	743
30,000 - 40,000	30.4	22 - 24	1.05	156
40,000 - 50,000	27.2	20 - 22	1.22	53
50,000 - 60,000	28.4	18 - 20	1.16	19
60,000 - 70,000	21.1	17 - 18	1.16	21
70,000 - 80,000	40.0	16 - 17	1.30	12
80,000 - 90,000	32.7	15 - 16	1.29	23
90,000 - 100,000	19.6	14 - 15	1.17	5
100,000 - 500,000	18.4	< 14	1.13	4
(1 - 500,000)	**(51.8)**	**(32 – 39)**	**(1.00)**	**(11,862)**
AM Period				
1 - 500	143.3	45 - 100	1.30	3,475
500 - 1,250	69.9	45 - 100	0.95	3,123
1,250 - 2,500	49.3	35 - 45	0.97	2,546
2,500 - 5,000	38.7	27 - 35	0.93	1,374
5,000 - 10,000	41.4	24 - 27	0.95	199
10,000 - 20,000	32.0	18 - 24	1.18	53
20,000 - 50,000	*	14 - 18	0.82	1
(1 - 50,000)	**(64.0)**	**(35 – 45)**	**(0.98)**	**(10,771)**
MD Period				
1 - 500	266.8	45 - 100	1.84	1,151
500 - 1,250	108.0	45 - 100	1.12	2,077
1,250 - 2,500	71.0	35 - 45	0.95	2,506
2,500 - 5,000	56.8	27 - 35	1.01	2,541
5,000 - 10,000	38.0	24 - 27	0.98	2,087
10,000 - 20,000	34.6	18 - 24	1.07	341
20,000 - 50,000	45.1	14 - 18	1.39	68
(1 - 50,000)	**(62.9)**	**(35 – 45)**	**(1.03)**	**(10,771)**
PM Period				
1 - 500	185.5	45 - 100	1.58	2,111
500 - 1,250	76.4	45 - 100	0.96	2,940
1,250 - 2,500	55.8	35 - 45	0.92	2,673
2,500 - 5,000	36.4	27 - 35	0.90	2,389
5,000 - 10,000	40.4	24 - 27	0.95	572
10,000 - 20,000	30.4	18 - 24	1.17	84
20,000 - 50,000	16.1	14 - 18	1.11	2
(1 - 50,000)	**(57.3)**	**(35 – 45)**	**(0.96)**	**(10,771)**

Notes: Bold format Indicates RMSE was better or within the allowable limits.
*RMSE cannot be calculated with only one link.
Source: Table produced by Florida's Turnpike Enterprise / AECOM with data generated by this study.

Table 5.1 (continued)
2015 Regional Time-of-Day Model Validation

Volume Group	RMSE (%)	Acceptable RMSE (%)	Volume/Count	Number of Counts
NT Period				
1 - 500	162.8	45 - 100	1.32	2,386
500 - 1,250	74.2	45 - 100	0.90	2,930
1,250 - 2,500	52.9	35 - 45	0.91	2,504
2,500 - 5,000	37.5	27 - 35	0.90	2,086
5,000 - 10,000	31.4	24 - 27	0.86	731
10,000 - 20,000	27.8	18 - 24	0.90	93
20,000 - 50,000	22.1	14 - 18	1.01	41
(1 - 50,000)	**(54.1)**	**(35 – 45)**	**(0.91)**	**(10,771)**

Notes: Bold format Indicates RMSE was better or within the allowable limits.
*RMSE cannot be calculated with only one link.
Source: Table produced by Florida's Turnpike Enterprise / AECOM with data generated by this study.

Table 5.2
2017 Before ODME Subarea Time-of-Day Model Validation

Volume Group	RMSE (%)	Acceptable RMSE (%)	Volume/Count	Number of Counts
Daily				
1 - 5,000	62.5	45 - 55	1.06	171
5,000 - 10,000	50.0	35 - 45	1.04	84
10,000 - 20,000	34.1	27 - 35	1.06	52
20,000 - 30,000	17.6	24 - 27	0.99	33
30,000 - 40,000	23.5	22 - 24	0.80	11
50,000 - 60,000	21.1	18 - 20	1.18	4
60,000 - 70,000	15.3	17 - 18	1.12	4
(1 - 500,000)	**(37.4)**	**(32 – 39)**	**(1.02)**	**(359)**
AM Period				
1 – 500	144.6	45 - 100	1.29	97
500 - 1,250	69.6	45 - 100	0.98	107
1,250 - 2,500	91.6	35 - 45	1.23	68
2,500 - 5,000	46.9	27 - 35	1.17	33
5,000 - 10,000	36.9	24 - 27	0.80	15
10,000 - 20,000	22.0	18 - 24	1.15	3
(1 - 50,000)	**(75.1)**	**(35 – 45)**	**(1.08)**	**(323)**
MD Period				
1 – 500	174.5	45 - 100	1.65	26
500 - 1,250	74.2	45 - 100	1.04	71
1,250 - 2,500	61.6	35 - 45	1.14	101
2,500 - 5,000	54.6	27 - 35	1.12	46
5,000 - 10,000	27.7	24 - 27	1.05	56
10,000 - 20,000	25.8	18 - 24	1.04	18
20,000 - 50,000	29.7	14 - 18	1.25	5
(1 - 50,000)	**(47.0)**	**(35 – 45)**	**(1.10)**	**(323)**

Notes: Bold format Indicates RMSE was better or within the allowable limits.
*RMSE cannot be calculated with only one link.
Source: Table produced by Florida's Turnpike Enterprise / AECOM with data generated by this study.

Table 5.2 (continued)
2017 Before ODME Subarea Time-of-Day Model Validation

Volume Group	RMSE (%)	Acceptable RMSE (%)	Volume/Count	Number of Counts
PM Period				
1 - 500	179.2	45 - 100	1.49	54
500 - 1,250	58.2	45 - 100	1.03	119
1,250 - 2,500	64.7	35 - 45	1.03	67
2,500 - 5,000	49.2	27 - 35	1.18	50
5,000 - 10,000	43.2	24 - 27	0.97	27
10,000 - 20,000	26.9	18 - 24	1.18	6
(1 - 50,000)	**(63.2)**	**(35 – 45)**	**(1.08)**	**(323)**
NT Period				
1 - 500	94.4	45 - 100	0.91	58
500 - 1,250	53.7	45 - 100	0.96	97
1,250 - 2,500	47.4	35 - 45	0.90	72
2,500 - 5,000	44.5	27 - 35	0.83	51
5,000 - 10,000	32.0	24 - 27	0.77	31
10,000 - 20,000	31.1	18 - 24	0.79	13
20,000 - 50,000	*	14 - 18	0.73	1
(1 - 50,000)	**(54.1)**	**(35 – 45)**	**(0.83)**	**(323)**

Notes: Bold format Indicates RMSE was better or within the allowable limits.
*RMSE cannot be calculated with only one link.
Source: Table produced by Florida's Turnpike Enterprise / AECOM with data generated by this study.

Table 5.3
2017 After ODME Subarea Time-of-Day Model Validation

Volume Group	RMSE (%)	Acceptable RMSE (%)	Volume/Count	Number of Counts
Daily				
1 - 5,000	45.5	45 - 55	1.07	171
5,000 - 10,000	36.3	35 - 45	1.05	84
10,000 - 20,000	20.2	27 - 35	1.00	52
20,000 - 30,000	7.8	24 - 27	0.99	33
30,000 - 40,000	16.1	22 - 24	0.87	11
50,000 - 60,000	6.4	18 - 20	0.97	4
60,000 - 70,000	7.0	17 - 18	1.04	4
(1 - 500,000)	**(22.8)**	**(32 – 39)**	**(1.00)**	**(359)**
AM Period				
1 – 500	100.6	45 - 100	1.35	97
500 - 1,250	25.3	45 - 100	0.96	107
1,250 - 2,500	24.2	35 - 45	1.03	68
2,500 - 5,000	7.9	27 - 35	1.04	33
5,000 - 10,000	15.5	24 - 27	0.91	15
10,000 - 20,000	9.9	18 - 24	1.02	3
(1 - 50,000)	**(24.7)**	**(35 – 45)**	**(1.01)**	**(323)**

Notes: Bold format Indicates RMSE was better or within the allowable limits.
*RMSE cannot be calculated with only one link.
Source: Table produced by Florida's Turnpike Enterprise / AECOM with data generated by this study.

Table 5.3 (continued)
2017 After ODME Subarea Time-of-Day Model Validation

Volume Group	RMSE (%)	Acceptable RMSE (%)	Volume/Count	Number of Counts
MD Period				
1 – 500	80.9	45 - 100	1.13	26
500 - 1,250	47.9	45 - 100	1.10	71
1,250 - 2,500	34.0	35 - 45	1.06	101
2,500 - 5,000	24.0	27 - 35	0.99	46
5,000 - 10,000	5.7	24 - 27	1.00	56
10,000 - 20,000	11.1	18 - 24	0.96	18
20,000 - 50,000	4.5	14 - 18	1.01	5
(1 - 50,000)	**(17.7)**	**(35 – 45)**	**(1.01)**	**(323)**
PM Period				
1 - 500	125.0	45 - 100	1.41	54
500 - 1,250	34.2	45 - 100	1.05	119
1,250 - 2,500	27.5	35 - 45	0.99	67
2,500 - 5,000	13.4	27 - 35	1.00	50
5,000 - 10,000	16.0	24 - 27	0.91	27
10,000 - 20,000	12.4	18 - 24	1.06	6
(1 - 50,000)	**(24.7)**	**(35 – 45)**	**(1.00)**	**(323)**
NT Period				
1 - 500	230.9	45 - 100	1.58	58
500 - 1,250	41.5	45 - 100	1.08	97
1,250 - 2,500	45.5	35 - 45	1.05	72
2,500 - 5,000	25.9	27 - 35	1.07	51
5,000 - 10,000	17.3	24 - 27	0.93	31
10,000 - 20,000	20.2	18 - 24	0.90	13
20,000 - 50,000	*	14 - 18	0.95	1
(1 - 50,000)	**(35.8)**	**(35 – 45)**	**(1.00)**	**(323)**

Notes: Bold format Indicates RMSE was better or within the allowable limits.
*RMSE cannot be calculated with only one link.
Source: Table produced by Florida's Turnpike Enterprise / AECOM with data generated by this study.

5.1.3 Future Year Transportation Network

The future No-Build regional network was updated to include the following planned and programmed improvements within the study area:

- Florida's Turnpike/SR 91 mainline widening (FPID: 435784-1) from four to eight lanes. This project extends from SR 50 in Clermont to the Orange County/Lake Countyline. The project is expected to be completed by year 2023.
- Florida's Turnpike/SR 91 mainline widening (FPID: 435785-1) from four to eight lanes. The limits for this project are from the Orange County/Lake County line to Hancock Road in Minneola. It is expected to be completed by year 2024.
- Florida's Turnpike/SR 91 mainline widening (FPID: 435786-1,-2,-3) from four to eight lanes. The limits for this project are from Hancock Road in Minneola to Obrien Road and from Obrien Road to US 27/SR 19 (North). It is expected to be completed by year 2026.

- Western Beltway/SR 429 widening from four to six lanes by CFX from Tilden Road to John Land Apopka Expressway/SR 414. It is expected to be completed by year 2024.
- Poinciana Parkway from Ronald Reagan Parkway to south of US 17/92 and from south of US 17/92 to County Road 532/Osceola Polk County Line Road. It is expected to be completed by year 2025.
- Poinciana Parkway from Ronald Reagan Parkway to Cypress Parkway/CR 580, widening from an undivided two-lane roadway to a divided four lane expressway. It is expected to be completed by year 2023.
- I-4 from County Line Road to west of US 27 and from west of US 27 to west of Kirkman Road/SR 435, widening to 10 lanes (including managed lanes).
- Lake/Orange Expressway (SR 516), a new four lane limited access expressway from US 27 to Western Beltway/SR 429. It is expected to be completed by year 2023.
- Southport Connector Expressway, a divided four lane tolled expressway from Poinciana Parkway to Canoe Creek Road with a full interchange at the Florida's Turnpike/SR 91. PD&E Study completion date 2023
- Avalon Road from US 192 to McKinney Road, widening from two to four lanes.

The first three improvements are within the FTE's system and will be funded by FTE. The rest are being designed and constructed by others. The Build network included Poinciana Parkway Extension Connector from CR 532/Osceola Polk Line Road to I-4 with full interchanges at I-4 and US 17/US 92 and a partial interchange at CR 532/Osceola Polk Line Road with north ramps access only.

5.1.4 Future Socioeconomic Data and Land Use

The COVID-19 pandemic has had impact on the national and state economies. it will likely result in lower population growth rates in counties statewide. To account for the impact, a factor was applied to reduce the populations in the BEBR forecasts for 2025 and 2045 model years. The reduction factors were developed by examining reductions in growth rates from the Great Recession (2008 to 2012) and applying these reductions to projected future year county population totals. For employment, a similar methodology was used to establish new 2025 and 2045 projected future employment totals based on employment data from U.S. Bureau of Economic Analysis (BEA) and projections from Woods & Poole Employment Projections. Future year model SE data in the study area which included the four counties were updated and integrated into the CFRPMv6.1 ToD FTE. Population and employment projections were compared to future year county projections to ensure reasonability. **Table 5.4** shows the base year and adjusted future year populations in the model, along with the compound annual growth rate (CAGR) percentage from the 2017 model base year to 2025 interim year and from 2025 interim year to 2045 horizon year.

Table 5.4
Adjusted Population Projections with CAGR

Area	CFRPM Model Population			CAGR	
	2017	2025	2045	2017 – 2025	2025 – 2045
Lake County	331,724	408,271	531,539	2.63%	1.33%
Orange County	1,313,880	1,560,951	1,959,258	2.18%	1.14%
Osceola County	337,614	447,378	637,712	3.58%	1.79%
Polk County	661,645	757,373	915,469	1.70%	0.95%
Total	**2,644,863**	**3,173,973**	**4,043,978**	**2.31%**	**1.22%**

Source: Bureau of Economic and Business Research (BEBR), Florida Population Study 174, 2016 and 186 (Medium), January 2020. Adjusted for COVID-19 impact by AECOM

Table 5.5 shows the base year and adjusted future year employment in the model, along with the CAGR percentage from the 2017 model base year to 2025 interim year and from 2025 interim year to 2045 horizon year.

Table 5.5
Adjusted Employment Projections with CAGR

Area	CFRPM Employment			CAGR	
	2017	2025	2045	2017 – 2025	2025 – 2045
Lake County	143,309	159,243	221,371	1.33%	1.66%
Orange County	1,090,417	1,244,679	1,769,424	1.67%	1.77%
Osceola County	145,301	169,308	276,010	1.93%	2.47%
Polk County	301,085	321,022	380,494	0.80%	0.85%
Total	**1,680,112**	**1,894,252**	**2,647,299**	**1.51%**	**1.69%**

Source: Woods and Poole State Profile, 2019. Adjusted for COVID-19 impact by AECOM

Osceola County's proximity to Orange County (i.e., includes Downtown Orlando) will continue to contribute to the Osceola County's future population and employment growth. To better manage this growth, Osceola County has enacted an Urban Growth Boundary and has also targeted specific areas for urban infill and expansion.

5.1.5 Future Year Model Trip Matrix Adjustment

The subarea Origin-Destination (O-D) matrices for the future years 2025 and 2045 were extracted from the regional model, corresponding to the opening and design years for the PD&E study. Then, correction factors, which were developed based on the subarea trip tables before and after the ODME process, were applied to create the future year trip tables. These trip tables were then used to run the subarea model for the No-Build and Build scenarios, which were then summarized in traffic profiles.

Traffic projections were developed using the updated CFRPMv6.1 ToD model for years 2025 and 2045. The PSWADT from the model was converted to AADT by applying a Model Output Conversion Factor (MOCF) of 0.95 for the SR 429 and Poinciana Parkway Extension Connector facilities. The MOCF used was from the original model with the 2010 base year. The AADT counts were converted to PSWADT using the model MOCF. Several MOCF were used for the major roadways based on their locations in a county with a global county specific MOCF for the county minor roadways. The model period volumes (AM, MD, PM, NT) were adjusted accordingly based on AADT. Model AM and PM peak hour volumes were developed by applying a factor of 0.42 and 0.35, respectively, to the period volumes. The factors were estimated using traffic counts. The model AADT, AM, and PM peak hour volumes were then adjusted following the National Cooperative Highway Research Program (NCHRP) Report 765 methodology. Additional adjustments were made based on growth rates and traffic factors (K and D) to ensure reasonableness and accuracy. The volumes were eventually adjusted for continuity of flow to develop final profiles for future AADT and Directional Design Hour Volumes (DDHV). Traffic volumes on the SR 429/Poinciana Parkway Extension Connector corridor were balanced using the traffic volume at the SR 429 Mainline Plaza north of US 192 as the anchor point since the detail toll data are available for both historical and different time of day periods. The I-4 Beyond the Ultimate (BtU) express lane splits were adopted for this study.

The Directional Design Hour Volumes (DDHVs) along US 192 were then adjusted based on the Everest Place (also known as Grand Medina) Traffic Impact Analysis prepared in June 2022.

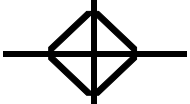
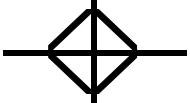
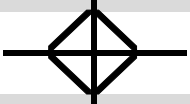
The forecasted 2025 and 2045 traffics were then interpolated and extrapolated to provide the opening year 2030 AADT and the design year 2050 AADT. **Table 5.6** shows the AADT for the No-Build Alternative. The overall impact of the traffic on the corridor due to COVID-19 is about 7 percent less in 2030 and about 1 percent less in 2050. **Table 5.7** shows the AADT for the Build Alternative with widening of the Western Beltway (SR 429) and Build for the Poinciana Parkway Extension Connector (SR 538) FTE. **Table 5.8** shows the AADT for the Build Alternative with Livingston Road interchange. The overall impact of the traffic on the corridor due to COVID-19 is about 6 percent less in 2030 and 2 percent less in 2050.

Table 5.6
2030 and 2050 No-Build AADT for Pre- and Post-Covid-19 Impact

Location	SR 429	Pre-Covid-19 No-Build AADT		Post-Covid-19 No-Build AADT	
		2030	2050	2030	2050
		67,500	113,500	64,000	113,400
11 - Seidel Road		6,200	11,800	5,800	11,700
		73,700	125,300	69,800	125,100
8 - Disney World/Hartzog Road		18,500	35,000	18,000	34,400
(Western Way)		6,700	11,400	5,600	10,800
7 - Toll Plaza		61,900	101,700	57,400	101,500
6 - US 192		17,500	28,000	17,300	28,000
		8,500	18,500	7,800	17,100
		52,900	92,200	47,900	90,600
1 - Sinclair Road		8,500	14,700	8,000	14,600
		8,400	14,800	7,500	13,400
		52,800	92,300	47,400	89,400
0 - I-4		52,800	92,300	47,400	89,400

Source: Table produced by Florida's Turnpike Enterprise / AECOM with data generated by this study.

Table 5.7
2030 and 2050 Build AADT for Pre- and Post-Covid-19 Impact

Location	SR 429	Pre -Covid 19 Build AADT		Post -Covid 19 Build AADT	
		2030	2050	2030	2050
		71,400	116,800	68,600	116,400
11 - Seidel Rd		6,400	12,400	6,000	12,300
		77,800	129,200	74,600	128,700
8 - Disney World/Hartzog Rd		18,500	35,000	18,000	34,400
(Western Way)		7,100	12,300	5,900	11,700
7 - Toll Plaza		66,400	106,500	62,500	106,000
6 - US 192		17,100	27,300	16,900	27,300
		8,800	19,100	8,100	17,700
		58,100	98,300	53,700	96,400
1 - Sinclair Rd		7,800	11,500	7,400	11,400
		8,800	15,800	7,800	14,300
		59,100	102,600	54,100	99,300
0 - I-4		47,500	82,400	42,700	80,000
		17,000	27,400	15,400	26,600
Poinciana Parkway Extension Connector		28,500	48,500	26,800	45,900
CR 532		7,600	13,300	7,400	13,000
		20,800	35,200	19,400	32,900
US 17/92		8,600	15,100	8,400	15,000
		7,200	15,600	7,000	15,500
Marigold Plaza		19,500	35,900	18,000	33,400

Source: Table produced by Florida's Turnpike Enterprise / AECOM with data generated by this study.

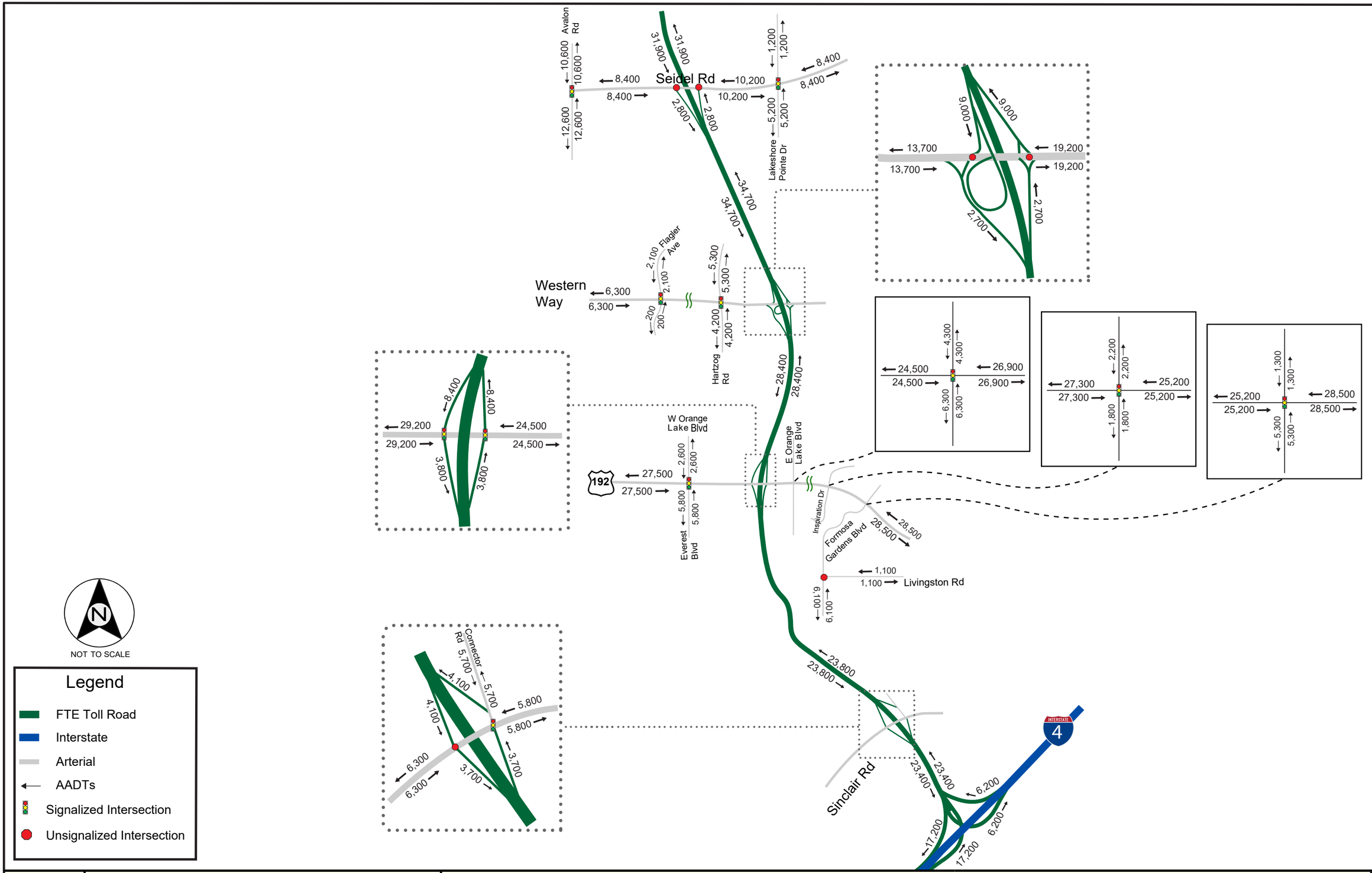
Table 5.8
2030 and 2050 Build AADT for Pre- and Post-Covid-19 Impact with Livingston Road Interchange

Location	SR 429	Pre -Covid 19 Build AADT		Post -Covid 19 Build AADT	
		2030	2050	2030	2050
		71,400	116,800	68,600	116,400
11 - Seidel Rd		6,400	12,400	6,000	12,300
		77,800	129,200	74,600	128,700
8 - Disney World/Hartzog Rd		18,500	35,000	18,000	34,400
(Western Way)		7,100	12,300	5,900	11,700
7 - Toll Plaza		66,400	106,500	62,500	106,000
6 - US 192		13,000	20,700	12,800	20,800
		7,600	16,700	7,000	15,400
		61,000	102,500	56,700	100,600
Livingston Road		7,200	11,500	6,900	11,000
		2,500	4,700	2,200	4,200
		56,300	95,700	52,000	93,800
1 - Sinclair Rd		5,000	7,200	4,800	7,200
		7,800	14,100	6,900	12,700
		59,100	102,600	54,100	99,300
0 - I-4		47,500	82,400	42,700	80,000
		17,000	27,400	15,400	26,600
Poinciana Parkway Extension Connector		28,500	48,500	26,800	45,900
CR 532		7,600	13,300	7,400	13,000
		20,800	35,200	19,400	32,900
US 17/92		8,600	15,100	8,400	15,000
		7,200	15,600	7,000	15,500
Marigold Plaza		19,500	35,900	18,000	33,400

Source:Table produced by Florida's Turnpike Enterprise / AECOM with data generated by this study.

Future year turning movement volumes for ramp-terminal intersections were developed using the projected ramp DDHVs. Turn proportions were estimated using peak period data from the CFRPM model and adjusted using existing conditions volumes where applicable. Cross-street through movements and adjacent intersections traffic were developed using growth rates estimated from historical data and verified with the CFRPM model. A linear growth rate of 4.6 percent was applied from 2018 to 2025 and 3.6 percent from 2025 to 2045. The forecasted 2025 and 2045 traffics were then interpolated and extrapolated to provide the opening year 2030 DDHVs and the design year 2050 DDHVs.

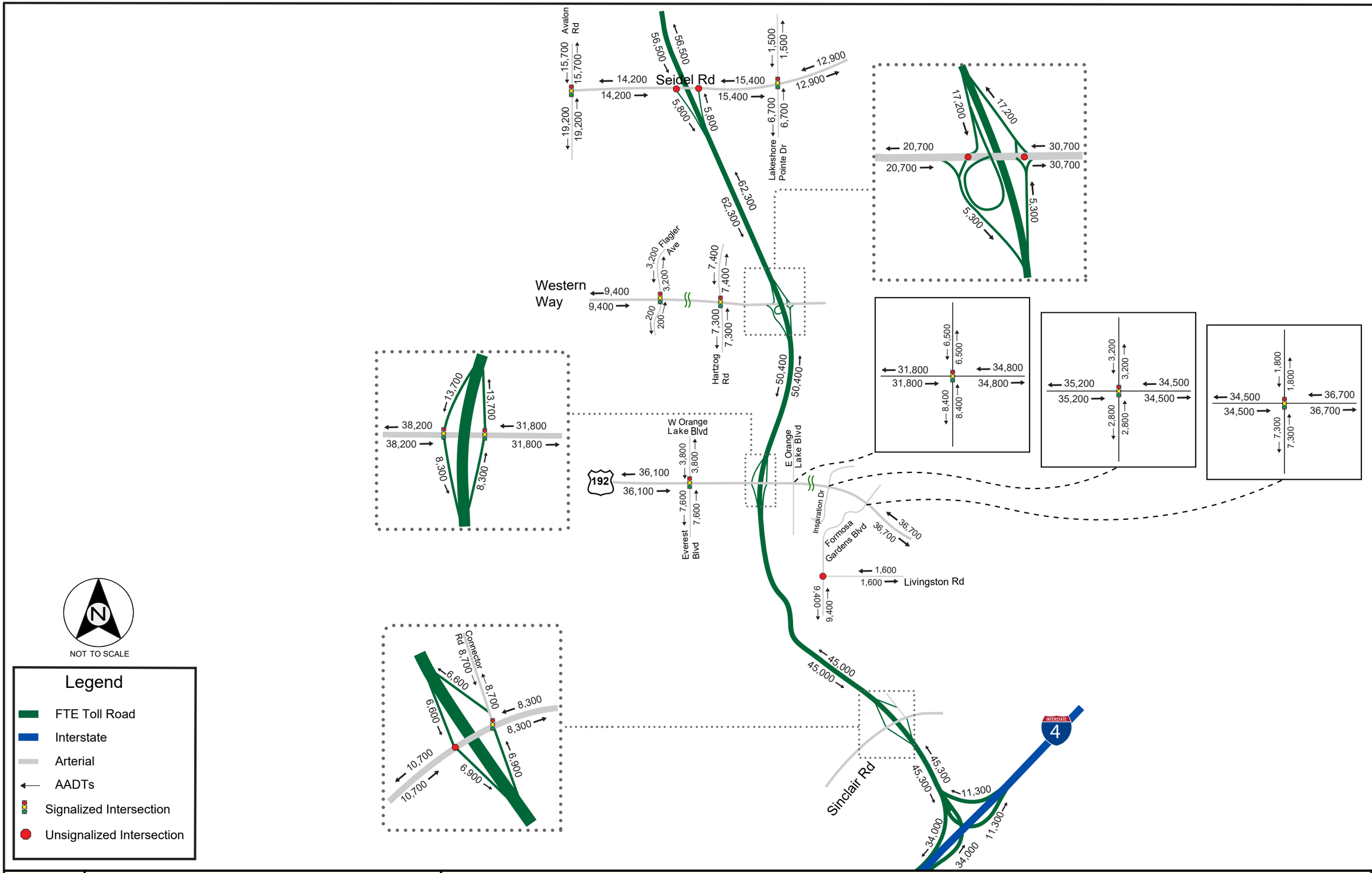
The 2030 and 2050 AADTs are presented on **Figures 5.1** through **5.4**, for No-Build and Build conditions, respectively. The 2030 and 2050 design hour volumes are presented on **Figures 5.5** through **5.8**, for the No-Build and Build conditions, respectively.



Western Beltway (SR 429) Widening PD&E Study
from I-4 to Seidel Road
Systems Interchange Justification Report (SIJR)

2030 No-Build One-Way AADTs

Figure 5.1

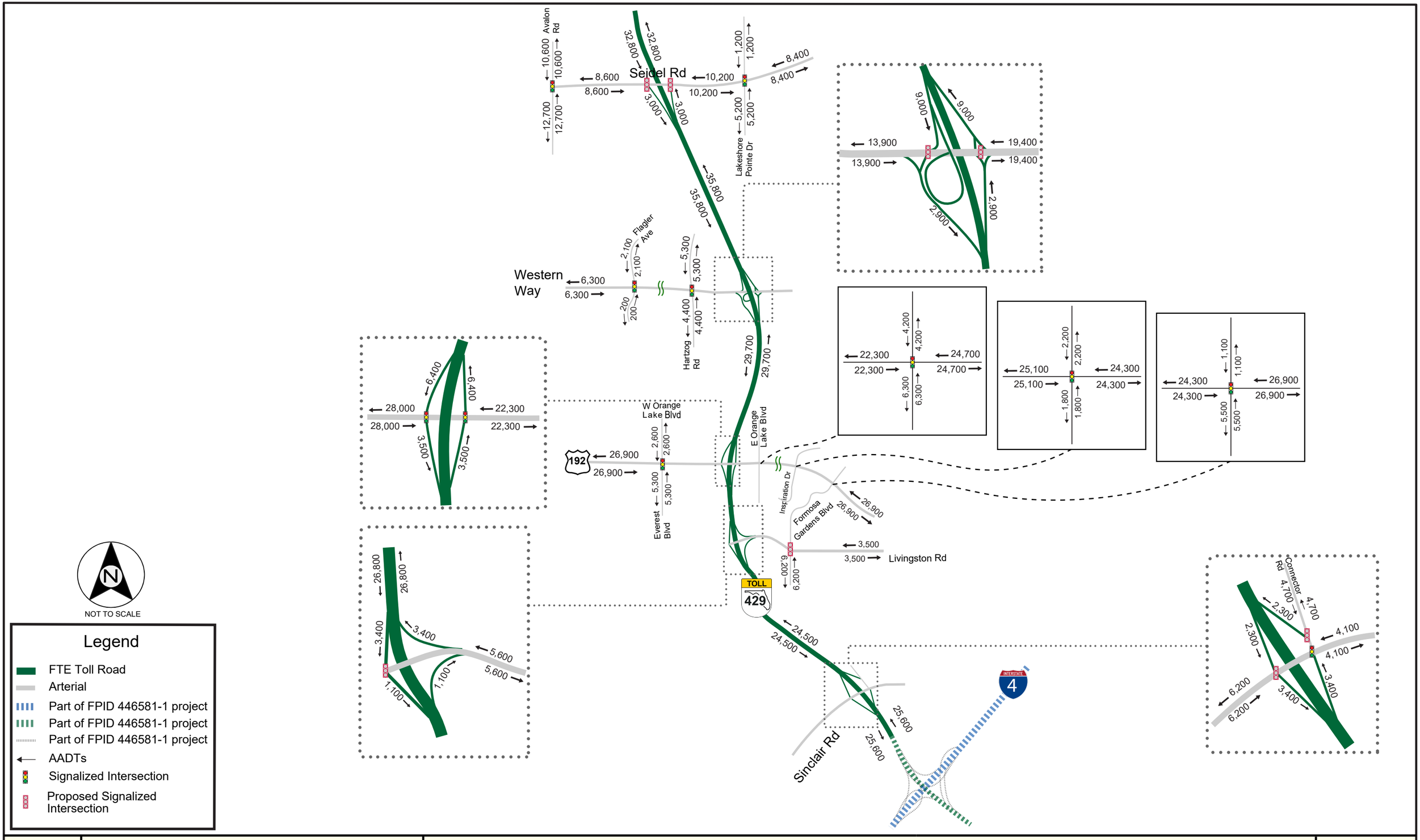


FLORIDA'S TURNPIKE

Western Beltway (SR 429) Widening PD&E Study
from I-4 to Seidel Road
Systems Interchange Justification Report (SIJR)

2050 No-Build One-Way AADTs

Figure 5.2

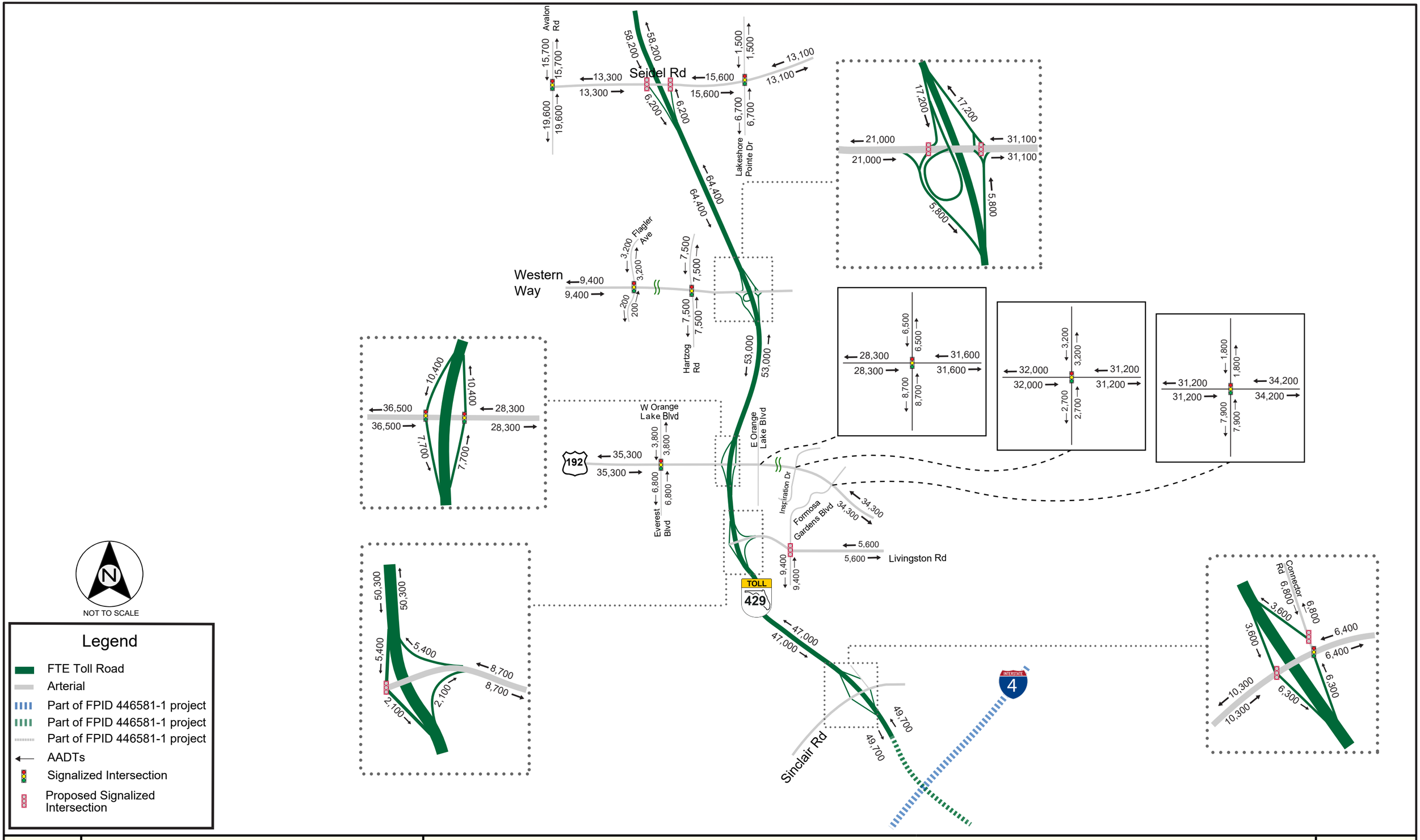


FLORIDA'S TURNPIKE

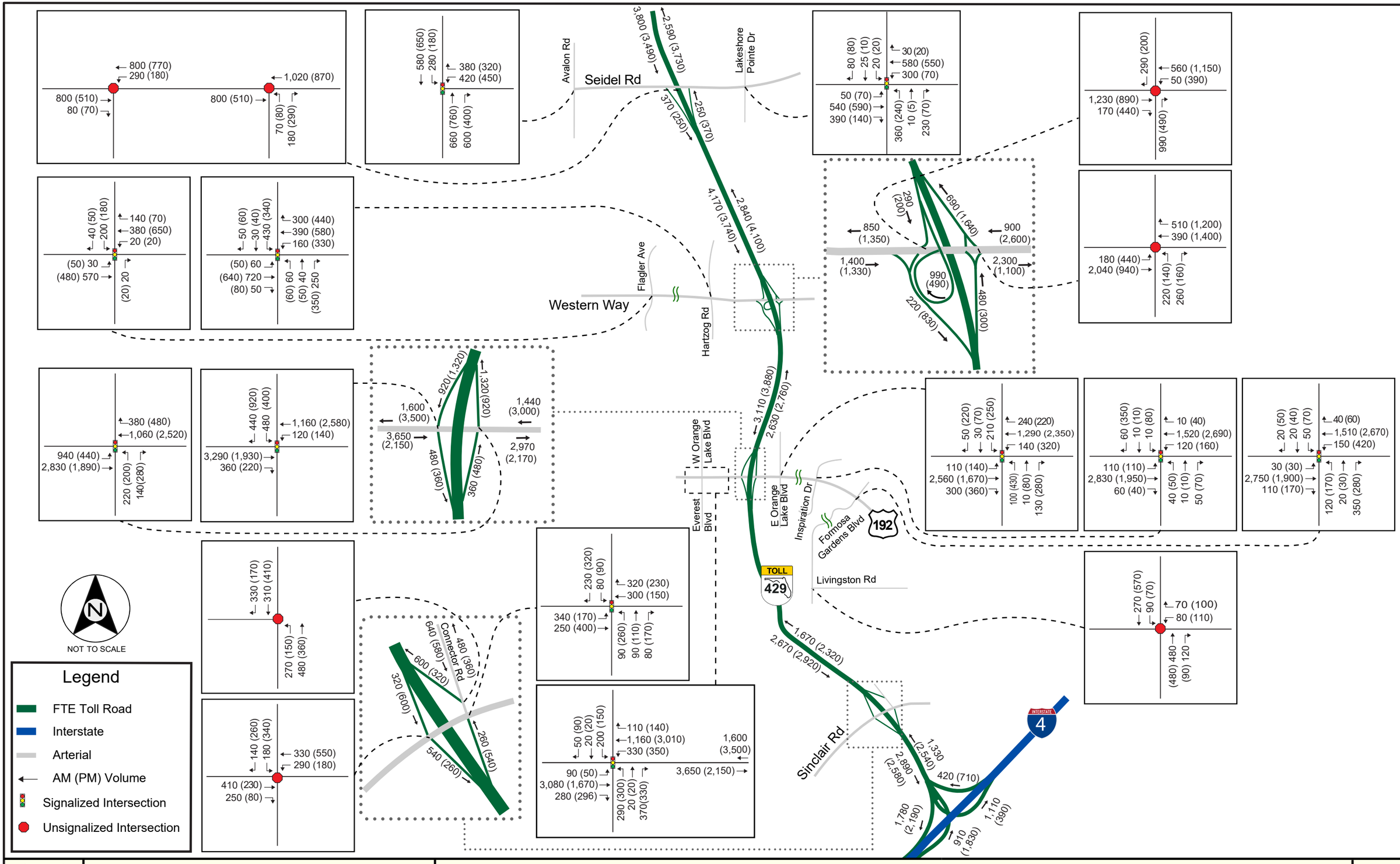
Western Beltway (SR 429) Widening PD&E Study
from I-4 to Seidel Road
Systems Interchange Justification Report (SIJR)

2030 Build One-Way AADTs

Figure 5.3

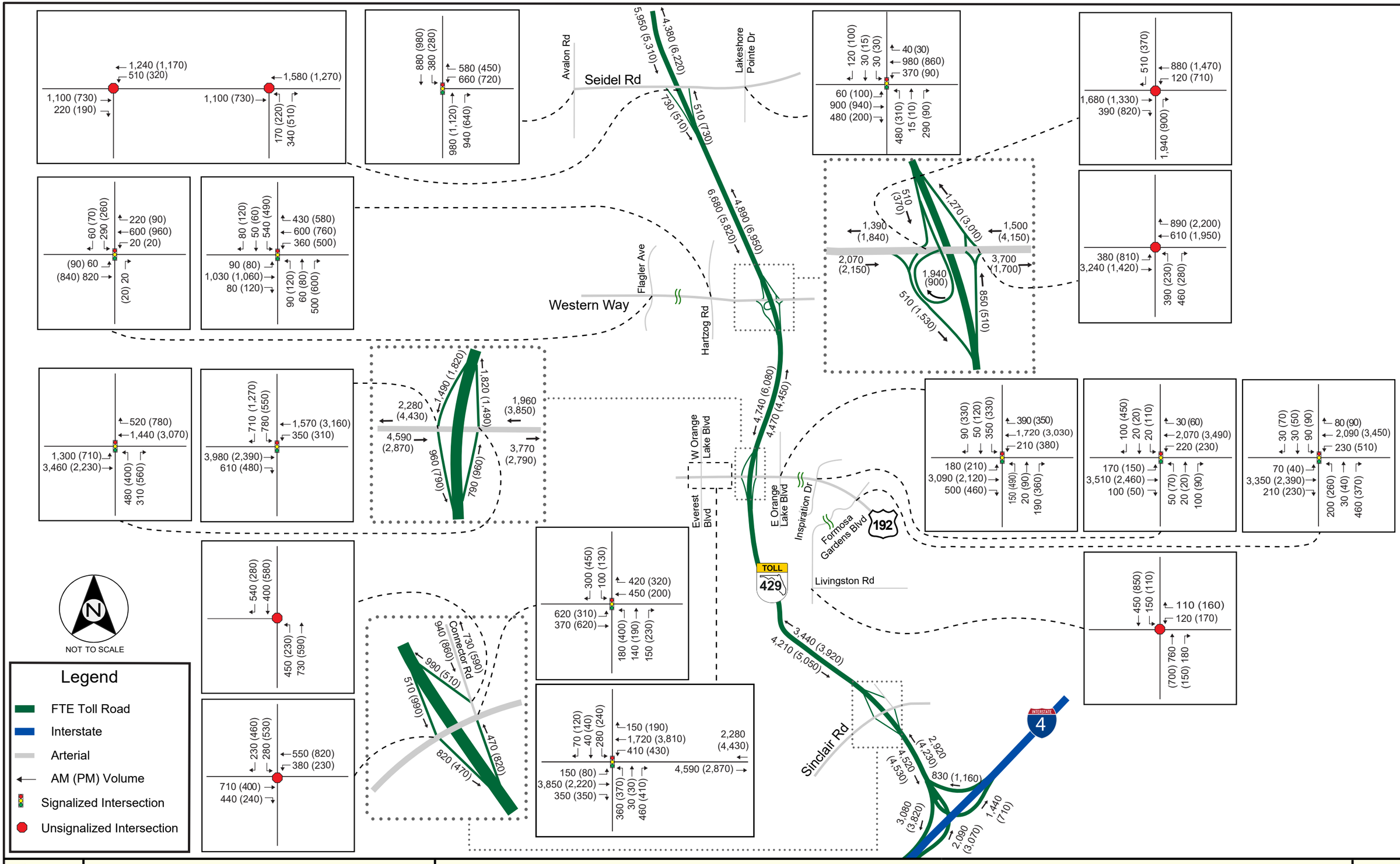


FLORIDA'S TURNPIKE	**Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road Systems Interchange Justification Report (SIJR)**	**2050 Build One-Way AADTs**	**Figure 5.4**



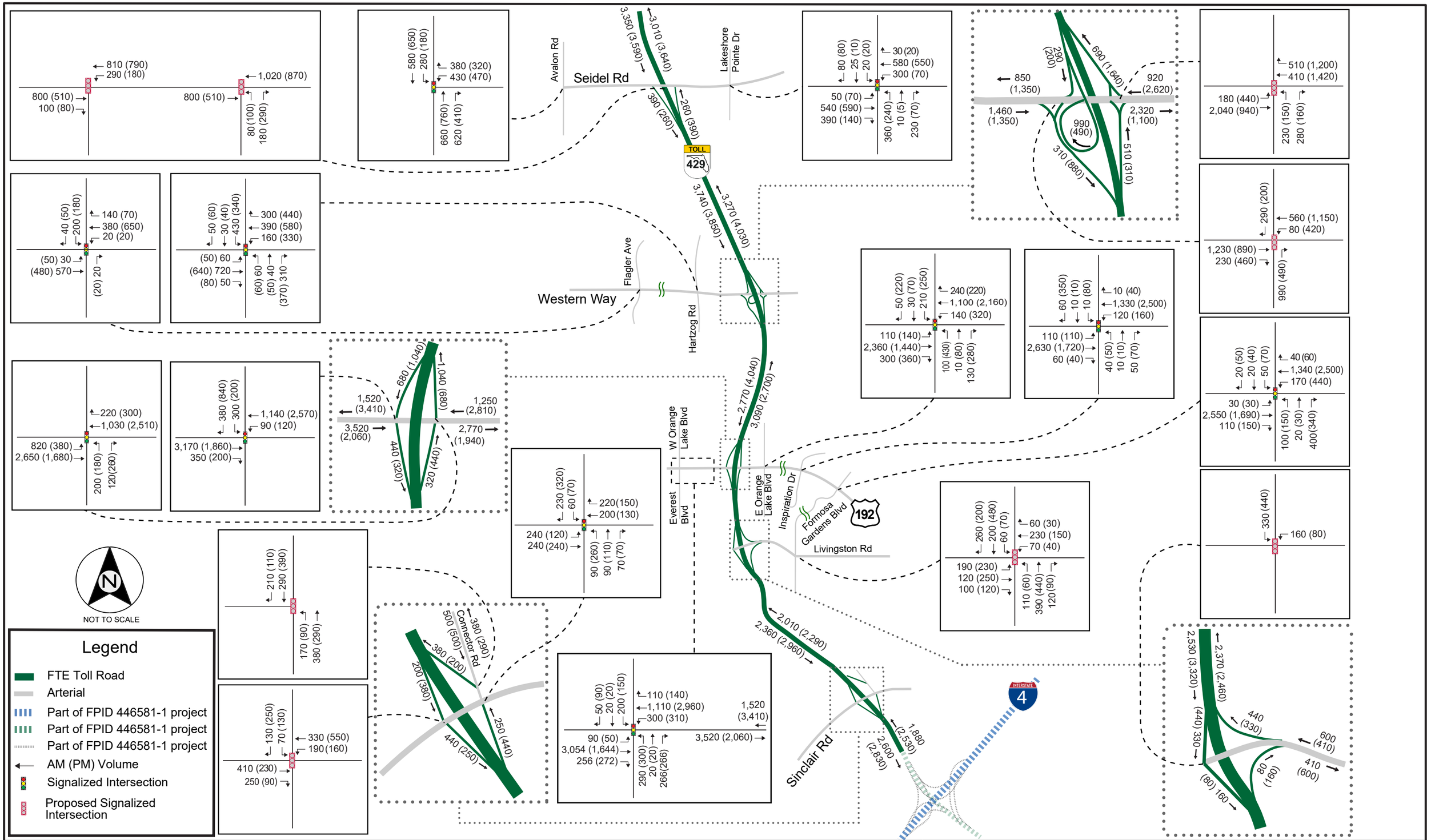
FLORIDA'S TURNPIKE	**Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road Systems Interchange Justification Report (SIJR)**	**2030 No-Build Design Hour Volumes**

Figure 5.5



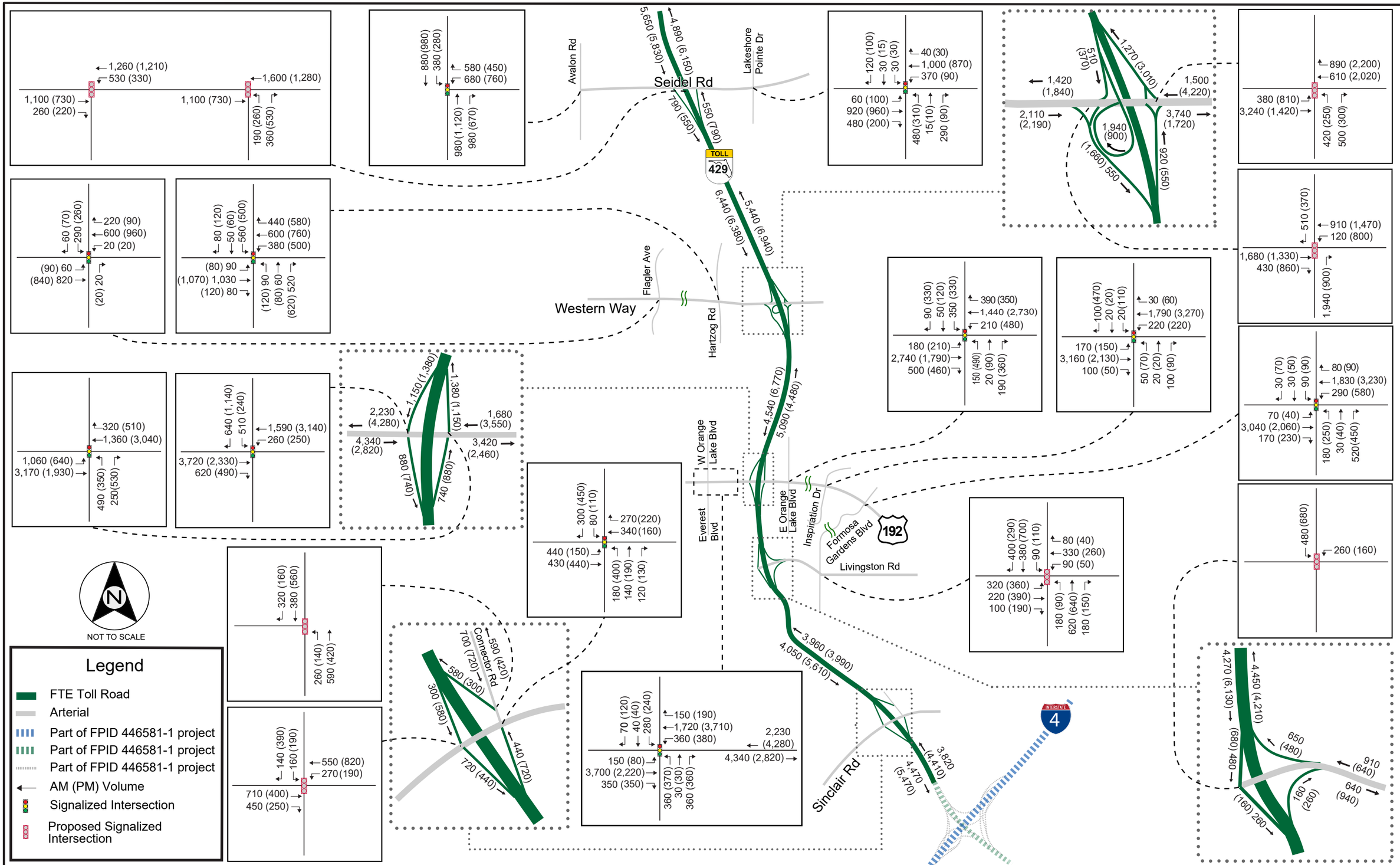
FLORIDA'S TURNPIKE	**Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road Systems Interchange Justification Report (SIJR)**	**2050 No-Build Design Hour Volumes**

Figure 5.6



FLORIDA'S TURNPIKE	**Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road Systems Interchange Justification Report (SIJR)**	**2030 Build Design Hour Volumes**

Figure 5.7



Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road
Systems Interchange Justification Report (SIJR)

2050 Build Design Hour Volumes

Figure 5.8

5.2 MAINLINE AND RAMPS LANE REQUIREMENTS

Future lane requirements were evaluated to provide an estimated timeline for the onset of capacity deficiencies along the freeway mainline and ramp roadways. Freeway mainline capacity evaluation was based on the 2020 FDOT Quality and LOS Handbook maximum service volumes. Capacity analysis for ramp roadways was based on capacity thresholds from the HCM 6th Edition. The FDOT and HCM 6th Edition thresholds were adjusted for local conditions. **Tables 5.9** and **5.10** show the detailed color-coded future lane requirements corresponding to LOS D (maximum service volume) for No-Build and Build conditions, respectively, for the freeway mainline. The two tables show ramp roadway lane requirements corresponding to for LOS E for capacity constrained roadway facilities. The Turnpike standard procedures use ramp capacity as the measure to identify needed additional ramp lanes. Ramp capacity, level of service of the ramp merge and diverge influence areas and intersection performance (which controls ramp flow) are used as the measures to identify needed improvements. The capacities were adjusted based on the SR 429 mainline having a truck parentage of seven percent.

The LOS D analysis (**Table 5.9**) shows that the SR 429 mainline will require three lanes of travel in each direction north of US 192 by 2030 under No-Build conditions. Four lanes of travel in each direction will be required on SR 429 between Western Way and Seidel Road by year 2040.

Table 5.9 shows that most of the ramp roadways within the study limits along SR 429 will require one lane through the design year 2050, except for the ramps to and from the north at I-4. The ramps to and from the north will need two lanes each by year 2030 and three lanes by 2040. The ramps to and from the north of Western Way will need two lanes each by year 2033. The ramps to and from north of US 192 also anticipated to reach over capacity of single lane and will require two lanes.

The LOS D analysis (**Table 5.10**) shows that the SR 429 mainline will require three lanes of travel in each direction north of US 192 by 2030 under Build conditions. Four lanes of travel in each direction will be required on SR 429 north of Livingston Road by year 2041.

Table 5.10 shows that most of the ramp roadways within the study limits along SR 429 will require one lane through the design year 2050, except for the ramps to and from the north and south at I-4. The ramps to and from the north at Western Way will need two lanes each by year 2033.

Table 5.9
SR 429 Freeway Mainline (LOS D) and Ramp Capacity (LOS E) Lane Requirements (No-Build)

DDHV - Worst Case AM or PM Design Hour

Location	SR 429	Model	Interpolated																		Model
		2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
		3,810	**3,930**	**4,050**	**4,170**	**4,290**	**4,420**	**4,540**	**4,660**	**4,780**	**4,900**	**5,020**	**5,140**	**5,260**	**5,380**	**5,500**	**5,620**	**5,740**	**5,860**	**5,980**	**6,100**	**6,220**
11 - Seidel Road		370	390	410	420	440	460	480	500	510	530	550	570	590	600	620	640	660	680	690	710	730
		4,180	**4,320**	**4,460**	**4,600**	**4,740**	**4,880**	**5,010**	**5,150**	**5,290**	**5,430**	**5,570**	**5,710**	**5,850**	**5,980**	**6,120**	**6,260**	**6,400**	**6,540**	**6,670**	**6,810**	**6,950**
8 - Disney World/Hartzog Road (Western Way)		1,640	1,710	1,780	1,860	1,920	1,990	2,050	2,120	2,190	2,260	2,330	2,400	2,470	2,530	2,600	2,670	2,740	2,810	2,870	2,940	3,010
		830	870	900	940	970	1,010	1,040	1,080	1,110	1,150	1,180	1,220	1,250	1,290	1,320	1,360	1,390	1,430	1,460	1,500	1,530
7 - Toll Plaza		**3,880**	**3,990**	**4,100**	**4,210**	**4,320**	**4,430**	**4,540**	**4,650**	**4,760**	**4,870**	**4,980**	**5,090**	**5,200**	**5,310**	**5,420**	**5,530**	**5,640**	**5,750**	**5,860**	**5,970**	**6,080**
6 - US 192		1,320	1,350	1,370	1,400	1,420	1,450	1,470	1,500	1,520	1,550	1,570	1,600	1,620	1,650	1,670	1,700	1,720	1,750	1,770	1,800	1,820
		480	500	530	550	580	600	620	650	670	700	720	740	770	790	820	840	860	890	910	940	960
		2,920	**3,030**	**3,130**	**3,240**	**3,350**	**3,460**	**3,560**	**3,670**	**3,780**	**3,880**	**3,990**	**4,100**	**4,200**	**4,310**	**4,410**	**4,520**	**4,630**	**4,730**	**4,840**	**4,940**	**5,050**
1 - Sinclair Road		600	620	640	660	680	700	720	740	760	780	800	820	840	860	880	900	910	930	950	970	990
		540	550	570	580	600	610	620	640	650	670	680	690	710	720	740	750	760	780	790	810	820
		2,890	**2,970**	**3,050**	**3,130**	**3,210**	**3,300**	**3,380**	**3,460**	**3,540**	**3,620**	**3,700**	**3,780**	**3,870**	**3,950**	**4,030**	**4,120**	**4,200**	**4,280**	**4,360**	**4,450**	**4,530**
0 - I-4		2,890	2,970	3,050	3,140	3,220	3,300	3,380	3,460	3,550	3,630	3,710	3,790	3,870	3,960	4,040	4,120	4,200	4,280	4,370	4,450	4,530
	Poinciana Parkway																					

Assumptions	
Truck % (t_f)	7.0%
Free Flow Speed (mph)	75
Peak Hour Factor (PHF)	0.95

Freeway LOS Targets	
Lanes	LOS D
2	3,640
3	5,460
4	7,280
5	9,100
6	10,920

Ramp Capacity	
Lanes	LOS E
1	1,850
2	3,700
3	5,550

Speed - 40 to 50 MPH

Table 5.10
SR 429 Freeway Mainline (LOS D) and Ramp Capacity (LOS E) Lane Requirements (Build)

DDHV - Worst Case AM or PM Design Hour

Location	SR 429	Model	Interpolated																		Model
		2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
		3,640	3,770	3,890	4,020	4,140	4,270	4,400	4,520	4,650	4,770	4,900	5,030	5,150	5,280	5,400	5,530	5,650	5,780	5,900	6,030	6,150
11 - Seidel Road																						
		390	410	430	450	470	490	510	530	550	570	590	610	630	650	670	690	710	730	750	770	790
		4,030	4,180	4,320	4,470	4,610	4,760	4,910	5,050	5,200	5,340	5,490	5,640	5,780	5,930	6,070	6,220	6,360	6,510	6,650	6,800	6,940
8 - Disney World/Hartzog		1,640	1,710	1,780	1,860	1,920	1,990	2,050	2,120	2,190	2,260	2,330	2,400	2,470	2,530	2,600	2,670	2,740	2,810	2,870	2,940	3,010
Road (Western Way)		880	920	960	1,000	1,040	1,080	1,110	1,150	1,190	1,230	1,270	1,310	1,350	1,390	1,430	1,470	1,500	1,540	1,580	1,620	1,660
7 - Toll Plaza		4,040	4,180	4,310	4,450	4,590	4,730	4,860	5,000	5,140	5,270	5,410	5,550	5,680	5,820	5,950	6,090	6,230	6,360	6,500	6,630	6,770
6 - US 192		1,040	1,060	1,070	1,090	1,110	1,130	1,140	1,160	1,180	1,190	1,210	1,230	1,240	1,260	1,280	1,300	1,310	1,330	1,350	1,360	1,380
		440	460	480	510	530	550	570	590	620	640	660	680	700	730	750	770	790	810	840	860	880
		3,320	3,530	3,740	3,950	4,160	4,370	4,570	4,780	4,990	5,200	5,410	5,480	5,550	5,630	5,700	5,770	5,840	5,910	5,990	6,060	6,130
4 - Livingston Road		440	450	460	480	490	500	510	520	540	550	560	570	580	600	610	620	630	640	660	670	680
		160	170	170	180	180	190	190	200	200	210	210	220	220	230	230	240	240	250	250	260	260
		2,960	3,140	3,310	3,490	3,670	3,850	4,020	4,200	4,380	4,550	4,730	4,820	4,910	4,990	5,080	5,170	5,260	5,350	5,430	5,520	5,610
1 - Sinclair Road		380	390	400	410	420	430	440	450	460	470	480	490	500	510	520	530	540	550	560	570	580
		440	450	470	480	500	510	520	540	550	570	580	590	610	620	640	650	660	680	690	710	720
		2,830	3,010	3,180	3,360	3,540	3,720	3,890	4,070	4,250	4,420	4,600	4,690	4,770	4,860	4,950	5,040	5,120	5,210	5,300	5,380	5,470
0 - I-4		2,350	2,440	2,540	2,630	2,730	2,820	2,910	3,010	3,100	3,200	3,290	3,380	3,480	3,570	3,670	3,760	3,850	3,950	4,040	4,140	4,230
		1,380	1,410	1,440	1,470	1,500	1,530	1,560	1,590	1,620	1,650	1,680	1,710	1,740	1,770	1,800	1,840	1,860	1,890	1,920	1,960	1,980
	Poinciana Parkway	1,860	1,970	2,090	2,200	2,310	2,430	2,540	2,650	2,760	2,880	2,990	3,010	3,040	3,060	3,080	3,110	3,130	3,150	3,170	3,200	3,220

Assumptions	
Truck % (tr)	7.0%
Free Flow Speed (mph)	75
Peak Hour Factor (PHF)	0.95

Freeway LOS Targets	
Lanes	LOS D
2	3,640
3	5,460
4	7,280
5	9,100
6	10,920

Ramp Capacity	
Lanes	LOS E
1	1,850
2	3,700
3	5,550

Speed - 40 to 50 MPH

The Build Alternative improvements are described in this section as well as future traffic operational analysis and safety assessment.

6.1 ANALYSIS ALTERNATIVE

Transportation System Management and Operations (TSM&O) measures have been implemented at the southbound off-ramp to US 192. The TSM&O considerations included the following: geometry improvements at the ramp terminal and widening of the southbound off-ramp to two lanes. These TSM&O improvements are not expected to: satisfy the need for capacity improvement of SR 429, improve access to the surface streets, and alleviate traffic congestion within the interchanges. Therefore, this PD&E Study and accompanying SIJR did not consider a standalone TSM&O Alternative. However, planned and programmed improvements within the study area were considered in developing the traffic and interchange concepts. The Build Alternative considered improvements included in the No-Build Alternative (See Chapter 5.1.3) including the TSM&O and additional improvements that were made to enhance safety, address traffic needs, improve travel time reliability and provide long-term mobility for the study area. Note that the Southbound off-ramp improvements at US 192 are part of this PD&E study and have been advanced as the TSM&O alternative. The TSM&O improvements are within FTE's system and will be included in the work program.

A Draft Technical Memorandum to identify the Preferred Build Alternative was prepared for this PD&E Study. The development and selection of the Preferred Build Alternative are discussed in detail in the memorandum. A summary of the Preferred Build Alternative is provided in this SIJR. The concepts for the alternatives are provided in **Appendix F**.

6.1.1 SR 429 Mainline

There is only one Build Alternative for the mainline widening of SR 429 has been proposed from four lanes to eight lanes for the length of the project. An Auxiliary Lane will be provided between the US 192 and the new Livingston Road interchange on both directions.

6.1.2 I-4 and SR 429 System-to-System Interchange

Florida's Turnpike Enterprise (FTE) has conducted a PD&E study (FPID No. 446581-1) for the future Poinciana Parkway Extension Connector (SR 538), a planned roadway connecting the CFX planned Poinciana Parkway Extension from CR 532 to the existing interchange at I-4 at the southern terminus of SR 429. The Build Alternative does not include this system-to system interchange under this SIJR. This system-to-system interchange will be analyzed under the ongoing *Poinciana Parkway Extension Connector, Osceola County – Systems Interchange Modification Report (SIMR)* ongoing study.

6.1.3 Sinclair Road Interchange

The improvements at Sinclair Road include adding turn lanes at the on- and off-ramp terminal intersections, signalizing the southbound ramp terminal intersection, and replacing the existing toll plazas with electronic toll gantries. The Connector Road and SR 429 northbound on-ramp intersection will be signalized, along with adding a northbound left turn lane and a southbound right turn lane. The intersection will include a signal bypass lane to allow the northbound through movement to flow freely.

6.1.4 SR 429 Reliever Interchange

The Livingston Road interchange is a proposed new interchange with an extension of Livingston Road. The proposed interchange would relieve the US 192 interchange, approximately 1.5 miles north, as well as provide more access to SR 429 for the project area.

The extension of Livingston Road would require improvements at the intersection with Formosa Gardens Boulevard. The improvements include signalizing the intersection along with adding turn lanes, and crosswalks. The section of Formosa Gardens Boulevard from north of Livingston Road to just south of Funie Steed Road would be widened to four lanes. No pedestrian or bicycle improvements are proposed on the extension of Livingston Road as it serves a connection to a limited-access facility. The Preferred Alternative is a T-Ramp interchange configuration compared to a partial cloverleaf.

6.1.5 US 192 Interchange

The improvements at the US 192 interchange include realigning ramps to accommodate the addition of turn lanes at the ramp terminal intersections, the addition of turn lanes on East Orange Lake Boulevard, replacing the existing toll plazas with electronic gantries, the addition of one through lane in each direction on US 192 within the vicinity of the interchange, and the addition of pedestrian and bicycle improvements along US 192. Currently, US 192 lacks pedestrian and bicycle facilities within the vicinity of the SR 429 interchange. Proposed interchange improvements include adding sidewalks and 7-foot bike lanes in each direction along US 192 between West Orange Lake Blvd and East Orange Lane Boulevard. Pedestrian crossings will be provided at all signalized intersections within the project area along US 192.

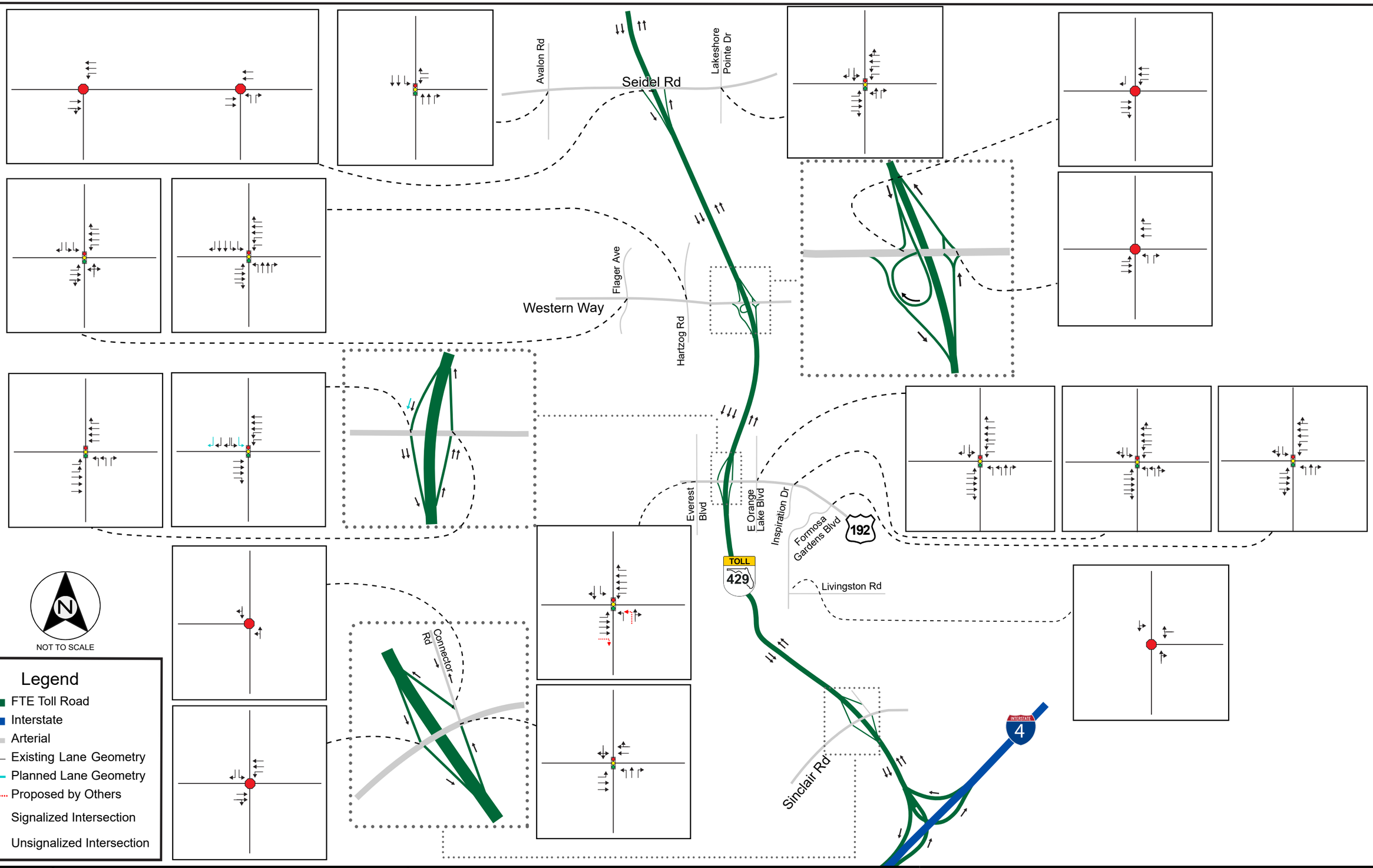
6.1.6 Western Way Interchange

The Western Way interchange improvements include signalizing the ramp terminal intersections along with adding turn lanes at the intersections, widening the loop ramp to two lanes, and providing an additional through lane in each direction on Western Way.

6.1.7 Seidel Road Interchange

At the Seidel Road interchange, the improvements include signalizing and add additional turn lanes at the ramp terminal intersections and replacing the existing toll plazas with electronic toll gantries. An additional westbound left turn lane has been proposed at the Avalon Road and Seidel Road intersection.

Documentation of the selection criteria is provided in the Preferred Build Alternative memorandum. This SIJR only documents traffic and safety analysis for the No-Build and the Preferred Build (also referred to Build herein) Alternatives. The results are provided for the 2030 opening and 2050 design years. The No-Build and Preferred Build Alternative Lane configurations are comprehensively depicted on **Figures 6.1** and **6.2**, respectively.

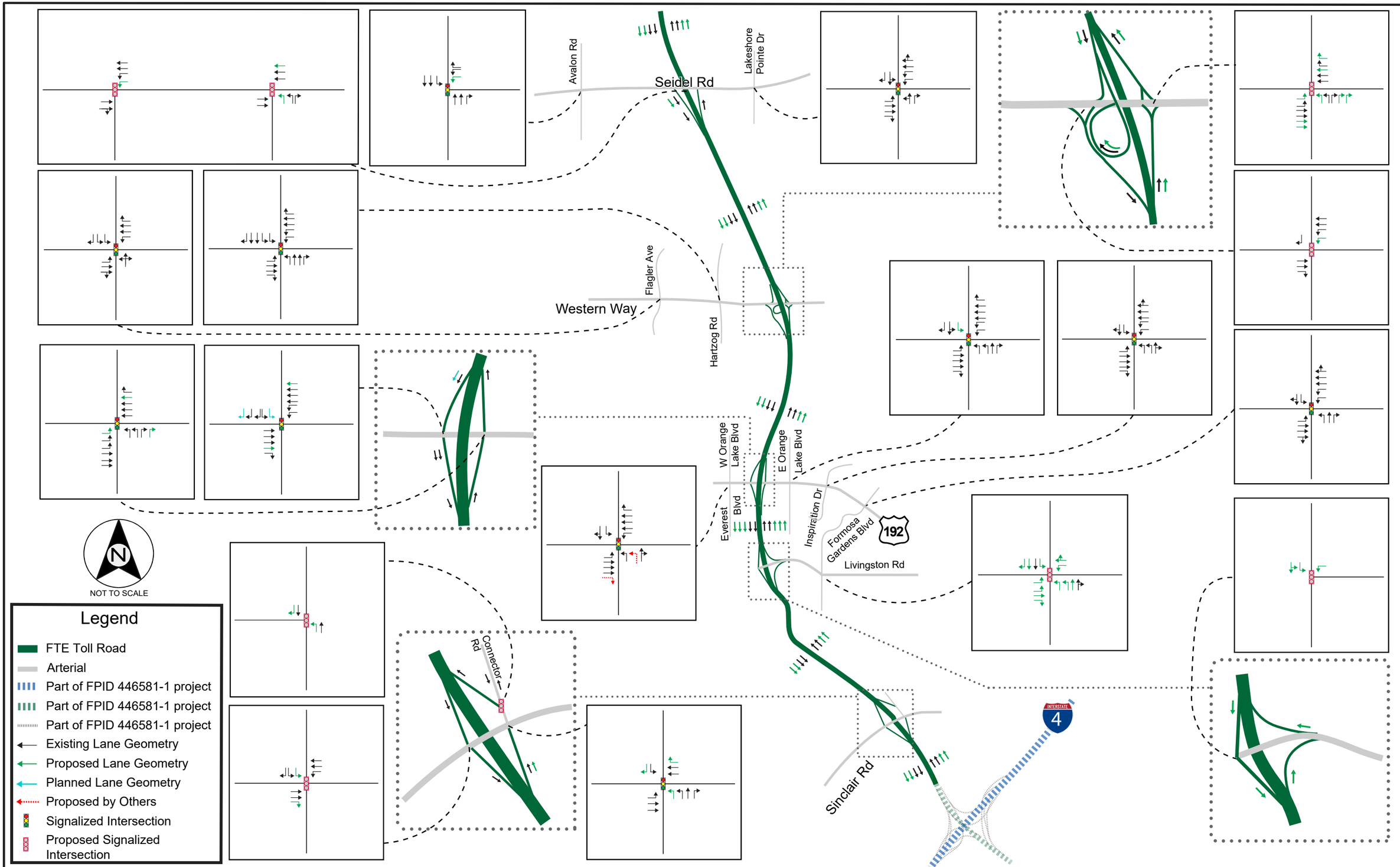


FLORIDA'S TURNPIKE

Western Beltway (SR 429) Widening PD&E Study
from I-4 to Seidel Road
Systems Interchange Justification Report (SIJR)

No-Build/TSM&O Lane Geometry

Figure 6.1



FLORIDA'S TURNPIKE

Western Beltway (SR 429) Widening PD&E Study from I-4 to Seidel Road
Systems Interchange Justification Report (SIJR)

Build Lane Geometry

Figure 6.2

6.2 FUTURE OPERATIONAL PERFORMANCE

This section provides a summary of traffic performance results for future conditions. Detailed output reports are provided in **Appendix G**.

6.2.1 Freeway Segment Analysis

The future traffic volumes were evaluated in each direction for freeway segments: basic, weave, and merge/diverge influence areas. Weaving volumes were calculated utilizing the proportion of traffic from the off-ramp and freeway. Exiting traffic volume was calculated by applying the ratio to the entrance ramp volume and freeway volume. HCS analysis results for SR 429 freeway segments for opening year 2030 are summarized in **Tables 6.1** and **6.2** for the No-Build and Build Alternatives, respectively. Note that the Build Alternative does not include the I-4 and SR 429 system-to system interchange under this SIJR. The proposed system-to-system interchange will be analyzed under the ongoing Poinciana Parkway Extension Connector, Osceola County SIMR ongoing study. Most of the SR 429 freeway segments within the study area are expected to operate at LOS E or better under the No-Build Alternative in the opening year 2030. No capacity constraints were identified along SR 429 under 2030 Build conditions.

The design year (2050) HCS output is summarized in **Tables 6.3** and **6.4** for the No-Build and Build Alternatives, respectively. Most of the freeway segments along SR 429 are expected to operate over capacity under the No-Build Alternative, which indicates that the SR 429 mainline needs to be widened to eight lanes. Under Build conditions, performance along SR 429 improved compared to No-Build conditions. Following are the key points for traffic operation improvements under Build (LOS D or better) compared to No-Build (LOS F):

- SR 429 southbound upstream of Seidel Road on-ramp basic segment
- SR 429 southbound Seidel Road on-ramp to Western Way off-ramp merge, basic and diverge segments
- SR 429 southbound Western Way off-ramp to on-ramp basic segment
- SR 429 southbound US 192 off-ramp to on-ramp basic segment
- SR 429 southbound US 192 on-ramp to Sinclair Road off-ramp basic segment
- SR 429 southbound Sinclair Road on-ramp to I-4 off-ramp weaving segment
- SR 429 northbound I-4 on-ramp to Sinclair Road off-ramp weaving segment
- SR 429 northbound US 192 on-ramp to Western Way off-ramp basic segment
- SR 429 northbound US 192 on-ramp to Western Way off-ramp diverge segment
- SR 429 northbound Western Way off-ramp to on-ramp basic segment
- SR 429 northbound Western Way on-ramp to Seidel Road off-ramp basic segment
- SR 429 northbound downstream of Seidel Road off-ramp basic segment

Table 6.1
2030 No-Build Peak Hour Freeway Mainline Segment Operations

Segment	Segment Type	Lanes	Volume (vph)		LOS/Density	
			AM	PM	AM	PM
SR 429 Southbound						
Upstream of Seidel Road on-ramp	Basic	2	3,800	3,490	**E/35.9**	D/30.8
Seidel Road on-ramp to Western Way off-ramp	Merge	2	4,170	3,740	**E/38.1**	D/34.4
Seidel Road on-ramp to Western Way off-ramp	Basic	2	4,170	3,740	**E/43.7**	D/34.9
Seidel Road on-ramp to Western Way off-ramp	Diverge	2	4,170	3,740	**E/41.4**	**E/37.2**
Western Way off-ramp to on-ramp	Basic	2	2,890	3,050	C/23.3	C/25.1
Western Way on-ramp to US 192 off-ramp	Merge	2	3,110	3,880	B/15.8	C/20.3
Western Way on-ramp to US 192 off-ramp	Basic	3	3,110	3,880	B/15.8	C/20.3
Western Way on-ramp to US 192 off-ramp	Diverge	2	3,110	3,880	A/09.2	B/14.7
US 192 off-ramp to on-ramp	Basic	2	2,190	2,560	B/16.8	C/20.0
US 192 on-ramp to Sinclair Road off-ramp	Merge	2	2,670	2,920	B/19.3	C/21.6
US 192 on-ramp to Sinclair Road off-ramp	Basic	2	2,670	2,920	C/21.1	C/23.6
US 192 on-ramp to Sinclair Road off-ramp	Diverge	2	2,670	2,920	C/27.9	D/30.4
Sinclair Road off-ramp to on-ramp	Basic	2	2,350	2,320	C/18.1	B/17.8
Sinclair Road on-ramp to I-4 off-ramp	Merge	2	2,890	2,580	D/28.6	C/26.1
Sinclair Road on-ramp to I-4 off-ramp	Basic	2	2,890	2,580	C/23.3	C/20.2
Sinclair Road on-ramp to I-4 off-ramp	Major Diverge	2	2,890	2,580	C/27.4	C/24.4
Additional Weaving Analysis between Sinclair Road on-ramp and I-4 off-ramp	Weaving	2	2,890	2,580	C/25.6	C/22.7
SR 429 Northbound						
Additional Weaving Analysis between I-4 on-ramp and Sinclair Road off-ramp	Weaving	2	1,330	2,540	B/11.2	C/22.2
I-4 on-ramp to Sinclair Road off-ramp	Major Merge	2	1,330	2,540	U/C	U/C
I-4 on-ramp to Sinclair Road off-ramp	Basic	2	1,330	2,540	A/10.1	C/19.8
I-4 on-ramp to Sinclair Road off-ramp	Diverge	2	1,330	2,540	B/15.2	C/27.0
Sinclair Road off-ramp to on-ramp	Basic	2	1,070	2,000	A/08.1	B/15.2
Sinclair Road on-ramp to US 192 off-ramp	Merge	2	1,670	2,320	B/15.5	C/21.4
Sinclair Road on-ramp to US 192 off-ramp	Basic	2	1,670	2,320	B/12.7	B/17.8
Sinclair Road on-ramp to US 192 off-ramp	Diverge	2	1,670	2,320	B/18.2	C/24.5
US 192 off-ramp to on-ramp	Basic	2	1,310	1,840	A/09.9	B/14.0
US 192 on-ramp to Western Way off-ramp	Merge	2	2,630	2,760	B/18.6	B/19.9
US 192 on-ramp to Western Way off-ramp	Basic	2	2,630	2,760	C/20.6	C/21.9
US 192 on-ramp to Western Way off-ramp	Diverge	2	2,630	2,760	C/27.4	D/28.6
Western Way off-ramp to on-ramp	Basic	2	2,150	2,460	B/16.4	C/19.1
Western Way on-ramp to Seidel Road off-ramp	Merge	2	2,840	4,100	C/27.3	**E/37.9**
Western Way on-ramp to Seidel Road off-ramp	Basic	2	2,840	4,100	C/22.8	**E/42.0**
Western Way on-ramp to Seidel Road off-ramp	Diverge	2	2,840	4,100	D/28.8	**E/41.0**
Downstream of Seidel Road off-ramp	Basic	2	2,590	3,730	C/20.3	D/34.7

Density –passenger cars/mile/lane
The results are based on the HCS 7.9
Truck = 7%; U/C stands for Under Capacity; NB on-ramp is connected to SR 429 from Sinclair Rd by a Connector Rd.
LOS E LOS F

Table 6.2
2030 Build Peak Hour Freeway Mainline Segment Operations

Segment	Segment Type	Lanes	Volume (vph)		LOS/Density	
			AM	PM	AM	PM
SR 429 Southbound						
Upstream of Seidel Road on-ramp	Basic	4	3,350	3,590	B/12.7	B/13.6
Seidel Road on-ramp to Western Way off-ramp	Merge	4	3,740	3,850	B/11.1	B/10.9
Seidel Road on-ramp to Western Way off-ramp	Basic	4	3,740	3,850	B/14.2	B/14.6
Seidel Road on-ramp to Western Way off-ramp	Diverge	4	3,740	3,850	A/09.3	A/05.7
Western Way off-ramp to on-ramp	Basic	4	2,460	3,160	A/09.3	B/12.0
Western Way on-ramp to US 192 off-ramp	Merge	4	2,770	4,040	B/10.9	B/17.7
Western Way on-ramp to US 192 off-ramp	Basic	4	2,770	4,040	A/10.5	B/15.4
Western Way on-ramp to US 192 off-ramp	Diverge	4	2,770	4,040	A/02.6	A/08.4
US 192 off-ramp to on-ramp	Basic	4	2,090	3000	A/07.9	B/11.4
US 192 on-ramp to Livingston Road off-ramp	Merge	5	2,530	3,320	A/07.7	A/10.1
US 192 on-ramp to Livingston Road off-ramp	Basic	5	2,530	3,320	A/08.1	A/10.6
US 192 on-ramp to Livingston Road off-ramp	Diverge	5	2,530	3,320	A/07.8	A/10.2
Livingston Road off-ramp to on-ramp	Basic	4	2,200	2,880	A/08.5	B/11.1
Livingston Road on-ramp to Sinclair Road off-ramp	Merge	4	2,360	2,960	B/10.5	A/09.7
Livingston Road on-ramp to Sinclair Road off-ramp	Basic	4	2,360	2,960	A/08.9	B/11.2
Livingston Road on-ramp to Sinclair Road off-ramp	Diverge	4	2,360	2,960	A/09.0	B/12.5
Sinclair Road off-ramp to on-ramp	Basic	4	2,160	2,580	A/08.2	A/09.8
Sinclair Road on-ramp to I-4 off-ramp	Merge	4	2,600	2,830	B/10.1	B/10.9
Sinclair Road on-ramp to I-4 off-ramp	Basic	4	2,600	2,830	A/09.9	A/10.7
SR 429 Northbound						
I-4 on-ramp to Sinclair Road off-ramp	Basic	4	1,880	2,530	A/07.1	A/09.6
I-4 on-ramp to Sinclair Road off-ramp	Diverge	4	1,880	2,530	A/00.0	A/00.5
Sinclair Road off-ramp to on-ramp	Basic	4	1,630	2,090	A/06.2	A/07.9
Sinclair Road on-ramp to Livingston Road off-ramp	Merge	4	2,010	2,290	A/07.4	A/08.4
Sinclair Road on-ramp to Livingston Road off-ramp	Basic	4	2,010	2,290	A/07.6	A/08.7
Sinclair Road on-ramp to Livingston Road off-ramp	Diverge	4	2,010	2,290	A/06.3	A/08.0
Livingston Road off-ramp to on-ramp	Basic	4	1,930	2,130	A/07.7	A/08.5
Livingston Road on-ramp to US 192 off-ramp	Merge	4	2,370	2,460	A/07.3	A/07.5
Livingston Road on-ramp to US 192 off-ramp	Basic	4	2,370	2,460	B/07.6	A/07.8
Livingston Road on-ramp to US 192 off-ramp	Diverge	4	2,370	2,460	A/07.3	A/07.5
US 192 off-ramp to on-ramp	Basic	4	2,050	2,020	A/07.8	A/07.7
US 192 on-ramp to Western Way off-ramp	Merge	4	3,090	2,700	B/13.0	B/10.8
US 192 on-ramp to Western Way off-ramp	Basic	4	3,090	2,700	B/11.7	A/10.2
US 192 on-ramp to Western Way off-ramp	Diverge	4	3,090	2,700	A/02.7	A/01.2
Western Way off-ramp to on-ramp	Basic	4	2,580	2,390	A/09.8	A/09.1
Western Way on-ramp to Seidel Road off-ramp	Merge	4	3,270	4,030	B/10.9	B/18.1
Western Way on-ramp to Seidel Road off-ramp	Basic	4	3,270	4,030	B/12.4	B/15.3
Western Way on-ramp to Seidel Road off-ramp	Diverge	4	3,270	4,030	A/06.0	A/09.9
Downstream of Seidel Road off-ramp	Basic	4	3,010	3,640	B/11.4	B/13.8

Density –passenger cars/mile/lane; the results are based on the HCS 7.9; Truck = 7%; NB on-ramp is connected to SR 429 from Sinclair Rd by a Connector Rd.

Table 6.3
2050 No-Build Peak Hour Freeway Mainline Segment Operations

Segment	Segment Type	Lanes	Volume (vph)		LOS/Density	
			AM	PM	AM	PM
SR 429 Southbound						
Upstream of Seidel Road on-ramp	Basic	2	5,950	5,310	**F/80.1**	**F/72.5**
Seidel Road on-ramp to Western Way off-ramp	Merge	2	6,680	5,820	**E/35.8**	**E/35.9**
Seidel Road on-ramp to Western Way off-ramp	Basic	2	6,680	5,820	**E/38.4**	**F/38.4**
Seidel Road on-ramp to Western Way off-ramp	Diverge	2	6,680	5,820	**E/39.1**	**E/39.1**
Western Way off-ramp to on-ramp	Basic	2	4,230	4,550	B/11.2	**F/20.9**
Western Way on-ramp to US 192 off-ramp	Merge	2	4,740	6,080	A/10.8	C/24.0
Western Way on-ramp to US 192 off-ramp	Basic	3	4,740	6,080	A/10.1	C/22.3
Western Way on-ramp to US 192 off-ramp	Diverge	2	4,740	6,080	A/07.4	B/18.7
US 192 off-ramp to on-ramp	Basic	2	3,250	4,260	A/03.8	**F/18.3**
US 192 on-ramp to Sinclair Road off-ramp	Merge	2	4,210	5,050	A/08.5	C/23.5
US 192 on-ramp to Sinclair Road off-ramp	Basic	2	4,210	5,050	B/11.1	**F/26.4**
US 192 on-ramp to Sinclair Road off-ramp	Diverge	2	4,210	5,050	B/16.2	D/32.7
Sinclair Road off-ramp to on-ramp	Basic	2	3,700	4,060	A/07.2	B/16.6
Sinclair Road on-ramp to I-4 off-ramp	Merge	2	4,520	4,530	B/18.7	C/26.5
Sinclair Road on-ramp to I-4 off-ramp	Basic	2	4,520	4,530	B/13.4	**F/20.7**
Sinclair Road on-ramp to I-4 off-ramp	Major Diverge	2	4,520	4,530	**F/>35**	**F/>35**
Additional Weaving Analysis between Sinclair Road on-ramp and I-4 off-ramp	Weaving	2	4,520	4,530	**F/>43**	**F/>43**
SR 429 Northbound						
Additional Weaving Analysis between I-4 on-ramp and Sinclair Road off-ramp	Weaving	2	2,920	4,230	C/25.8	**F/>43**
I-4 on-ramp to Sinclair Road off-ramp	Major Merge	2	2,920	4,230	U/C	**O/C**
I-4 on-ramp to Sinclair Road off-ramp	Basic	2	2,920	4,230	C/23.6	**F/45.0**
I-4 on-ramp to Sinclair Road off-ramp	Diverge	2	2,920	4,230	D/30.6	**E/43.2**
Sinclair Road off-ramp to on-ramp	Basic	2	2,450	3,410	C/19.0	D/29.5
Sinclair Road on-ramp to US 192 off-ramp	Merge	2	3,440	3,920	D/30.9	**E/35.2**
Sinclair Road on-ramp to US 192 off-ramp	Basic	2	3,440	3,920	D/30.1	**E/38.0**
Sinclair Road on-ramp to US 192 off-ramp	Diverge	2	3,440	3,920	**E/35.3**	**E/39.9**
US 192 off-ramp to on-ramp	Basic	2	2,650	2,960	C/20.9	C/23.9
US 192 on-ramp to Western Way off-ramp	Merge	2	4,470	4,450	D/32.2	D/29.9
US 192 on-ramp to Western Way off-ramp	Basic	2	4,470	4,450	**F/45.5**	**F/47.7**
US 192 on-ramp to Western Way off-ramp	Diverge	2	4,470	4,450	**F/45.2**	**F/45.0**
Western Way off-ramp to on-ramp	Basic	2	3,620	3,940	**F/66.4**	**F/74.5**
Western Way on-ramp to Seidel Road off-ramp	Merge	2	4,890	6,950	**E/36.6**	**E/35.7**
Western Way on-ramp to Seidel Road off-ramp	Basic	2	4,890	6,950	**F/38.4**	**F/38.4**
Western Way on-ramp to Seidel Road off-ramp	Diverge	2	4,890	6,950	**E/39.3**	**E/39.3**
Downstream of Seidel Road off-ramp	Basic	2	4,380	6,220	**F/29.8**	**F/26.9**

Density –passenger cars/mile/lane
The results are based on the HCS 7.9; Truck = 7%
U/C stands for Under Capacity; O/C stands for Over Capacity; NB on-ramp is connected to SR 429 from Sinclair Rd by a Connector Rd.
LOS E LOS F

Table 6.4
2050 Build Peak Hour Freeway Mainline Segment Operations

Segment	Segment Type	Lanes	Volume (vph)		LOS/Density	
			AM	PM	AM	PM
SR 429 Southbound						
Upstream of Seidel Road on-ramp	Basic	4	5,650	5,830	C/22.6	C/23.6
Seidel Road on-ramp to Western Way off-ramp	Merge	4	6,440	6,380	C/22.5	C/21.2
Seidel Road on-ramp to Western Way off-ramp	Basic	4	6,440	6,380	D/27.1	D/26.8
Seidel Road on-ramp to Western Way off-ramp	Diverge	4	6,440	6,380	C/24.5	B/15.9
Western Way off-ramp to on-ramp	Basic	4	3,990	5,110	B/15.2	C/19.9
Western Way on-ramp to US 192 off-ramp	Merge	4	4,540	6,770	B/17.8	D/30.9
Western Way on-ramp to US 192 off-ramp	Basic	4	4,540	6,770	B/17.4	D/29.3
Western Way on-ramp to US 192 off-ramp	Diverge	4	4,540	6,770	B/10.4	B/17.7
US 192 off-ramp to on-ramp	Basic	4	3,390	5,390	B/12.9	C/21.3
US 192 on-ramp to Livingston Road off-ramp	Merge	5	4,270	6,130	B/13.0	C/19.0
US 192 on-ramp to Livingston Road off-ramp	Basic	5	4,270	6,130	B/13.7	C/19.9
US 192 on-ramp to Livingston Road off-ramp	Diverge	5	4,270	6,130	B/13.1	C/19.3
Livingston Road off-ramp to on-ramp	Basic	4	3,790	5,450	B/14.6	C/22.0
Livingston Road on-ramp to Sinclair Road off-ramp	Merge	4	4,050	5,610	B/14.4	B/19.4
Livingston Road on-ramp to Sinclair Road off-ramp	Basic	4	4,050	5,610	B/15.4	C/22.4
Livingston Road on-ramp to Sinclair Road off-ramp	Diverge	4	4,050	5,610	B/16.7	C/24.8
Sinclair Road off-ramp to on-ramp	Basic	4	3,750	5,030	B/14.2	C/19.6
Sinclair Road on-ramp to I-4 off-ramp	Merge	4	4,470	5,470	B/16.6	B/18.8
Sinclair Road on-ramp to I-4 off-ramp	Basic	4	4,470	5,470	B/17.1	C/21.7
SR 429 Northbound						
I-4 on-ramp to Sinclair off-ramp	Basic	4	3,820	4,410	B/14.5	B/16.9
I-4 on-ramp to Sinclair off-ramp	Diverge	4	3,820	4,410	A/05.5	A/07.8
Sinclair Road off-ramp to on-ramp	Basic	4	3,380	3,690	B/12.8	B/14.0
Sinclair Road on-ramp to Livingston Road off-ramp	Merge	4	3,960	3,990	B/13.8	B/12.6
Sinclair Road on-ramp to Livingston Road off-ramp	Basic	4	3,960	3,990	B/15.0	B/15.2
Sinclair Road on-ramp to Livingston Road off-ramp	Diverge	4	3,960	3,990	B/15.0	B/15.7
Livingston Road off-ramp to on-ramp	Basic	4	3,800	3,730	B/15.2	B/14.9
Livingston Road on-ramp to US 192 off-ramp	Merge	4	4,450	4,210	B/13.6	B/12.9
Livingston Road on-ramp to US 192 off-ramp	Basic	4	4,450	4,210	C/14.2	B/13.4
Livingston Road on-ramp to US 192 off-ramp	Diverge	4	4,450	4,210	B/13.6	B/12.9
US 192 off-ramp to on-ramp	Basic	4	3,710	3,330	B/14.1	B/12.6
US 192 on-ramp to Western Way off-ramp	Merge	4	5,090	4,480	C/21.5	B/18.2
US 192 on-ramp to Western Way off-ramp	Basic	4	5,090	4,480	C/19.8	B/17.2
US 192 on-ramp to Western Way off-ramp	Diverge	4	5,090	4,480	B/10.5	A/08.1
Western Way off-ramp to on-ramp	Basic	4	4,170	3,930	B/15.9	B/14.9
Western Way on-ramp to Seidel Road off-ramp	Merge	4	5,440	6,940	C/21.3	D/34.8
Western Way on-ramp to Seidel Road off-ramp	Basic	4	5,440	6,940	C/21.5	D/30.5
Western Way on-ramp to Seidel Road off-ramp	Diverge	4	5,440	6,940	B/16.7	C/24.4
Downstream of Seidel Road off-ramp	Basic	4	4,890	6,150	C/18.9	C/25.4

Density –passenger cars/mile/lane; the results are based on the HCS 7.9; Truck = 7%; NB on-ramp is connected to SR 429 from Sinclair Rd by a Connector Rd.

6.2.2 Ramp Capacity Analysis

Tables 6.5 and **6.6** summarize the evaluation of ramp capacities for the No-Build and Build Alternatives for design year 2050, respectively. Volume to capacity ratios at Western Way ramps to/from the north has volume to capacity ratios greater than one. Opening Year 2030 under No-Build and Build Alternatives volume to capacity ratios anticipated to be below capacity. The results showed that the ramps within the study area under Build conditions are expected to operate under capacity by year 2050.

Table 6.5
2050 No-Build Peak Hour Ramp Roadway Capacity Analysis

Interchange	Ramp	Lanes	Volume (vph)		Capacity (vph)	V/C	
			AM	PM		AM	PM
Sinclair Road	Southbound off-ramp	1	510	990	1,850	0.28	0.54
	Northbound on-ramp	1	990	510	1,850	0.54	0.28
	Southbound on-ramp	1	820	470	1,850	0.44	0.25
	Northbound off-ramp	1	470	820	1,850	0.25	0.44
US 192	Southbound off-ramp*	2	1,490	1,820	3,640	0.41	0.50
	Northbound on-ramp	1	1,820	1,490	1,850	0.98	0.81
	Southbound on-ramp	1	960	790	1,850	0.52	0.43
	Northbound off-ramp	1	790	960	1,850	0.43	0.52
Western Way	Southbound off-ramp	1	2,450	1,270	1,850	**1.32**	0.69
	Northbound on-ramp	1	1,270	3,010	1,850	0.69	**1.63**
	Southbound on-ramp	1	510	1,530	1,850	0.28	0.83
	Northbound off-ramp	1	850	510	1,850	0.46	0.28
Seidel Road	Southbound on-ramp	1	730	510	1,850	0.39	0.28
	Northbound off-ramp	1	510	730	1,850	0.28	0.39

*TSM&O improvement; Highlighted: V/C ≥ 1.0

Table 6.6
2050 Build Peak Hour Ramp Roadway Capacity Analysis

Interchange	Ramp	Lanes	Volume (vph)		Capacity (vph)	V/C	
			AM	PM		AM	PM
Sinclair Road	Southbound off-ramp	1	300	580	1,850	0.16	0.31
	Northbound on-ramp	1	580	300	1,850	0.31	0.16
	Southbound on-ramp	1	720	440	1,850	0.39	0.24
	Northbound off-ramp	2	440	720	3,640	0.12	0.20
Livingston Road	Southbound off-ramp	1	480	680	1,850	0.26	0.37
	Northbound on-ramp	1	650	480	1,850	0.35	0.26
	Southbound on-ramp	1	260	160	1,850	0.14	0.09
	Northbound off-ramp	1	160	260	1,850	0.09	0.14
US 192	Southbound off-ramp	2	1,150	1,380	3,640	0.32	0.38
	Northbound on-ramp	1	1,380	1,150	1,850	0.75	0.62
	Southbound on-ramp	1	880	740	1,850	0.48	0.40
	Northbound off-ramp	1	740	880	1,850	0.40	0.48

Table 6.6 (continued)
2050 Build Peak Hour Ramp Roadway Capacity Analysis

Interchange	Ramp	Lanes	Volume (vph)		Capacity (vph)	V/C	
			AM	PM		AM	PM
Western Way	Southbound off-ramp	2	2,450	1,270	3,640	0.67	0.35
	Northbound on-ramp	2	1,270	3,010	3,640	0.35	0.83
	Southbound on-ramp	1	1,660	550	1,850	0.90	0.30
	Northbound off-ramp	2	920	550	3,640	0.25	0.15
Seidel Road	Southbound on-ramp	1	790	550	1,850	0.43	0.30
	Northbound off-ramp	1	550	790	1,850	0.30	0.43

6.2.3 Intersection Analysis

Synchro results for the No-Build and Build Alternatives are summarized in **Tables 6.7** through **6.10** for 2030 opening, and 2050 design years.

It is anticipated that most of the intersections within the AOI will be over capacity, particularly during the PM peak hour from opening to design years under the No-Build conditions. Key deficiencies of the No-Build Alternative include no direct ramps between US 192 and Sinclair Road, resulting in motorists using the US 192 and Sinclair Road surface streets. Congestion along Sinclair Road, US 192, Western Way, and Seidel Road are expected to propagate onto the freeway system. However, operations within the AOI are expected to be improved with the Build conditions. Note that the existing signal timing plans were obtained from FDOT and supporting documentation were included in Appendix C which shows the two cycle lengths (235 seconds and 250 seconds) along US 192 corridor. Based on the Everest Place Traffic Impact Analysis (June 2022), an exclusive eastbound right turn lane and an additional northbound left turn lane were assigned under No-Build condition. Although north and southbound approaches are operating as permitted signal phasing under existing condition, in future the signal timing needs to be updated to protected phasing due to dual northbound left turn lanes.

The inclusion of the new full reliever interchanges at Livingston Road and SR 429 improves the operations at US 192 and Sinclair Road by dispersing surface street demand. In addition, this interchange reduces the need for surface street improvements along US 192, which is a capacity constrained roadway facility. The modified or proposed new intersections are expected to operate at an acceptable LOS D or better by design year 2050 except both ramp terminals at Western Way during the PM peak hour. However, the delays at the ramp terminals are less than the No-Build conditions due to the proposed improvements. The list of modified and new intersections or interchanges include:

- Sinclair Road and SR 429 both ramp terminals (added a traffic signal at the southbound ramp terminal and provided capacity improvements)
- Connector Road and SR 429 northbound ramp terminal (added a traffic signal and provided capacity improvements)
- Livingston Road ramp terminal (added a new T-ramp interchange)

  Livingston Road and Formosa Gardens Boulevard intersection (added a traffic signal and provided capacity improvements)

- US 192 and West Orange Lake Boulevard intersection (a traffic reduction is expected due to new Livingston Road interchange rerouting traffic)
- US 192 and SR 429 southbound ramp terminal (provided capacity improvements)
- US 192 and SR 429 northbound ramp terminal (provided capacity improvements)
- US 192 and East Orange Lake Boulevard (provided capacity improvements)
- US 192 and Inspiration Drive a traffic reduction is expected due to new Livingston Road interchange rerouting traffic)
- Formosa Gardens Boulevard (a traffic reduction is expected due to new Livingston Road interchange rerouting traffic)
- Western Way and SR 429 both ramp terminals (added a traffic signal at both ramp terminals and provided capacity improvements)
- Seidel Road and Avalon Road (provided capacity improvements)
- Seidel Road and SR 429 both ramp terminals (added a traffic signal at both ramp terminals and provided

Overall, Synchro results estimate the Build Alternative will reduce total intersection control delay by 77 percent and 71 percent within the AOI during the 2050 design year AM and PM peak hours, respectively, when compared to the No- Build Alternative (See **Figure 6.3**).

However, due to the rerouting of traffic from the new interchange reliever and signal timing optimization, the following intersections showed approach delays higher than No-Build in design year 2050:

- US 192 at West Orange Lake Boulevard southbound approach (signal timing optimization).
- US 192 at northbound ramp terminal eastbound approach (signal timing optimization).
- US 192 at Inspiration Drive southbound approach (signal timing optimization).
- US 192 at Formosa Gardens Boulevard northbound and southbound approaches (rerouting of traffic).
- Western Way and Flamingo Crossing Boulevard northbound and southbound approaches (signal timing optimization).

The benefits of the Build alternative must be looked at from a global perspective due to the extensive nature of the improvements, as opposed to single isolated locations. Therefore, the inclusion of system ramps and a new full reliever interchange improves the overall delay at the study intersections by dispersing surface street traffic demand.

Figure 6.3
Intersections Cumulative Delay (minutes)

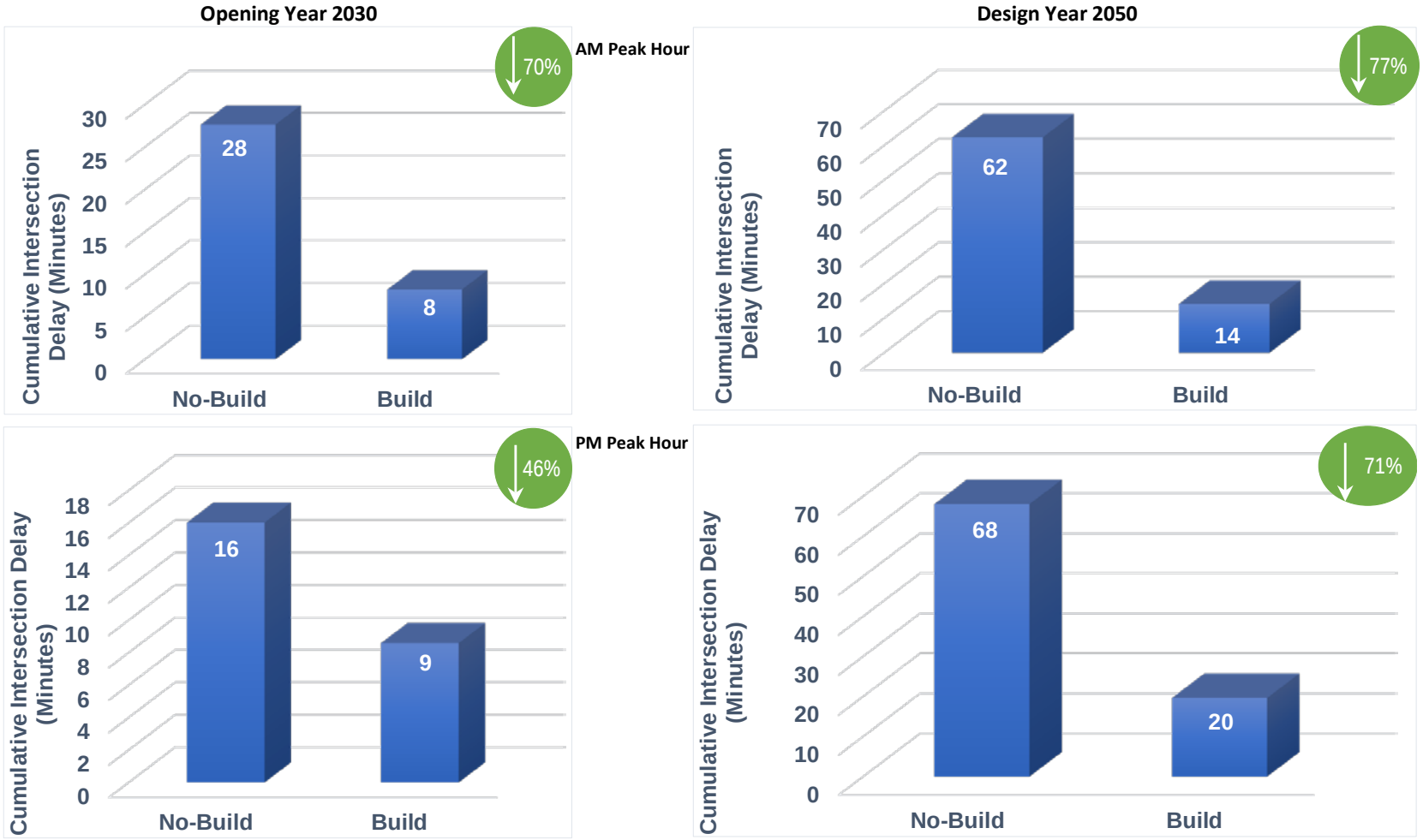


Table 6.7
2030 Peak Hour No-Build Intersection Level of Service/Delay

Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection
			Eastbound			Westbound			Northbound			Southbound			AM LOS (Delay)
			Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
*Sinclair Road & SR 429 Southbound	Volume			410	250	290	330					180		140	F (130.3)
	LOS (Delay)	Movement		A (0.0)		B (11.2)						F (130.3)		B (10.2)	
		Approach		A (0.0)			B (11.2)						F (130.3)		
	Queue Length 95th (ft)	Movement		*0*		50						225		25	
Sinclair Road & SR 429 Northbound	Volume		340	250			300	320	90	90	80	80		230	C (25.5)
	LOS (Delay)	Movement	D (45.7)	A (8.5)			A (4.5)		D (36.5)	C (31.3)	A (8.9)		E (58.2)		
		Approach		C (29.9)			A (4.5)			C (26.2)			E (58.2)		
	Queue Length 95th (ft)	Movement	318	52			64		110	110	42		#416		
*SR 429 Northbound Ramp & Connector Road	Volume								270	480			310	330	B (10.8)
	LOS (Delay)	Movement								B (10.8)			A (0.0)		
		Approach								B (10.8)			A (0.0)		
	Queue Length 95th (ft)	*Movement*								50			*0*		
US 192 & West Orange Lake Boulevard	Volume		90	3080	280	330	1160	110	290	20	370	200	20	50	F (99.8)
	LOS (Delay)	Movement	F (96.0)	F (93.9)	B (15.5)	F (141.9)	A (4.8)	A (0.3)	F (388.5)	F (114.0)	F (260.7)	F (150.5)	D (44.7)		
		Approach	F (87.6)			C (32.7)			F (310.9)			F (123.0)			
	Queue Length 95th (ft)	*Movement*	210	#2107	207	330	34	0	#470	71	#768	#530	106		
US 192 & SR 429 Southbound	Volume			3290	360	120	1160					480		440	D (52.5)
	LOS (Delay)	Movement		E (58.3)	A (0.0)	F (173.6)	A (7.5)					F (95.3)		F (90.7)	
		Approach		D (52.6)			C (23.0)						F (93.1)		
	Queue Length 95th (ft)	Movement		*m265*	*m0*	*129*	*148*					*459*		*353*	
US 192 & SR 429 Northbound	Volume		940	2830			1060	380	220		140				C (27.4)
	LOS (Delay)	Movement	E (59.5)	A (6.4)			D (35.7)	A (7.2)	F (117.3)		F (87.5)				
		Approach		B (19.6)			C (28.2)			F (105.7)					
	Queue Length 95th (ft)	*Movement*	m512	m258			468	114	*232*		*233*				
US 192 & East Orange Lake Boulevard	Volume		110	2560	300	140	1290	240	100	10	130	210	30	50	D (43.6)
	LOS (Delay)	Movement	F (83.5)	D (42.1)	A (9.1)	F (122.5)	C (31.0)	A (5.9)	F (125.7)	F (109.8)	C (26.6)		F (124.4)	A (0.8)	
		Approach		D (40.3)			D (35.1)			E (71.3)			F (103.0)		
	Queue Length 95th (ft)	Movement	m233	1333	93	#169	593	84	#131	45	80	0	494	0	
US 192 & Inspiration Drive	Volume		110	2830	60	120	1520	10	40	10	50	10	10	60	C (27.7)
	LOS (Delay)	Movement	F (87.9)	C (24.5)	A (0.7)	F (115.1)	B (18.3)		F (143.7)	D (44.9)		F (119.6)	D (45.8)		
		Approach		C (26.3)			C (25.3)			F (84.0)			E (55.4)		
	Queue Length 95th (ft)	Movement	*m176*	*924*	*m0*	*145*	*401*		*#65*	*79*		*45*	*81*		
US 192 & Formosa Gardens Boulevard	Volume		30	2750	110	150	1510	40	120	20	350	50	20	20	D (50.4)
	LOS (Delay)	Movement	F (111.7)	D (53.8)		F (129.4)	C (20.0)		F (90.2)	E (75.2)	F (99.9)	E (79.9)	D (45.5)		
		Approach		D (54.4)			C (29.7)			F (96.5)			E (64.7)		
	Queue Length 95th (ft)	Movement	*m66*	*1170*		*#180*	*530*		*256*	*59*	*#622*	*120*	*73*		
*Livingstone Road & Formosa Gardens Boulevard	Volume					100		150		420	20	70	330		D (31.4)
	LOS (Delay)	Movement					D (31.4)			A (0.0)		B (10.2)			
		Approach					D (31.4)			A (0.0)			B (10.2)		
	Queue Length 95th (ft)	Movement					*125*			*0*		*25*			
Western Way & Flager Avenue	Volume		30	570		20	380	140			20	200		40	B (18.6)
	LOS (Delay)	Movement	A (6.4)	B (10.3)		E (61.6)	B (15.3)	A (5.9)	A (0.6)			E (60.4)		A (0.1)	
		Approach		B (10.1)			B (14.5)			A (0.6)			D (50.4)		
	Queue Length 95th (ft)	Movement	*20*	*183*		*44*	*114*	*31*	*0*			*119*		*0*	
Western Way & Flamingo Crossing Boulevard	Volume		60	720	50	160	390	300	60	40	250	430	30	50	C (34.8)
	LOS (Delay)	Movement	E (75.1)	C (31.8)	A (0.6)	E (60.3)	C (24.0)	A (4.3)	E (65.8)	D (52.8)	C (20.2)	E (65.7)	D (43.3)	A (0.7)	
		Approach		C (33.1)			C (23.8)			C (31.8)			E (58.0)		
	Queue Length 95th (ft)	Movement	*101*	*354*	*3*	*100*	*171*	*63*	*92*	*33*	*80*	*#255*	*25*	*0*	
*Western Way & SR 429 Southbound	Volume			1230	170	50	560							290	B (14.0)
	LOS (Delay)	Movement		A (0.0)		B (12.5)								B (14.0)	
		Approach		A (0.0)			B (12.5)						B (14.0)		
	Queue Length 95th (ft)	Movement		*0*		*25*								*75*	
*Western Way & SR 429 Northbound	Volume		180	2040			390	510	220		260				F (>999)
	LOS (Delay)	Movement	A (8.8)				A (0.0)		F (>999)		F (197.2				
		Approach		A (8.8)			A (0.0)			F (>999)					
	Queue Length 95th (ft)	Movement	*25*				*0*		*750*		*375*				
Seidel Road & Avalon Road	Volume					420		380		660	600	280	580		C (27.5)
	LOS (Delay)	Movement				D (49.6)		A (6.8)		D (37.4)	A (6.3)	E (73.2)	B (13.6)		
		Approach					C (29.2)			C (22.6)			C (33.0)		
	Queue Length 95th (ft)	Movement				*m296*		*m72*		*340*	*103*	*#388*	*181*		
*Seidel Road & SR 429 Southbound	Volume			800	80	290	800								B (13.6)
	LOS (Delay)	Movement		A (0.0)		B (13.6)									
		Approach		A (0.0)			B (13.6)								
	Queue Length 95th (ft)	Movement		*0*		*75*									
*Seidel Road & SR 429 Northbound	Volume			800			1020		70		180				C (17.0)
	LOS (Delay)	Movement		A (0.0)			A (0.0)		C (24.1)		B (14.3)				
		Approach		A (0.0)			A (0.0)			C (17.0)					
	Queue Length 95th (ft)	Movement		*0*					*50*		*50*				
Seidel Road & Lakeshore Point Drive	Volume		50	540	390	300	580	30	360	10	230	20	25	80	C (33.5)
	LOS (Delay)	Movement	E (76.7)	C (29.2)	A (4.3)	E (62.2)	C (28.5)			E (67.9)	A (6.7)		E (66.3)	A (6.6)	
		Approach		C (21.7)			D (39.6)			D (44.5)			C (28.0)		
	Queue Length 95th (ft)	Movement	*m66*	*261*	*m97*	*177*	*284*			*#469*	*64*		*78*	*13*	

Synchro Version 11 Build 168; *Unsignalized intersection analyzed using HCS v7.9; N/A - queue not reported

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

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

Table 6.7 (Continued)

2030 Peak Hour No-Build Intersection Level of Service/Delay

Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection
			Eastbound			Westbound			Northbound			Southbound			PM LOS (Delay)
			Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
*Sinclair Road & SR 429 Southbound	Volume			230	80	180	550					340		260	F (279.5)
	LOS (Delay)	Movement		A (0.0)		A (8.5)						**F (279.5)**		B (13.4)	
		Approach		A (0.0)			A (8.5)						**F (279.5)**		
	Queue Length 95th (ft)	Movement		0		25						198		50	
Sinclair Road & SR 429 Northbound	Volume		170	400			150	230	260	110	170	90		320	C (21.0)
	LOS (Delay)	Movement	D (41.1)	C (24.7)			B (10.2)		B (14.5)	B (10.6)	A (2.5)		C (33.8)		
		Approach		C (29.6)			B (10.2)			A (9.9)			C (33.8)		
	Queue Length 95th (ft)	Movement	169	162			77		161	71	33		305		
*SR 429 Northbound Ramp & Connector Road	Volume								150	360			410	170	A (9.5)
	LOS (Delay)	Movement							A (9.5)				A (0.0)		
		Approach								A (9.5)			A (0.0)		
	Queue Length 95th (ft)	*Movement*							25				0		
US 192 & West Orange Lake Boulevard	Volume		50	1670	296	350	3010	140	300	20	330	150	20	90	**E (57.2)**
	LOS (Delay)	Movement	**F (155.5)**	D (36.3)	B (10.2)	**F (105.5)**	**E (56.4)**	A (7.3)	**F (117.7)**	**F (102.8)**	**E (71.1)**	**F (141.6)**	**E (58.4)**		
		Approach		D (35.4)			**E (59.4)**			**F (93.6)**			**F (106.3)**		
	Queue Length 95th (ft)	*Movement*	#172	736	157	m297	m1568	m38	307	69	#436	#373	#190		
US 192 & SR 429 Southbound	Volume			1930	220	140	2580					400		920	**F (80.2)**
	LOS (Delay)	Movement		D (36.2)	A (0.1)	**F (257.8)**	A (2.2)					**F (105.7)**		**F (372.9)**	
		Approach		C (32.5)			B (15.3)						**F (291.9)**		
	Queue Length 95th (ft)	Movement		*m920*	*m0*	*m#174*	*119*					*400*		*#1079*	
US 192 & SR 429 Northbound	Volume		440	1890			2520	480	200		280				**E (58.6)**
	LOS (Delay)	Movement	**F (93.7)**	A (9.5)			**F (88.7)**	A (7.2)	**F (90.7)**		**F (128.4)**				
		Approach		C (25.4)			**E (75.7)**			**F (112.7)**					
	Queue Length 95th (ft)	*Movement*	415	259			1504	m151	*205*		*#623*				
US 192 & East Orange Lake Boulevard	Volume		140	1670	360	320	2350	220	430	80	280	250	70	220	**F (85.3)**
	LOS (Delay)	Movement	**F (154.6)**	B (19.2)	A (3.7)	**F (168.0)**	**F (112.9)**	B (19.2)	**F (132.8)**	**F (95.7)**	**E (58.3)**		**F (234.1)**	D (48.1)	
		Approach		C (25.3)			**F (111.8)**			**F (102.7)**			**F (158.2)**		
	Queue Length 95th (ft)	Movement	m#406	m367	m33	#421	1424	181	#491	190	#341	0	#902	0	
US 192 & Inspiration Drive	Volume		110	1950	40	160	2690	40	50	10	70	80	10	350	D (50.9)
	LOS (Delay)	Movement	**F (138.2)**	C (29.0)	A (0.1)	**F (112.9)**	D (43.9)		**F (128.0)**	D (51.8)		**F (105.9)**	**F (150.8)**		
		Approach		C (34.2)			D (47.7)			**F (81.1)**			**F (142.6)**		
	Queue Length 95th (ft)	Movement	*#298*	*817*	*0*	*m178*	*1063*		*75*	*92*		*207*	*#776*		
US 192 & Formosa Gardens Boulevard	Volume		30	1900	170	420	2670	60	170	30	280	70	40	0	D (49.2)
	LOS (Delay)	Movement	**F (103.8)**	D (54.9)		**F (104.9)**	C (31.4)		**F (147.0)**	**F (84.6)**	B (11.3)	**F (92.7)**	**E (70.0)**		
		Approach		**E (55.6)**			D (41.2)			**E (64.0)**			**E (79.9)**		
	Queue Length 95th (ft)	Movement	*m#143*	*953*		*434*	*1302*		*392*	*82*	*99*	*165*	*168*		
*Livingstone Road & Formosa Gardens Boulevard	Volume					60		90		300	40	150	460		D (27.9)
	LOS (Delay)	Movement					D (27.9)			A (0.0)		A (9.8)			
		Approach					D (27.9)			A (0.0)			A (9.8)		
	Queue Length 95th (ft)	Movement					*75*			0		*25*			
Western Way & Flager Avenue	Volume		50	480		20	650	70			20	180		50	C (25.1)
	LOS (Delay)	Movement	A (6.3)	A (9.6)		D (51.8)	C (31.6)	B (11.5)	A (0.3)			**E (60.3)**		A (1.4)	
		Approach		A (9.3)			C (30.2)			A (0.3)			D (47.4)		
	Queue Length 95th (ft)	Movement	*28*	*150*		*m41*	*346*	*58*	*0*			*109*		*0*	
Western Way & Flamingo Crossing Boulevard	Volume		50	640	80	330	580	440	60	50	350	340	40	60	D (36.2)
	LOS (Delay)	Movement	**E (67.7)**	D (50.4)	A (1.9)	D (46.8)	C (29.7)	A (5.3)	**E (65.8)**	D (45.6)	C (31.5)	**E (58.2)**	D (37.2)	A (0.7)	
		Approach		D (46.5)			C (25.9)			D (37.5)			D (48.5)		
	Queue Length 95th (ft)	Movement	*78*	*#453*	*14*	*180*	*297*	*91*	*92*	*36*	*163*	*181*	*27*	*0*	
*Western Way & SR 429 Southbound	Volume			890	440	390	1150							200	C (20.4)
	LOS (Delay)	Movement		A (0.0)		C (16.2)								C (20.4)	
		Approach		A (0.0)			C (16.2)						C (20.4)		
	Queue Length 95th (ft)	Movement		0		*100*								*75*	
*Western Way & SR 429 Northbound	Volume		440	940			1400	1200	140		160				**F (78.4)**
	LOS (Delay)	Movement	**F (78.4)**				A (0.0)				C (15.2)				
		Approach		**F (78.4)**			A (0.0)			c (15.2)					
	Queue Length 95th (ft)	Movement	*350*				0				*50*				
Seidel Road & Avalon Road	Volume					450		320		760	400	180	650		C (29.1)
	LOS (Delay)	Movement				**E (56.4)**		A (8.4)		D (35.2)	A (5.0)	**E (74.4)**	B (15.6)		
		Approach					D (36.5)			C (24.8)			C (28.3)		
	Queue Length 95th (ft)	Movement				*498*		*36*		*393*	*78*	*#239*	*221*		
*Seidel Road & SR 429 Southbound	Volume			510	70	180	770								A (9.7)
	LOS (Delay)	Movement		A (0.0)		A (9.7)									
		Approach		A (0.0)			A (9.7)								
	Queue Length 95th (ft)	Movement		0		*25*									
*Seidel Road & SR 429 Northbound	Volume			510			870		80		290				B (14.3)
	LOS (Delay)	Movement		A (0.0)			A (0.0)		C (17.5)		B (13.4)				
		Approach		A (0.0)			A (0.0)			B (14.3)					
	Queue Length 95th (ft)	Movement		*0*					*25*		*75*				
Seidel Road & Lakeshore Point Drive	Volume		70	590	140	70	550	20	240	5	70	20	10	80	C (28.2)
	LOS (Delay)	Movement	**E (71.7)**	B (18.5)	A (3.5)	**E (62.2)**	C (23.5)			**E (64.7)**	A (1.0)		**E (64.8)**	A (7.3)	
		Approach		C (20.6)			C (27.7)			D (50.5)			C (23.1)		
	Queue Length 95th (ft)	Movement	*m108*	*211*	*m27*	*56*	*263*			*279*	*0*		*60*	*14*	

Synchro Version 11 Build 168; *Unsignalized intersection analyzed using HCS v7.9; N/A - queue not reported

LOS notes:

Delay is in sec/veh units

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

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

Queue notes:

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 6.8

2030 Peak Hour Build Intersection Level of Service/Delay

Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection
			Eastbound			Westbound			Northbound			Southbound			AM LOS (Delay)
			Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
Sinclair Road & SR 429 Southbound	Volume			410	250	190	330					70		130	B (10.1)
	LOS (Delay)	Movement		B (17.5)	A (4.8)	A (8.0)	A (6.4)					B (17.4)		A (5.8)	
		Approach		B (12.7)			A (7.0)						A (9.9)		
	Queue Length 95th (ft)	Movement		102	44	58	45					25		37	
Sinclair Road & SR 429 Northbound	Volume		240	240			200	220	90	90	70	60		230	B (13.3)
	LOS (Delay)	Movement	B (12.8)	A (9.7)			C (28.5)	A (4.2)	B (17.8)	C (32.6)	A (1.2)	C (33.2)		A (2.5)	
		Approach		B (11.3)			B (15.8)			B (18.5)			A (8.8)		
	Queue Length 95th (ft)	Movement	104	47			80	44	33	88	0	66		19	
SR 429 Northbound Ramp & Connector Road	Volume								170	380			290	210	A (2.9)
	LOS (Delay)	Movement							A (1.1)	A (0.3)			A (8.0)	A (2.2)	
		Approach								A (0.5)			A (5.5)		
	Queue Length 95th (ft)	*Movement*							*0*	*0*			*80*	*24*	
Livingston Road & SR 429 Southbound	Volume					160						330			B (18.2)
	LOS (Delay)	Movement				D (44.9)	A (5.2)					A (5.2)	A (5.2)		
		Approach					D (44.9)						A (5.2)		
	Queue Length 95th (ft)	*Movement*				145						63	63		
US 192 & West Orange Lake Boulevard	Volume		90	3054	256	300	1110	110	290	20	266	200	20	50	**E (79.2)**
	LOS (Delay)	Movement	**F (97.3)**	**E (79.3)**	B (15.5)	**F (143.0)**	B (16.2)	A (5.1)	**F (259.5)**	**F (101.0)**	D (51.3)	**F (232.7)**	D (43.6)		
		Approach		**E (74.9)**			D (40.4)			**F (157.8)**			**F (183.6)**		
	Queue Length 95th (ft)	Movement	211	#2255	217	325	280	36	#435	65	211	#613	99		
US 192 & SR 429 Southbound	Volume			3170	350	90	1140					300		380	C (33.5)
	LOS (Delay)	Movement		D (35.7)	A (0.0)	**F (161.7)**	A (0.2)					**E (78.2)**		**F (80.3)**	
		Approach		C (32.1)			B (12.0)						**E (79.4)**		
	Queue Length 95th (ft)	*Movement*		*m750*	*m0*	*117*	*0*					*272*		*292*	
US 192 & SR 429 Northbound	Volume		820	2650			1030	220	200		120				C (29.2)
	LOS (Delay)	Movement	**E (77.6)**	B (13.5)			A (9.7)	A (2.4)	**F (119.7)**		**F (111.1)**				
		Approach		C (28.6)			A (8.4)			**F (116.5)**					
	Queue Length 95th (ft)	Movement	*548*	*1044*			*61*		*218*		*153*				
US 192 & East Orange Lake Boulevard	Volume		110	2360	300	140	1100	240	100	10	130	210	30	50	D (38.4)
	LOS (Delay)	Movement	**E (62.2)**	A (7.7)	A (1.1)	**F (94.3)**	**F (80.4)**	D (46.7)	**F (125.2)**	**F (109.2)**	C (26.1)	**F (116.9)**	**F (116.3)**	A (1.3)	
		Approach		A (9.2)			**E (76.2)**			**E (70.9)**			**F (96.6)**		
	Queue Length 95th (ft)	Movement	*235*	*743*	*6*	*#175*	*696*	*373*	*125*	*45*	*79*	*266*	*269*	*0*	
US 192 & Inspiration Drive	Volume		110	2630	60	120	1330	10	40	10	50	10	10	60	D (44.7)
	LOS (Delay)	Movement	**F (108.3)**	D (39.2)	A (0.3)	**F (104.7)**	D (45.6)		**F (143.7)**	C (23.8)		**F (128.7)**	C (22.6)		
		Approach		D (41.0)			D (50.4)			**E (71.3)**			D (36.3)		
	Queue Length 95th (ft)	Movement	*m247*	*1623*	*m0*	*143*	*764*		*#65*	*68*		*46*	*72*		
US 192 & Formosa Garden Boulevard	Volume		30	2550	110	170	1340	40	100	20	400	50	20	20	D (39.2)
	LOS (Delay)	Movement	**F (143.2)**	C (29.6)		**F (103.5)**	C (22.3)		**F (125.0)**	**F (81.6)**	**F (90.2)**	**F (130.9)**	D (50.7)		
		Approach		C (30.8)			C (31.2)			**F (96.6)**			**F (95.4)**		
	Queue Length 95th (ft)	Movement	*m54*	*#1821*		*187*	*531*		*#297*	*60*	*562*	*139*	*75*		
Livingstone Road & Formosa Gardens Boulevard	Volume		190	120	100	70	230	60	110	390	120	60	200	260	C (34.3)
	LOS (Delay)	Movement	**E (57.0)**	D (37.2)	A (4.5)	**E (62.3)**	**E (55.7)**		**E (57.3)**	C (26.4)		**E (61.8)**	C (25.8)	A (2.7)	
		Approach		D (38.4)			**E (57.0)**			C (31.9)			B (18.4)		
	Queue Length 95th (ft)	Movement	*111*	*126*	*32*	*103*	*299*		*74*	*232*		*92*	*97*	*45*	
Western Way & Flager Avenue	Volume		30	570		20	380	140	0		20	200		40	B (18.6)
	LOS (Delay)	Movement	A (6.4)	B (10.3)		D (52.4)	B (14.4)	B (10.1)	A (0.6)			**E (60.4)**		A (0.1)	
		Approach		B (10.1)			B (14.7)			A (0.6)			D (50.4)		
	Queue Length 95th (ft)	Movement	*20*	*183*		*42*	*187*	*118*	*0*			*119*		*0*	
Western Way & Flamingo Crossing Boulevard	Volume		60	720	50	160	390	300	60	40	310	430	30	50	C (34.2)
	LOS (Delay)	Movement	**E (59.9)**	C (29.9)	A (1.5)	**E (66.3)**	C (23.5)	A (7.4)	**E (65.8)**	D (51.1)	C (22.3)	**E (64.1)**	D (41.4)	A (0.7)	
		Approach		C (30.3)			C (25.8)			C (31.5)			**E (56.5)**		
	Queue Length 95th (ft)	Movement	*95*	*328*	*11*	*101*	*218*	*146*	*92*	*32*	*100*	*#238*	*24*	*0*	
Western Way & SR 429 Southbound	Volume			1230	230	80	560							290	B (10.9)
	LOS (Delay)	Movement		B (13.4)		**E (64.0)**	A (2.2)							A (0.6)	
		Approach		B (13.4)			A (9.9)						A (0.6)		
	Queue Length 95th (ft)	Movement		*322*		*60*	*36*							*13*	
Western Way & SR 429 Northbound	Volume		180	2040			410	510	230						B (11.3)
	LOS (Delay)	Movement	**E (67.3)**	A (3.5)			B (12.2)	A (1.7)	**E (57.2)**						
		Approach		A (8.6)			A (6.4)			**E (57.2)**					
	Queue Length 95th (ft)	Movement	*115*	*88*			*81*	*28*	*131*						
Seidel Road & Avalon Road	Volume					430		380		660	620	280	580		C (23.3)
	LOS (Delay)	Movement				D (48.9)		B (11.5)		C (27.4)	A (4.9)	**E (64.3)**	A (7.2)		
		Approach					C (31.3)			B (16.5)			C (25.8)		
	Queue Length 95th (ft)	Movement				*206*		*110*		*312*	*92*	*322*	*128*		
Seidel Road & SR 429 Southbound	Volume			800	100	290	810								B (11.0)
	LOS (Delay)	Movement		A (4.4)		**E (61.7)**	A (0.2)								
		Approach		A (4.4)			B (16.4)								
	Queue Length 95th (ft)	Movement		*160*		*172*	*1*								
Seidel Road & SR 429 Northbound	Volume			800			1020		80		180				A (7.3)
	LOS (Delay)	Movement		A (2.2)			A (4.0)		**E (58.8)**		C (25.6)				
		Approach		A (2.2)			A (4.0)			D (35.8)					
	Queue Length 95th (ft)	Movement		*69*			*128*		*59*		*94*				
Seidel Road & Lakeshore Point Drive	Volume		50	540	390	300	580	30	360	10	230	20	25	80	C (33.1)
	LOS (Delay)	Movement	**E (73.3)**	C (25.4)	A (8.7)	**E (63.8)**	C (29.6)			**E (63.7)**	A (6.3)		**E (66.4)**	A (6.7)	
		Approach		C (21.2)			D (40.9)			D (41.8)			C (28.1)		
	Queue Length 95th (ft)	Movement	79	277	159	180	299			418	61		78	13	

Synchro Version 11 Build 168

LOS notes:

Delay is in sec/veh units

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

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

Queue notes:

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 6.8 (Continued)

2030 Peak Hour Build Intersection Level of Service/Delay

Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection
			Eastbound			Westbound			Northbound			Southbound			PM LOS (Delay)
			Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
Sinclair Road & SR 429 Southbound	Volume			230	90	160	550					130		250	A (9.7)
	LOS (Delay)	Movement		B (16.5)	A (6.3)	A (7.1)	A (6.7)					B (16.0)		A (9.8)	
		Approach		B (13.6)			A (6.8)						B (11.9)		
	Queue Length 95th (ft)	Movement		58	28	48	73					35		60	
Sinclair Road & SR 429 Northbound	Volume		120	240			130	150	260	110	70	70		320	B (13.0)
	LOS (Delay)	Movement	B (12.3)	B (11.4)			C (24.0)	A (3.5)	B (15.4)	C (32.2)	A (3.1)	C (32.1)		A (3.9)	
		Approach		B (11.7)			B (13.0)			B (17.6)			A (9.0)		
	Queue Length 95th (ft)	Movement	65	57			54	34	69	97	11	70		23	
SR 429 Northbound Ramp & Connector Road	Volume								90	290			390	110	A (2.9)
	LOS (Delay)	Movement							A (1.0)	A (0.3)			A (5.6)	A (2.1)	
		Approach								A (0.4)			A (4.8)		
	Queue Length 95th (ft)	*Movement*							*0*	*0*			*103*	*16*	
Livingston Road & SR 429 Southbound	Volume					80						440			A (9.2)
	LOS (Delay)	Movement				D (40.5)	A (3.6)					A (3.6)	A (3.6)		
		Approach					D (40.5)						A (3.6)		
	Queue Length 95th (ft)	*Movement*				81						63	63		
US 192 & West Orange Lake Boulevard	Volume		50	1644	272	310	2960	140	300	20	266	150	20	90	D (49.8)
	LOS (Delay)	Movement	**F (155.5)**	C (31.9)	B (10.4)	**F (111.1)**	D (45.5)	B (10.7)	**F (117.1)**	**F (104.2)**	D (38.4)	**F (141.6)**	**E (69.7)**		
		Approach		C (32.1)			D (50.0)			**F (81.0)**			**F (111.1)**		
	Queue Length 95th (ft)	Movement	#172	768	165	318	#1347	m87	306	67	170	#373	148		
US 192 & SR 429 Southbound	Volume			1860	200	120	2570					200		840	C (30.2)
	LOS (Delay)	Movement		C (28.4)	A (0.1)	**F (173.2)**	B (12.5)					D (53.2)		**E (69.6)**	
		Approach		C (25.6)			B (19.7)						**E (66.4)**		
	Queue Length 95th (ft)	*Movement*		*586*	*m0*	*148*	*193*					*156*		*593*	
US 192 & SR 429 Northbound	Volume		380	1680			2510	300	180		260				C (33.3)
	LOS (Delay)	Movement	**F (87.5)**	A (1.0)			D (36.4)	A (7.1)	**F (98.5)**		**F (119.0)**				
		Approach		B (16.9)			C (33.2)			**F (110.6)**					
	Queue Length 95th (ft)	Movement	*275*	*26*			*835*		*186*		*298*				
US 192 & East Orange Lake Boulevard	Volume		140	1440	360	320	2160	220	430	80	280	250	70	220	**E (64.1)**
	LOS (Delay)	Movement	**F (143.3)**	D (44.1)	A (5.4)	**F (122.3)**	D (51.8)	B (15.2)	**F (153.7)**	**F (98.8)**	D (40.4)	**F (145.0)**	**F (145.2)**	D (50.0)	
		Approach		D (44.1)			**E (57.1)**			**F (108.0)**			**F (106.3)**		
	Queue Length 95th (ft)	Movement	*#378*	*664*	*92*	*331*	*1158*	*157*	*#524*	*191*	*256*	*#429*	*#442*	*242*	
US 192 & Inspiration Drive	Volume		110	1720	40	160	2500	40	50	10	70	80	10	350	D (47.8)
	LOS (Delay)	Movement	**F (150.8)**	C (30.2)	A (0.1)	**F (128.7)**	D (37.0)		**F (127.3)**	C (27.4)		**F (140.8)**	**F (118.3)**		
		Approach		D (36.7)			D (42.4)			**E (65.8)**			**F (122.4)**		
	Queue Length 95th (ft)	Movement	*#293*	*703*	*0*	*m193*	*897*		*75*	*89*		*209*	*#751*		
US 192 & Formosa Garden Boulevard	Volume		0	0	0	0	0	0	0	0	0	0	0	0	0 (56.4)
	LOS (Delay)	Movement													
		Approach								#N/A					
	Queue Length 95th (ft)	Movement	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	
Livingstone Road & Formosa Gardens Boulevard	Volume		230	250	120	40	150	30	60	440	90	70	480	200	C (27.8)
	LOS (Delay)	Movement	D (42.9)	D (36.0)	B (11.3)	**E (69.0)**	D (42.7)		D (40.6)	C (23.5)		D (44.3)	C (22.6)	A (2.5)	
		Approach		C (33.7)			D (47.4)			C (25.2)			B (19.3)		
	Queue Length 95th (ft)	Movement	*106*	*231*	*51*	*#71*	*153*		*36*	*200*		*80*	*172*	*35*	
Western Way & Flager Avenue	Volume		50	480		20	650	70	0		20	180			C (25.1)
	LOS (Delay)	Movement	A (6.3)	A (9.6)		D (49.9)	C (31.6)	B (10.8)	A (0.3)			**E (60.3)**		A (1.4)	
		Approach		A (9.3)			C (30.1)			A (0.3)			D (47.4)		
	Queue Length 95th (ft)	Movement	*28*	*150*		*m40*	*346*	*60*	*0*			*109*		*0*	
Western Way & Flamingo Crossing Boulevard	Volume		50	640	80	330	580	440	60	50	370	340	40	60	D (35.8)
	LOS (Delay)	Movement	**E (69.3)**	D (50.3)	A (3.2)	**E (64.5)**	B (17.9)	A (3.5)	**E (65.6)**	D (43.4)	C (33.2)	**E (58.4)**	D (35.5)	A (0.6)	
		Approach		D (46.6)			C (24.6)			D (38.3)			D (48.4)		
	Queue Length 95th (ft)	Movement	*80*	*#453*	*20*	*170*	*271*	*50*	*92*	*35*	*184*	*181*	*26*	*0*	
Western Way & SR 429 Southbound	Volume			890	460	420	1150							200	B (18.5)
	LOS (Delay)	Movement		B (17.2)		**E (78.8)**	A (0.9)							A (2.5)	
		Approach		B (17.2)			C (21.7)						A (2.5)		
	Queue Length 95th (ft)	Movement		*159*		*196*	*3*							*39*	
Western Way & SR 429 Northbound	Volume		440	940			1420	1200	150						C (20.1)
	LOS (Delay)	Movement	**E (58.1)**	A (5.5)			B (19.2)	B (12.9)	**E (66.4)**						
		Approach		C (22.3)			B (16.3)			**E (66.4)**					
	Queue Length 95th (ft)	Movement	*230*	*106*			*312*	*314*	*#105*						
Seidel Road & Avalon Road	Volume					470		320		760	410	180	650		C (21.7)
	LOS (Delay)	Movement				D (44.7)		A (7.7)		C (23.7)	A (3.6)	**E (68.7)**	A (8.1)		
		Approach					C (29.7)			B (16.6)			C (21.2)		
	Queue Length 95th (ft)	Movement				*247*		*36*		*337*	*65*	*225*	*154*		
Seidel Road & SR 429 Southbound	Volume			510	80	180	790								A (9.6)
	LOS (Delay)	Movement		A (3.0)		**E (71.2)**	A (0.5)								
		Approach		A (3.0)			B (13.6)								
	Queue Length 95th (ft)	Movement		*91*		*122*	*0*								
Seidel Road & SR 429 Northbound	Volume			510			870		100		290				B (12.0)
	LOS (Delay)	Movement		A (6.6)			A (4.3)		D (53.9)		C (30.1)				
		Approach		A (6.6)			A (4.3)			D (36.2)					
	Queue Length 95th (ft)	Movement		*152*			*7*		*65*		*147*				
Seidel Road & Lakeshore Point Drive	Volume		70	590	140	70	550	20	240	5	70	20	10	80	C (28.0)
	LOS (Delay)	Movement	**E (72.3)**	B (17.4)	A (4.7)	**E (62.2)**	C (23.5)			**E (64.5)**	A (1.0)		**E (64.8)**	A (7.3)	
		Approach		C (20.0)			C (27.8)			D (50.3)			C (23.1)		
	Queue Length 95th (ft)	Movement	114	205	36	56	263			279	0		60	14	

Synchro Version 11 Build 168

LOS notes:

Delay is in sec/veh units

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

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

Queue notes:

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 6.9

2050 Peak Hour No-Build Intersection Level of Service/Delay

Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection
			Eastbound			Westbound			Northbound			Southbound			AM LOS (Delay)
			Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
*Sinclair Road & SR 429 Southbound	Volume			710	440	380	550					280		230	F (>999)
	LOS (Delay)	Movement		A (0.0)		D (25.8)						**F (>999)**		B (12.8)	
		Approach	A (0.0)			D (25.8)						**F (>999)**			
	Queue Length 95th (ft)	Movement	0			150						850		50	
Sinclair Road & SR 429 Northbound	Volume		620	370			450	420	180	140	150	100		300	F (154.5)
	LOS (Delay)	Movement	**F (432.7)**	A (7.4)			A (4.6)		**F (170.1)**	D (42.2)	A (7.9)		**F (272.2)**		
		Approach	**F (273.9)**			A (4.6)			**F (80.1)**			**F (272.2)**			
	Queue Length 95th (ft)	Movement	#694	77			101		#326	159	55		#585		
*SR 429 Northbound Ramp & Connector Road	Volume								450	730			400	540	C (20.8)
	LOS (Delay)	Movement								C (20.8)			A (0.0)		
		Approach							C (20.8)			A (0.0)			
	Queue Length 95th (ft)	*Movement*								150		0			
US 192 & West Orange Lake Boulevard	Volume		150	3850	350	410	1720	150	360	30	460	280	40	70	F (167.6)
	LOS (Delay)	Movement	**F (111.2)**	**F (190.1)**	B (16.4)	**F (249.4)**	B (16.9)	A (4.4)	**F (305.5)**	**F (112.1)**	**F (512.0)**	**F (267.8)**	**F (84.4)**		
		Approach	**F (173.4)**			**E (57.9)**			**F (410.3)**			**F (216.0)**			
	Queue Length 95th (ft)	*Movement*	336	#2935	267	m#539	m480	m54	#541	94	#1208	#830	214		
US 192 & SR 429 Southbound	Volume			3980	610	350	1570					780		710	F (132.0)
	LOS (Delay)	Movement		**F (180.3)**	A (0.1)	**F (358.4)**	A (0.7)					**F (160.6)**		**F (122.5)**	
		Approach	**F (156.3)**			**E (65.8)**						**F (142.4)**			
	Queue Length 95th (ft)	Movement		*m788*	*m0*	*m#442*	*m0*					*#908*		*#642*	
US 192 & SR 429 Northbound	Volume		1300	3460			1440	520	480		310				E (75.4)
	LOS (Delay)	Movement	**F (111.1)**	**E (60.8)**			**E (75.5)**	C (21.2)	**F (104.7)**		**F (132.6)**				
		Approach	**E (74.6)**			**E (61.1)**			**F (115.6)**						
	Queue Length 95th (ft)	*Movement*	m864	m543			m#822	m140	*472*		*#680*				
US 192 & East Orange Lake Boulevard	Volume		180	3090	500	210	1720	390	150	20	190	350	50	90	F (84.4)
	LOS (Delay)	Movement	**F (84.0)**	**F (105.4)**	B (10.4)	**F (190.8)**	D (43.6)	A (9.0)	**F (189.1)**	**F (117.1)**	**F (88.9)**		**F (183.6)**	A (1.9)	
		Approach	**F (91.8)**			D (51.1)			**F (132.2)**			**F (150.1)**			
	Queue Length 95th (ft)	Movement	m289	#2170	m124	#305	860	95	#232	72	#296	0	#1030	0	
US 192 & Inspiration Drive	Volume		170	3510	100	220	2070	30	50	20	100	20	20	100	E (67.9)
	LOS (Delay)	Movement	**F (97.9)**	**F (85.3)**	A (4.3)	**F (96.2)**	D (35.7)		**F (131.6)**	D (53.7)		**F (123.9)**	**E (57.7)**		
		Approach	**F (83.7)**			D (41.4)			**E (76.8)**			**E (67.2)**			
	Queue Length 95th (ft)	Movement	*m219*	*m#1130*	*m1*	*m241*	*m766*		*73*	*141*		*71*	*139*		
US 192 & Formosa Gardens Boulevard	Volume		70	3350	210	230	2090	80	200	30	460	90	30	30	F (141.6)
	LOS (Delay)	Movement	**F (97.1)**	**F (200.5)**		**F (117.9)**	D (38.8)		**F (199.5)**	**F (88.6)**	**F (176.6)**	**F (143.5)**	**E (73.2)**		
		Approach	**F (198.5)**			D (46.4)			**F (179.4)**			**F (115.2)**			
	Queue Length 95th (ft)	Movement	*m111*	*m#2379*		*250*	*1036*		*#589*	*86*	*#963*	*#234*	*129*		
*Livingstone Road & Formosa Gardens Boulevard	Volume					140		220		610	30	100	460		F (379.6)
	LOS (Delay)	Movement					**F (379.6)**			A (0.0)		B (13.2)			
		Approach				**F (379.6)**			A (0.0)			B (13.2)			
	Queue Length 95th (ft)	Movement					*650*			*0*		*25*			
Western Way & Flager Avenue	Volume		60	820		20	600	220			20	290		60	B (16.8)
	LOS (Delay)	Movement	A (7.8)	B (13.0)		**E (72.5)**	A (8.4)	A (1.0)	A (1.0)			**E (59.8)**		A (0.1)	
		Approach	B (12.7)			A (8.0)			A (1.0)			D (49.6)			
	Queue Length 95th (ft)	Movement	*36*	*300*		*m35*	*67*	*8*	*0*			*160*		*0*	
Western Way & Flamingo Crossing Boulevard	Volume		90	1030	80	360	600	430	90	60	500	540	50	80	E (72.5)
	LOS (Delay)	Movement	**E (59.4)**	**F (133.8)**	A (2.3)	**E (60.4)**	D (37.8)	A (6.1)	**E (67.8)**	D (44.7)	**E (58.6)**	**F (98.4)**	D (39.0)	A (0.6)	
		Approach	**F (119.5)**			C (33.8)			**E (58.6)**			**F (82.2)**			
	Queue Length 95th (ft)	Movement	*m131*	*#691*	*m15*	*195*	*293*	*84*	*125*	*44*	*#405*	*#358*	*37*	*0*	
*Western Way & SR 429 Southbound	Volume			1680	390	120	800							510	F (62.2)
	LOS (Delay)	Movement		A (0.0)		C (21.1)								**F (62.2)**	
		Approach	A (0.0)			C (21.1)						**F (62.2)**			
	Queue Length 95th (ft)	Movement		*0*		*50*								*350*	
*Western Way & SR 429 Northbound	Volume		380	3240			610	890	390		460				F (>999)
	LOS (Delay)	Movement	B (11.7)				A (0.0)		**F (>999)**		**F (>999)**				
		Approach	B (11.7)			A (0.0)			**F (>999)**						
	Queue Length 95th (ft)	Movement	*75*				*0*		*1350*		*1350*				
Seidel Road & Avalon Road	Volume					660		580		980	940	380	880		E (58.7)
	LOS (Delay)	Movement				**F (104.9)**		B (15.7)		**E (72.1)**	D (46.3)	**F (132.4)**	B (19.0)		
		Approach				**E (63.1)**			**E (59.5)**			D (53.2)			
	Queue Length 95th (ft)	Movement				*m#821*		*m317*		*#607*	*#682*	*#591*	*295*		
*Seidel Road & SR 429 Southbound	Volume			1100	220	510	1240								F (107.6)
	LOS (Delay)	Movement		A (0.0)		**F (107.6)**									
		Approach	A (0.0)			**F (107.6)**									
	Queue Length 95th (ft)	Movement		*0*		*475*									
*Seidel Road & SR 429 Northbound	Volume			1100			1580		170		340				F (149.5)
	LOS (Delay)	Movement		A (0.0)			A (0.0)		**F (149.5)**		**E (35.6)**				
		Approach	A (0.0)			A (0.0)			**F (149.5)**						
	Queue Length 95th (ft)	Movement		*0*					*250*		*175*				
Seidel Road & Lakeshore Point Drive	Volume		60	900	480	370	980	40	480	15	290	30	30	120	D (51.2)
	LOS (Delay)	Movement	**E (57.9)**	**E (60.4)**	B (15.1)	**E (61.5)**	D (38.8)			**F (115.4)**	B (12.4)		**E (67.5)**	B (16.6)	
		Approach	D (45.2)			D (44.8)			**E (77.3)**			C (33.7)			
	Queue Length 95th (ft)	Movement	*m62*	*m#481*	*m87*	*210*	*#594*			*#718*	*126*		*98*	*57*	

Synchro Version 11 Build 168; *Unsignalized intersection analyzed using HCS v7.9; N/A - queue not reported

LOS notes:

Delay is in sec/veh units

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

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

Queue notes:

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 6.9 (Continued)

2050 Peak Hour No-Build Intersection Level of Service/Delay

Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection
			Eastbound			Westbound			Northbound			Southbound			PM LOS (Delay)
			Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
*Sinclair Road & SR 429 Southbound	Volume			400	240	230	820					530		460	F (>999)
	LOS (Delay)	Movement		A (0.0)		B (10.5)						F (>999)		E (37.9)	
		Approach	A (0.0)			B (10.5)						F (>999)			
	Queue Length 95th (ft)	Movement		0		50						1450		250	
Sinclair Road & SR 429 Northbound	Volume		310	620			200	320	400	190	230	130		450	E (55.6)
	LOS (Delay)	Movement	F (163.3)	C (28.9)			B (10.2)		E (63.7)	B (17.1)	A (9.1)		F (92.7)		
		Approach	E (73.7)			B (10.2)			D (37.6)			F (92.7)			
	Queue Length 95th (ft)	Movement	#451	262			98		#421	129	100		#675		
*SR 429 Northbound Ramp & Connector Road	Volume								230	590			580	280	B (12.2)
	LOS (Delay)	Movement								B (12.2)			A (0.0)		
		Approach							B (12.2)			A (0.0)			
	Queue Length 95th (ft)	*Movement*								50			0		
US 192 & West Orange Lake Boulevard	Volume		80	2220	350	430	3810	190	370	30	410	240	40	120	F (118.7)
	LOS (Delay)	Movement	F (340.3)	D (52.9)	B (17.7)	F (105.8)	F (153.1)	B (16.5)	F (167.3)	F (105.6)	F (181.7)	F (191.3)	F (100.0)		
		Approach	E (57.0)			F (142.6)			F (172.3)			F (154.9)			
	Queue Length 95th (ft)	*Movement*	#321	1210	265	m344	m#2027	m83	#474	92	#754	#674	#321		
US 192 & SR 429 Southbound	Volume			2390	480	310	3160					550		1270	F (155.6)
	LOS (Delay)	Movement		D (50.5)	A (0.2)	F (187.1)	D (46.1)					F (155.9)		F (676.9)	
		Approach	D (42.0)			E (58.7)						F (519.4)			
	Queue Length 95th (ft)	Movement		*m1168*	*m0*	*m214*	*m166*					*#658*		*#1602*	
US 192 & SR 429 Northbound	Volume		710	2230			3070	780	400		560				F (118.4)
	LOS (Delay)	Movement	F (171.3)	B (18.3)			F (165.2)	E (67.3)	F (84.0)		F (288.8)				
		Approach	E (55.3)			F (145.4)			F (203.5)						
	Queue Length 95th (ft)	*Movement*	#871	m545			m1496	m202	*368*		*#1463*				
US 192 & East Orange Lake Boulevard	Volume		210	2120	460	380	3030	350	490	90	360	330	120	330	F (149.8)
	LOS (Delay)	Movement	F (270.7)	F (91.2)	A (8.7)	F (137.3)	F (207.0)	C (29.4)	F (196.2)	F (101.0)	F (88.4)		F (292.2)	F (80.1)	
		Approach	F (91.1)			F (183.4)			F (145.8)			F (202.4)			
	Queue Length 95th (ft)	Movement	m#580	m1160	m101	#446	#2367	366	#635	213	#550	0	#1260	0	
US 192 & Inspiration Drive	Volume		150	2460	50	230	3490	60	70	20	90	110	20	450	F (117.2)
	LOS (Delay)	Movement	F (242.0)	D (51.7)	A (0.1)	F (143.6)	F (143.9)		F (130.2)	F (81.0)		F (101.6)	F (227.3)		
		Approach	E (61.5)			F (143.9)			F (100.2)			F (203.5)			
	Queue Length 95th (ft)	Movement	*#507*	*1424*	*0*	*m185*	*m#2041*		*98*	*163*		*266*	*#1164*		
US 192 & Formosa Gardens Boulevard	Volume		40	2390	230	510	3450	90	260	40	370	90	50	0	F (130.2)
	LOS (Delay)	Movement	F (92.5)	F (137.4)		F (139.9)	F (139.9)		F (130.8)	E (67.5)	C (20.8)	E (74.0)	E (56.2)		
		Approach	F (136.7)			F (139.9)			E (66.4)			E (63.8)			
	Queue Length 95th (ft)	Movement	*m76*	*#2112*		*#607*	*#2934*		*#589*	*91*	*247*	*184*	*193*		
*Livingstone Road & Formosa Gardens Boulevard	Volume					100		140		440	50	200	630		F (494.5)
	LOS (Delay)	Movement					F (494.5)			A (0.0)		B (12.3)			
		Approach				F (494.5)			A (0.0)			B (12.3)			
	Queue Length 95th (ft)	Movement					500			0		*50*			
Western Way & Flager Avenue	Volume		90	840		20	960	90			20	260		70	C (29.5)
	LOS (Delay)	Movement	A (8.5)	B (12.6)		C (32.9)	D (41.7)	B (16.5)	A (0.6)			E (59.9)		A (2.2)	
		Approach	B (12.2)			D (39.5)			A (0.6)			D (47.7)			
	Queue Length 95th (ft)	Movement	*49*	*303*		*m20*	*m356*	*m30*	*0*			*147*		*0*	
Western Way & Flamingo Crossing Boulevard	Volume		80	1060	120	500	760	580	120	80	600	490	60	120	F (233.6)
	LOS (Delay)	Movement	F (98.7)	F (450.0)	A (1.9)	F (678.7)	F (217.6)	B (16.2)	E (74.4)	C (32.3)	D (46.9)	E (55.6)	C (24.1)	A (0.5)	
		Approach	F (385.1)			F (279.3)			D (49.6)			D (42.9)			
	Queue Length 95th (ft)	Movement	*#146*	*#848*	*9*	*#458*	*#560*	*#218*	*160*	*47*	*#581*	*245*	*32*	*0*	
*Western Way & SR 429 Southbound	Volume			1330	820	710	1470							370	F (276.9)
	LOS (Delay)	Movement		A (0.0)		F (276.9)								F (127.4)	
		Approach	A (0.0)			F (276.9)						F (276.9)			
	Queue Length 95th (ft)	Movement		0		*1000*								*400*	
*Western Way & SR 429 Northbound	Volume		810	1420			1950	2200	230		2820				F (>999)
	LOS (Delay)	Movement	F (>999)				A (0.0)				E (49.3)				
		Approach	F (>999)			A (0.0)			E (49.3)						
	Queue Length 95th (ft)	Movement	*1925*				0				*200*				
Seidel Road & Avalon Road	Volume					720		450		1120	640	280	980		E (61.3)
	LOS (Delay)	Movement				F (113.1)		B (19.1)		F (93.3)	A (7.1)	F (126.2)	C (22.9)		
		Approach				E (76.9)			E (62.0)			D (45.9)			
	Queue Length 95th (ft)	Movement				*#1008*		*330*		*#719*	*104*	*#460*	*367*		
*Seidel Road & SR 429 Southbound	Volume			730	190	320	1170								B (15.0)
	LOS (Delay)	Movement		A (0.0)		B (15.0)									
		Approach	A (0.0)			B (15.0)									
	Queue Length 95th (ft)	Movement		0		*75*									
*Seidel Road & SR 429 Northbound	Volume			730			1270		220		510				F (73.9)
	LOS (Delay)	Movement		A (0.0)			A (0.0)		F (73.9)		E (38.3)				
		Approach	A (0.0)			A (0.0)			F (73.9)						
	Queue Length 95th (ft)	Movement		*0*					*200*		*275*				
Seidel Road & Lakeshore Point Drive	Volume		100	940	200	90	860	30	310	10	90	30	15	100	D (38.7)
	LOS (Delay)	Movement	E (64.2)	D (38.6)	A (9.8)	E (62.5)	C (34.8)			E (68.0)	A (3.1)		E (66.4)	B (11.5)	
		Approach	D (36.0)			D (37.3)			D (53.8)			C (28.7)			
	Queue Length 95th (ft)	Movement	*m125*	*m474*	*m66*	*68*	*477*			*369*	*18*		*80*	*36*	

Synchro Version 11 Build 168; *Unsignalized intersection analyzed using HCS v7.9; N/A - queue not reported

LOS notes:

Delay is in sec/veh units

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

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

Queue notes:

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 6.10

2050 Peak Hour Build Intersection Level of Service/Delay

Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	AM Movement/Approach LOS (Delay)												Intersection
			Eastbound			Westbound			Northbound			Southbound			AM LOS (Delay)
			Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
Sinclair Road & SR 429 Southbound	Volume			710	450	270	550					160		140	B (12.1)
	LOS (Delay)	Movement		B (19.4)	A (4.3)	B (12.1)	A (6.4)					C (25.1)		A (7.8)	
		Approach		B (13.5)			A (8.3)						B (17.0)		
	Queue Length 95th (ft)	Movement		186	52	80	71					64		47	
Sinclair Road & SR 429 Northbound	Volume		440	430			340	270	180	140	120	80		300	B (18.6)
	LOS (Delay)	Movement	B (16.5)	A (9.2)			D (36.1)	A (6.6)	C (23.7)	D (52.8)	A (5.0)	D (49.2)		A (4.5)	
		Approach		B (12.9)			C (23.0)			C (27.9)			B (13.9)		
	Queue Length 95th (ft)	Movement	205	80			138	69	70	#173	20	#100		46	
SR 429 Northbound Ramp & Connector Road	Volume								260	590			380	210	A (4.0)
	LOS (Delay)	Movement							A (1.6)	A (0.5)			B (11.8)	A (2.8)	
		Approach								A (0.8)			A (8.6)		
	Queue Length 95th (ft)	*Movement*							*0*	*0*			*132*	*28*	
Livingston Road & SR 429 Southbound	Volume					260						480			C (20.6)
	LOS (Delay)	Movement				D (43.6)	A (8.2)					A (8.2)	A (8.2)		
		Approach					D (43.6)						A (8.2)		
	Queue Length 95th (ft)	*Movement*				209						114	115		
US 192 & West Orange Lake Boulevard	Volume		150	3700	350	360	1720	150	360	30	360	280	40	70	**F (133.1)**
	LOS (Delay)	Movement	**F (114.0)**	**F (136.7)**	B (12.8)	**F (259.2)**	C (21.0)	A (6.0)	**F (127.5)**	**F (135.1)**	**F (565.1)**	**F (251.1)**	**F (233.8)**		
		Approach	**F (125.6)**			**E (58.4)**			**F (337.7)**			**F (246.2)**			
	Queue Length 95th (ft)	Movement	337	#2658	229	m#513	435	m63	#397	97	#990	#818	#354		
US 192 & SR 429 Southbound	Volume			3720	620	260	1590					510		640	**E (64.7)**
	LOS (Delay)	Movement		**F (85.0)**	A (0.1)	**F (145.1)**	A (1.3)					**F (96.3)**		**F (108.9)**	
		Approach	**E (72.9)**			C (21.5)						**F (103.3)**			
	Queue Length 95th (ft)	*Movement*		*m673*	*m0*	*286*	*12*					*487*		*#549*	
US 192 & SR 429 Northbound	Volume		1060	3170			1360	320	490		250				**E (74.3)**
	LOS (Delay)	Movement	**F (120.9)**	**E (74.2)**			D (36.4)	A (5.3)	**F (114.6)**		**F (94.2)**				
		Approach	**F (85.9)**			C (30.5)			**F (107.7)**						
	Queue Length 95th (ft)	Movement	*m625*	*m1793*			*m561*		*482*		*275*				
US 192 & East Orange Lake Boulevard	Volume		180	2740	500	210	1440	390	150	20	190	350	50	90	D (47.4)
	LOS (Delay)	Movement	**E (78.2)**	D (41.8)	A (4.0)	**F (182.1)**	B (18.2)	A (5.0)	**F (171.4)**	**F (115.9)**	**F (82.9)**	**F (146.0)**	**F (144.1)**	A (2.9)	
		Approach	D (38.2)			C (32.6)			**F (121.6)**			**F (118.9)**			
	Queue Length 95th (ft)	Movement	*m326*	*1115*	*100*	*#306*	*548*	*190*	*#232*	*72*	*#296*	*#537*	*#538*	*3*	
US 192 & Inspiration Drive	Volume		170	3160	100	220	1790	30	50	20	100	20	20	100	D (49.5)
	LOS (Delay)	Movement	**F (131.3)**	D (55.0)	A (3.8)	**F (108.2)**	C (24.9)		**F (131.6)**	D (44.5)		**F (133.6)**	D (49.8)		
		Approach	**E (57.3)**			C (33.9)			**E (70.3)**			**E (61.8)**			
	Queue Length 95th (ft)	Movement	*m309*	*#1996*	*m12*	*m236*	*m583*		*73*	*146*		*73*	*148*		
US 192 & Formosa Garden Boulevard	Volume		70	3040	170	290	1830	80	180	30	520	90	30	30	**F (113.3)**
	LOS (Delay)	Movement	**F (111.0)**	**F (136.4)**		**F (121.0)**	C (32.4)		**F (416.8)**	**F (88.6)**	**F (161.7)**	**F (143.5)**	**E (65.0)**		
		Approach	**F (135.8)**			D (44.0)			**F (221.5)**			**F (111.9)**			
	Queue Length 95th (ft)	Movement	*m124*	*#2312*		*#314*	*826*		*#626*	*86*	*#1230*	*#234*	*122*		
Livingstone Road & Formosa Gardens Boulevard	Volume		320	220	100	90	330	80	180	620	180	90	380	400	D (43.8)
	LOS (Delay)	Movement	**E (56.9)**	D (37.8)	A (4.8)	**E (62.9)**	**E (61.2)**		**E (57.5)**	D (47.9)		**E (62.9)**	D (35.3)	B (13.9)	
		Approach	D (42.2)			**E (61.5)**			D (49.7)			C (28.3)			
	Queue Length 95th (ft)	Movement	*179*	*251*	*36*	*123*	*#613*		*108*	*373*		*123*	*166*	*193*	
Western Way & Flager Avenue	Volume		60	820		20	600	220	0		20	290		0	B (16.6)
	LOS (Delay)	Movement	B (14.0)	B (13.0)		**F (87.0)**	A (6.4)	A (0.8)	A (0.6)			**E (59.8)**			
		Approach	B (13.1)			A (6.8)			A (0.6)			D (49.6)			
	Queue Length 95th (ft)	Movement	*53*	*300*		*m26*	*45*	*0*	*0*			*160*			
Western Way & Flamingo Crossing Boulevard	Volume		90	1030	80	380	600	440	90	60	520	560	50	80	**E (71.7)**
	LOS (Delay)	Movement	**E (66.8)**	**F (104.5)**	A (3.5)	**E (59.9)**	C (24.0)	A (7.1)	**E (67.7)**	D (45.6)	**F (91.4)**	**F (129.7)**	D (40.6)	A (0.7)	
		Approach	**F (94.9)**			C (28.4)			**F (84.1)**			**F (108.2)**			
	Queue Length 95th (ft)	Movement	*m129*	*#692*	*m22*	*195*	*251*	*121*	*125*	*44*	*#478*	*#389*	*37*	*0*	
Western Way & SR 429 Southbound	Volume			1680	430	120	910							510	C (29.6)
	LOS (Delay)	Movement		D (44.6)		D (50.3)	A (6.5)							A (4.3)	
		Approach	D (44.6)			B (11.6)						A (4.3)			
	Queue Length 95th (ft)	Movement		*m458*		*m80*	*222*							*137*	
Western Way & SR 429 Northbound	Volume		380	3240			610	890	420						B (18.0)
	LOS (Delay)	Movement	**E (57.9)**	B (12.2)			C (20.1)	A (2.6)	**E (56.3)**						
		Approach	B (17.0)			A (9.7)			**E (56.3)**						
	Queue Length 95th (ft)	Movement	*m171*	*m606*			*147*	*40*	*218*						
Seidel Road & Avalon Road	Volume					680		580		980	980	380	880		D (43.7)
	LOS (Delay)	Movement				D (41.7)		C (22.1)		**E (60.6)**	**E (58.8)**	**E (66.6)**	B (14.0)		
		Approach				C (32.7)			**E (59.7)**			C (29.9)			
	Queue Length 95th (ft)	Movement				*257*		*208*		*#582*	*#771*	*#591*	*284*		
Seidel Road & SR 429 Southbound	Volume			1100	260	530	1260								B (18.0)
	LOS (Delay)	Movement		B (15.6)		**E (66.4)**	A (0.4)								
		Approach	B (15.6)			B (19.9)									
	Queue Length 95th (ft)	Movement		*m553*		*310*	*0*								
Seidel Road & SR 429 Northbound	Volume			1100			1600		190		360				C (20.0)
	LOS (Delay)	Movement		B (12.1)			B (15.4)		D (38.4)		**E (55.3)**				
		Approach	B (12.1)			B (15.4)			D (49.5)						
	Queue Length 95th (ft)	Movement		*239*			*m260*		*92*		*337*				
Seidel Road & Lakeshore Point Drive	Volume		60	920	480	370	1000	40	480	15	290	30	30	120	D (46.9)
	LOS (Delay)	Movement	**E (71.4)**	D (48.5)	B (11.2)	**E (68.5)**	D (41.8)			**F (96.3)**	B (11.1)		**E (67.7)**	B (16.7)	
		Approach	D (37.2)			D (48.8)			**E (64.9)**			C (33.9)			
	Queue Length 95th (ft)	Movement	m0	#543	208	#253	#635			#694	118		99	57	

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LOS notes:

Delay is in sec/veh units

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

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

Queue notes:

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 6.10 (Continued)

2050 Peak Hour Build Intersection Level of Service/Delay

Signal Controlled Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection
			Eastbound			Westbound			Northbound			Southbound			PM LOS (Delay)
			Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
Sinclair Road & SR 429 Southbound	Volume			400	250	190	820					190		390	B (17.2)
	LOS (Delay)	Movement		C (26.0)	A (6.8)	B (13.5)	B (13.7)					B (17.1)		C (24.2)	
		Approach		B (18.6)			B (13.7)						C (21.9)		
	Queue Length 95th (ft)	Movement		157	59	110	231					62		248	
Sinclair Road & SR 429 Northbound	Volume		150	440			160	220	400	190	130	110		450	B (17.1)
	LOS (Delay)	Movement	B (15.9)	B (15.3)			C (30.4)	A (3.9)	B (16.3)	D (37.7)	A (8.4)	D (38.6)		B (10.2)	
		Approach		B (15.4)			B (15.1)			C (20.5)			B (15.8)		
	Queue Length 95th (ft)	Movement	100	131			79	46	112	176	47	116		84	
SR 429 Northbound Ramp & Connector Road	Volume								140	420			560	160	A (5.1)
	LOS (Delay)	Movement							A (1.1)	A (0.3)			B (10.5)	A (2.0)	
		Approach								A (0.5)			A (8.6)		
	Queue Length 95th (ft)	*Movement*							*0*	*0*			*189*	*20*	
Livingston Road & SR 429 Southbound	Volume					160						680			B (12.9)
	LOS (Delay)	Movement				D (45.6)	A (5.3)					A (5.3)	A (5.3)		
		Approach					D (45.6)						A (5.3)		
	Queue Length 95th (ft)	*Movement*				#147						105	105		
US 192 & West Orange Lake Boulevard	Volume		80	2220	350	380	3710	190	370	30	360	240	40	120	**F (109.2)**
	LOS (Delay)	Movement	**F (340.3)**	D (48.7)	B (16.3)	**F (105.0)**	**F (135.5)**	B (12.5)	**F (121.7)**	**F (97.3)**	**F (90.5)**	**F (379.3)**	**F (161.5)**		
		Approach		D (53.2)			**F (127.4)**			**F (106.0)**			**F (292.4)**		
	Queue Length 95th (ft)	Movement	#321	1187	257	m343	m#2232	m110	378	89	#537	#782	#427		
US 192 & SR 429 Southbound	Volume			2330	490	250	3140					240		1140	**E (55.9)**
	LOS (Delay)	Movement		B (16.5)	A (0.2)	**F (139.3)**	A (4.7)					**E (77.0)**		**F (278.5)**	
		Approach		B (13.7)			B (14.6)						**F (243.4)**		
	Queue Length 95th (ft)	*Movement*		*m426*	*m0*	*m226*	*103*					*222*		*#1233*	
US 192 & SR 429 Northbound	Volume		640	1930			3040	510	350		530				**E (59.0)**
	LOS (Delay)	Movement	**F (94.7)**	A (1.3)			**E (75.5)**	A (7.0)	**F (92.9)**		**F (159.6)**				
		Approach		C (24.6)			**E (65.6)**			**F (133.1)**					
	Queue Length 95th (ft)	Movement	*437*	*15*			*m632*		*340*		*#711*				
US 192 & East Orange Lake Boulevard	Volume		210	1790	460	480	2730	350	490	90	360	330	120	330	**F (107.0)**
	LOS (Delay)	Movement	**F (243.4)**	**E (56.6)**	B (11.9)	**F (198.8)**	**F (116.8)**	C (23.2)	**F (196.2)**	**F (101.0)**	**F (97.3)**	**F (159.6)**	**F (160.9)**	**F (108.4)**	
		Approach		**E (64.2)**			**F (118.7)**			**F (149.2)**			**F (138.3)**		
	Queue Length 95th (ft)	Movement	*m#594*	*m1043*	*m265*	*#626*	*#1912*	*316*	*#635*	*213*	*#582*	*#618*	*#642*	*#579*	
US 192 & Inspiration Drive	Volume		150	2130	50	220	3270	60	70	20	90	110	20	470	**F (105.4)**
	LOS (Delay)	Movement	**F (178.6)**	D (37.5)	A (0.1)	**F (97.4)**	**F (117.9)**		**F (130.2)**	D (54.7)		**F (142.3)**	**F (306.7)**		
		Approach		D (45.8)			**F (116.6)**			**F (84.1)**			**F (276.5)**		
	Queue Length 95th (ft)	Movement	*#454*	*1039*	*0*	*m190*	*m#2278*		*98*	*163*		*274*	*#1265*		
US 192 & Formosa Garden Boulevard	Volume		40	2060	230	580	3230	90	250	40	450	90	50	70	**F (88.1)**
	LOS (Delay)	Movement	**F (117.2)**	**E (74.2)**		**F (141.6)**	**E (64.8)**		**F (206.7)**	**F (95.9)**	**E (65.7)**	**F (570.6)**	**F (202.4)**		
		Approach		**E (74.9)**			**E (76.2)**			**F (115.0)**			**F (359.9)**		
	Queue Length 95th (ft)	Movement	*m98*	*1147*		*#691*	*#2336*		*#744*	*112*	*687*	*#397*	*#381*		
Livingstone Road & Formosa Gardens Boulevrad	Volume		360	390	190	50	260	40	90	640	150	110	700	290	D (36.2)
	LOS (Delay)	Movement	**E (57.4)**	D (39.7)	B (12.3)	**E (71.8)**	D (42.5)		D (40.9)	D (39.0)		D (45.2)	C (33.0)	A (3.1)	
		Approach		D (40.9)			D (46.7)			D (39.2)			C (26.4)		
	Queue Length 95th (ft)	Movement	*#189*	*335*	*64*	*#86*	*231*		*49*	*#471*		*110*	*#341*	*48*	
Western Way & Flager Avenue	Volume		90	840		20	960	90	0		20	260		70	C (29.1)
	LOS (Delay)	Movement	A (8.5)	B (12.6)		C (34.4)	D (40.8)	B (17.1)	A (0.6)			**E (60.0)**		A (2.2)	
		Approach		B (12.2)			D (38.7)			A (0.6)			D (47.7)		
	Queue Length 95th (ft)	Movement	*49*	*303*		*m21*	*m360*	*m31*	*0*			*147*		*0*	
Western Way & Flamingo Crossing Boulevard	Volume		80	1070	120	500	760	580	120	80	620	500	60	120	**F (230.3)**
	LOS (Delay)	Movement	**F (89.8)**	**F (457.6)**	A (3.3)	**F (552.4)**	**F (199.8)**	B (19.0)	**E (66.8)**	C (33.3)	**F (117.0)**	**F (81.3)**	C (26.1)	A (0.5)	
		Approach		**F (391.6)**			**F (238.5)**			**F (101.5)**			**E (62.2)**		
	Queue Length 95th (ft)	Movement	*#138*	*#845*	*10*	*#445*	*#556*	*#408*	*153*	*48*	*#720*	*249*	*34*	*0*	
Western Way & SR 429 Southbound	Volume			1330	860	800	1470							370	**F (95.5)**
	LOS (Delay)	Movement		**F (125.7)**		**F (224.6)**	A (2.4)							A (7.1)	
		Approach		**F (125.7)**			**F (80.8)**						A (7.1)		
	Queue Length 95th (ft)	Movement		*m557*		*m#570*	*m87*							*136*	
Western Way & SR 429 Northbound	Volume		810	1420			2020	2200	250						**F (102.5)**
	LOS (Delay)	Movement	**F (220.6)**	A (1.6)			D (43.0)	**F (173.9)**	**F (146.4)**						
		Approach		**F (81.1)**			**F (111.2)**			**F (146.4)**					
	Queue Length 95th (ft)	Movement	*m#441*	*m29*			*527*	*#1362*	*#208*						
Seidel Road & Avalon Road	Volume					760		450		1120	670	280	980		D (41.6)
	LOS (Delay)	Movement				D (53.8)		C (23.0)		**E (78.1)**	A (7.1)	**E (61.8)**	B (16.9)		
		Approach					D (42.3)			D (51.5)			C (26.9)		
	Queue Length 95th (ft)	Movement				*312*		*259*		*#719*	*108*	*#438*	*355*		
Seidel Road & SR 429 Southbound	Volume			730	220	330	1210								B (12.5)
	LOS (Delay)	Movement		B (13.6)		D (53.4)	A (0.4)								
		Approach		B (13.6)			B (11.8)								
	Queue Length 95th (ft)	Movement		*351*		*209*	*7*								
Seidel Road & SR 429 Northbound	Volume			730			1280		260		530				C (21.8)
	LOS (Delay)	Movement		B (14.2)			B (13.9)		C (28.9)		D (47.6)				
		Approach		B (14.2)			B (13.9)			D (41.5)					
	Queue Length 95th (ft)	Movement		*269*			*167*		*102*		*467*				
Seidel Road & Lakeshore Point Drive	Volume		100	960	200	90	870	30	310	10	90	30	15	100	C (32.0)
	LOS (Delay)	Movement	**E (73.2)**	B (19.3)	A (3.2)	**E (62.5)**	D (35.3)			**E (66.8)**	A (3.1)		**E (66.4)**	B (11.5)	
		Approach		C (21.0)			D (37.7)			D (52.8)			C (28.7)		
	Queue Length 95th (ft)	Movement	m131	296	m31	68	#520			365	17		80	36	

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LOS notes:

Delay is in sec/veh units

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

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

Queue notes:

#: 95th percentile volume exceeds capacity

m: Upstream metering is in effect

Table 6.11 summarizes the results of the off-ramp signals back of queue analyses for the AM and PM design hours for the 2050 Build conditions. The 95th percentile queue length for each movement was estimated using Synchro. The available storage length was calculated from the stop bar at the ramp terminal intersection to the gore with SR 429 mainline. The analysis indicates that the off-ramp queue lengths are well below the available storage lengths and queues are not expected to back into the SR 429 mainline.

Table 6.11
2050 Build – Off-Ramp Signals Queuing Analysis Results

Intersection	Approach	Movement	Number of Lanes	Available Storage (feet)	Queue (feet)	
					AM	PM
Sinclair Road at southbound off-ramp	Southbound	L (EB)	2	1,200	64	62
		R (WB)	1		47	248
Sinclair Road at northbound off-ramp	Northbound	L (WB)	2	1,450	70	112
		T (NB)	1		#173	176
		R (EB)	1		20	47
Livingston Road northbound off-ramp	Northbound	R (EB)	1	1,700	22	55
Livingston Road southbound off-ramp	Southbound	L (EB)	2	1,700	114	105
US 192 southbound off-ramp	Southbound	L (EB)	2	2,450	487	222
		R (WB)	3		#549	#1233
US 192 northbound off-ramp	Northbound	L (WB)	2	2,450	482	340
		R (EB)	2		275	#711
Western Way southbound off-ramp	Southbound	R (WB)	1	2,000	137	136
		R (EB) Loop Ramp	2	3,750	1,982	276
Western Way northbound off-ramp	Northbound	L (WB)	2	2,000	218	#208
		R (EB)	3	2,000	218	139
Seidel Road northbound off-ramp	Northbound	L (WB)	2	3,200	92	102
		R (EB)	1		337	467

Notes:
Synchro 95th percentile queue was utilized.
= 95th percentile volume exceeds capacity; queue may be longer.

Tables 6.12 provides a comparison of the intersection analysis results for the No-Build and Build Alternatives. It is evident from these comparison tables that overall, the Build Alternative is projected to provide better operating conditions than the No-Build Alternative in design year 2050. Considering the overall operations along SR 429, ramp terminals, and along the interchange cross-streets, the Build Alternative is projected to provide better operating conditions than the No-Build Alternative. Overall delay results show Build operations are better than No Build at interchange ramp terminals and intersections within the AOI.

Table 6.12
Comparison of No-Build and Build Alternatives Intersection Level of Service/Delay

Intersection	2050 No-Build		2050 Build	
	AM Peak	PM Peak	AM Peak	PM Peak
Sinclair Road				
SR 429 Southbound Ramp Terminal*	**F (999)**	**F (999)**	B (12.1)	B (17.2)
SR 429 Northbound Ramp Terminal	**F (154.5)**	**E (55.6)**	B (18.6)	B (17.1)
Connector Road and Northbound Ramp*	C (20.8)	B (12.2)	A (4.0)	A (5.1)
Livingston Road				
SR 429 Ramp Terminal	-	-	C (20.6)	B (12.9)
Formosa Gardens Boulevard*	**F (379.6)**	**F (494.5)**	D (43.8)	D (36.2)
US 192				
West Orange Lake Boulevard	**F (167.6)**	**F (118.7)**	**F (133.1)**	**F (109.2)**
SR 429 Southbound Ramp Terminal	**F (132.0)**	**F (155.6)**	**E (64.7)**	**E (55.9)**
SR 429 Northbound Ramp Terminal	**E (75.4)**	**F (118.4)**	**E (74.3)**	**E (59.0)**
East Orange Lake Boulevard	**F (84.4)**	**F (149.8)**	D (47.4)	**F (107.0)**
Inspiration Drive	**E (67.9)**	**F (117.2)**	D (49.5)	**F (105.4)**
Formosa Gardens Boulevard	**F (141.6)**	**F (130.2)**	**F (113.3)**	**F (88.1)**
Western Way				
Flagler Avenue	B (16.8)	C (29.5)	B (16.6)	C (29.1)
Hertzog Road	**E (72.5)**	**F (233.6)**	**E (71.7)**	**F (230.3)**
SR 429 Southbound Ramp Terminal*	**F (62.2)**	**F (276.9)**	C (29.6)	**F (95.5)**
SR 429 Northbound Ramp Terminal*	**F (999)**	**F (999)**	B (18)	**F (102.5)**
Seidel Road				
Avalon Road	**E (58.7)**	**E (61.3)**	D (43.7)	D (41.6)
SR 429 Southbound Ramp Terminal*	**F (107.6)**	B (15.0)	B (18.0)	B (12.5)
SR 429 Northbound Ramp Terminal*	**F (149.5)**	**F (77.0)**	C (20.0)	C (21.8)
Lakeshore Point Drive	D (51.6)	D (38.7)	D (46.9)	C (32.0)

Synchro Version 11 Build 168. *Unsignalized intersection under No-Build (Build Alternative analyzed as signalized intersection) analyzed using HCS v7.9; Worst Movement Delay and Level of Service Reported for unsignalized intersection; Delays more than 999 seconds/vehicle are shown as 999 seconds/vehicle indicating LOS F.
Level of Service notes: Delay is in seconds/vehicle units
= Level of service (LOS) E reflecting at capacity operations = Level of service (LOS) F reflecting over capacity operations

6.3 MICROSIMULATION EVALUATION

The future year No-Build Alternative network includes all locally funded and committed projects within the study area, and the Transportation System Management and Operations (TSM&O) measures implemented at the southbound SR 429 off-ramp to US 192. The TSM&O considerations included the following: geometry improvement at the ramp terminal converting the three lanes (one left, one shared left/right and one right) to five lanes (three right turns and two left turns) as well as two southbound off-ramps from SR 429 extending back to the cash plaza slip ramp and providing approximately 1.3 miles of additional storage. These TSM&O improvements are not expected to satisfy the need for additional capacity on SR 429, improved access to the surface streets, and relief of traffic congestion within the interchanges. Therefore, this PD&E Study and the SIJR did not consider a standalone TSM&O Alternative, as the No-Build Alternative serves as the TSM&O Alternative.

The Build Alternative improvements included the No-Build Alternative (see Section 5.1.3) with TSM&O improvements and additional improvements were made to enhance safety, address traffic needs, improve travel time reliability and provide long-term mobility for the study area. Build network lane geometry at exiting interchanges and mainline segments are presented in **Figure 6.2**. The Build Alternative was evaluated with and without the proposed new interchange on SR 429 at Livingston Road.

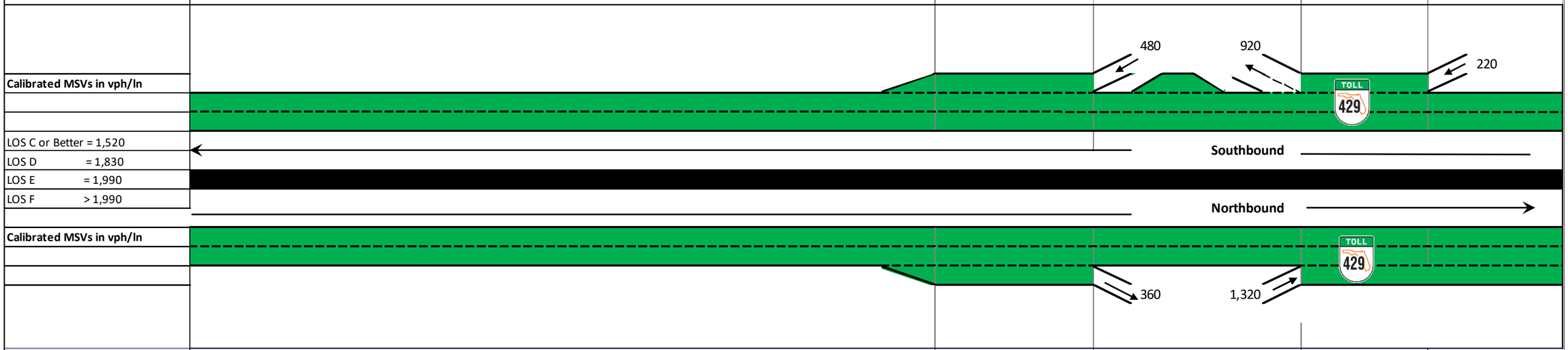
Vissim driving behavior parameters used to calibrate the existing conditions model and documented in the calibration report provided in **Appendix D** were carried over to the future year analysis. These parameters were used in evaluating future conditions for the No-Build and Build scenarios with and without the SR 429 at Livingston Road interchange.

6.3.1 2030 No-Build and Build Alternatives – Freeway Analysis

The Opening Year 2030 Vissim analysis results for the No-Build mainline/basic and ramp merge/diverge northbound and southbound segments are summarized in **Figures 6.4** and **6.5** for AM and PM peak hours, respectively. The freeway segments analysis results indicated that in the AM and PM design hours, all northbound and southbound segments are projected to operates at LOS C or better. The Opening Year 2030 Build Alternative without the SR 429 at Livingston Road interchange analysis results are depicted in **Figures 6.6** and **6.7** for the AM and PM peak hour, respectively. The Build Alternative with SR 429 at Livingston Road interchange analysis results are shown in **Figure 6.8** and **6.9** for AM and PM peak hour respectively. The freeway segments analysis results indicated that in the AM and PM design hours, all northbound and southbound segments are projected to operate at LOS B or better.

Figure 6.4
2030 AM No-Build Design Hour Vissim Freeway Performance Results

Type	Downstream of US-192 On-ramp_Basic	Downstream of US-192_Merge	Dowstream of US-192-Off-ramp_Basic	Downstream of Western Way On-ramp_Weave	Upstream of Western Way On-ramp_Basic
Input Demand (vph)	2,670	2,670	2,190	3,110	2,890
Model (vph)	2,361	2,599	2,186	3,104	2,887
Processed Demand	88%	97%	100%	100%	100%
Speed (mph)	70	69	70	69	70
Density (pcpmpl)	17	12	14	16	22
Demand over Capacity (d/c)	0.67	0.45	0.44	0.52	0.73
Estimated LOS	B	B	B	B	C

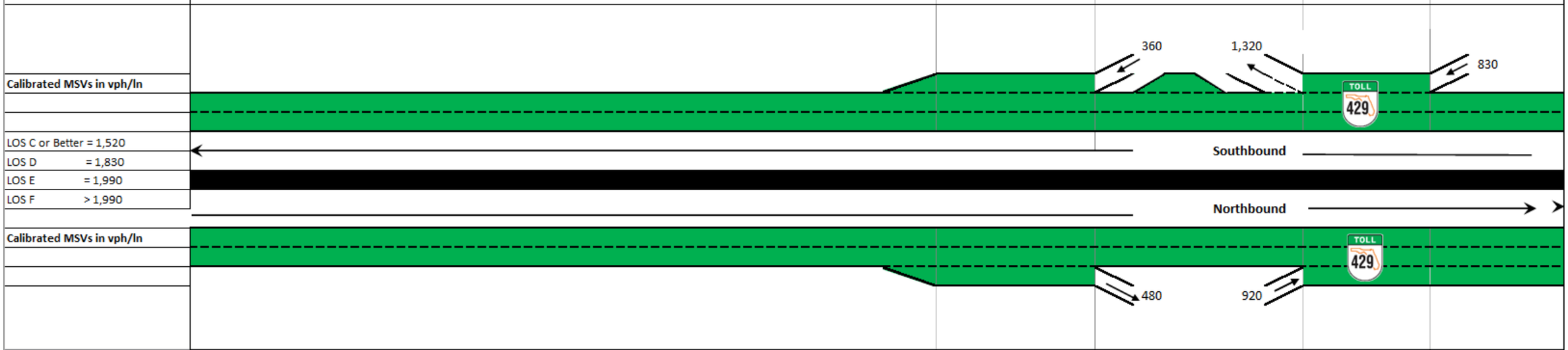


Type	Upstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192 on-ramp_Basic	Downstream of US-192 On Ramp_Merge	Downstream of US-192_Basic
Input Demand (vph)	1,670	1,670	1,310	2,630	2,630
Model (vph)	1,668	1,669	1,314	2,491	2,503
Processed Demand	100%	100%	100%	95%	95%
Speed (mph)	71	68	71	66	71
Density (pcpmpl)	12	12	10	13	14
Demand over Capacity (d/c)	0.17	0.28	0.33	0.44	0.44
Estimated LOS	B	B	A	B	B

LOS = A-C / Uncongested LOS = D / Light Congestion LOS = E / Moderate Congestion LOS = F / Heavily Congested

Figure 6.5
2030 PM No-Build Design Hour Vissim Freeway Performance Results

Type	Downstream of US-192 On-ramp_Basic	Downstream of US-192_Merge	Dowstream of US-192-Off-ramp_Basic	Downstream of Western Way On-ramp_Weave	Upstream of Western Way On-ramp_Basic
Input Demand (vph)	2,920	2,920	2,560	3,880	3,050
Model (vph)	2,692	2,900	2,567	3,875	3,043
Processed Demand	92%	99%	100%	100%	100%
Speed (mph)	69	69	70	67	69
Density (pcpmpl)	20	14	16	20	23
Demand over Capacity (d/c)	0.73	0.49	0.51	0.65	0.77
Estimated LOS	C	B	B	C	C

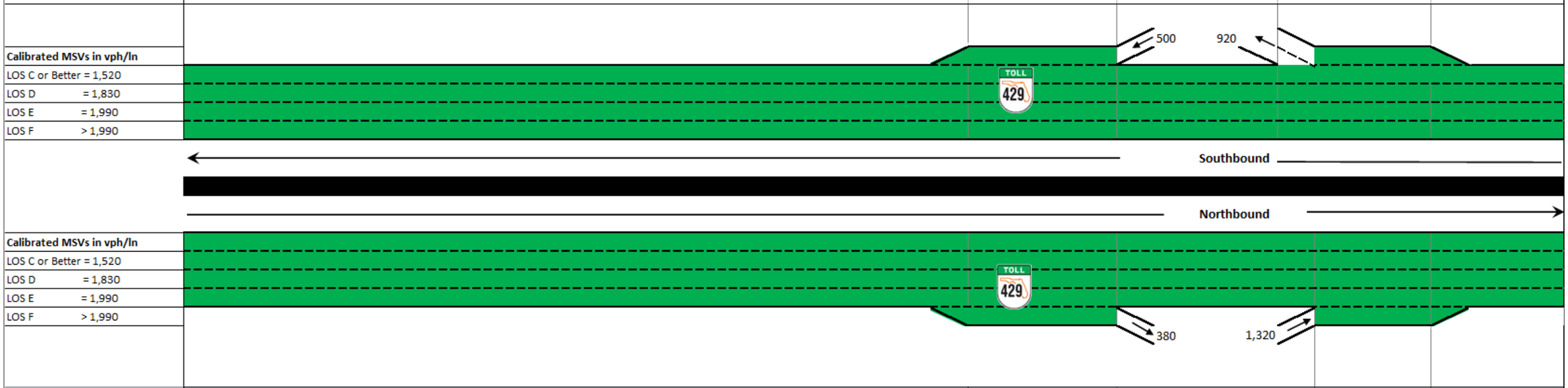


Type	Upstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192 on-ramp_Basic	Downstream of US-192 On Ramp_Merge	Downstream of US-192_Basic
Input Demand (vph)	2,320	2,320	1,840	2,760	2,760
Model (vph)	2,318	2,318	1,833	2,683	2,678
Processed Demand	100%	100%	100%	97%	97%
Speed (mph)	70	66	70	67	70
Density (pcpmpl)	17	17	14	14	16
Demand over Capacity (d/c)	0.58	0.39	0.46	0.69	0.46
Estimated LOS	B	B	B	B	B

LOS = A-C / Uncongested LOS = D / Light Congestion LOS = E / Moderate Congestion LOS = F / Heavily Congested

Figure 6.6
2030 AM Build w/o Livingston Road Interchange Design Hour Vissim Freeway Performance Results

Type	Downstream of US-192 on-ramp_Basic	Downstream of US-192 on-ramp_Merge	Downstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192_Basic
Input Demand (vph)	2,350	2,350	1,850	2,770	2,770
Model (vph)	2,343	2,345	1,853	2,769	2,769
Processed Demand	100%	100%	100%	100%	100%
Speed (mph)	72	70	72	71	71
Density (pcpmpl)	9	7	5	8	12
Demand over Capacity (d/c)	0.30	0.24	0.23	0.28	0.35
Estimated LOS	A	A	A	A	B

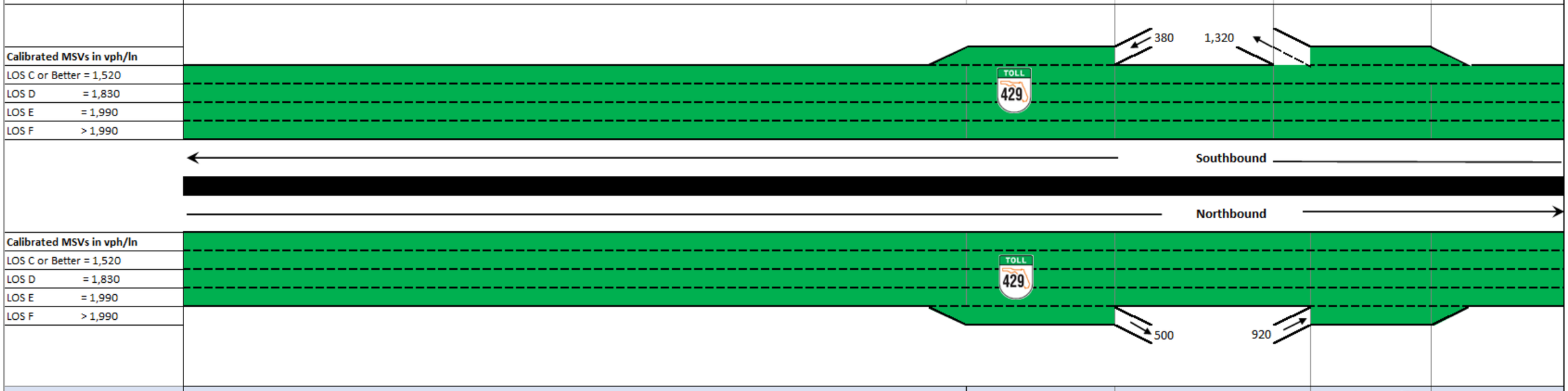


Type	Upstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192 on-ramp_Basic	Downstream of US-192 On Ramp_Merge	Downstream of US-192_Basic
Input Demand (vph)	2,150	2,150	1,770	3,090	3,090
Model (vph)	2,148	2,143	1,756	3,075	3,089
Processed Demand	100%	100%	99%	100%	100%
Speed (mph)	72	72	72	68	71
Density (pcpmpl)	8	6	6	9	11
Demand over Capacity (d/c)	0.27	0.22	0.22	0.31	0.39
Estimated LOS	A	A	A	A	B

LOS = A-C / Uncongested LOS = D / Light Congestion LOS = E / Moderate Congestion LOS = F / Heavily Congested

Figure 6.7
2030 PM Build w/o Livingston Road Interchange Design Hour Vissim Freeway Performance Results

Type	Downstream of US-192 on-ramp_Basic	Downstream of US-192 on-ramp_Merge	Downstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192_Basic
Input Demand (vph)	3,100	3,100	2,720	4,040	4,040
Model (vph)	3,075	3,065	2,707	4,023	4,039
Processed Demand	99%	99%	100%	100%	100%
Speed (mph)	71	71	71	71	71
Density (pcpmpl)	11	9	8	12	18
Demand over Capacity (d/c)	0.39	0.31	0.34	0.41	0.51
Estimated LOS	B	A	A	B	B

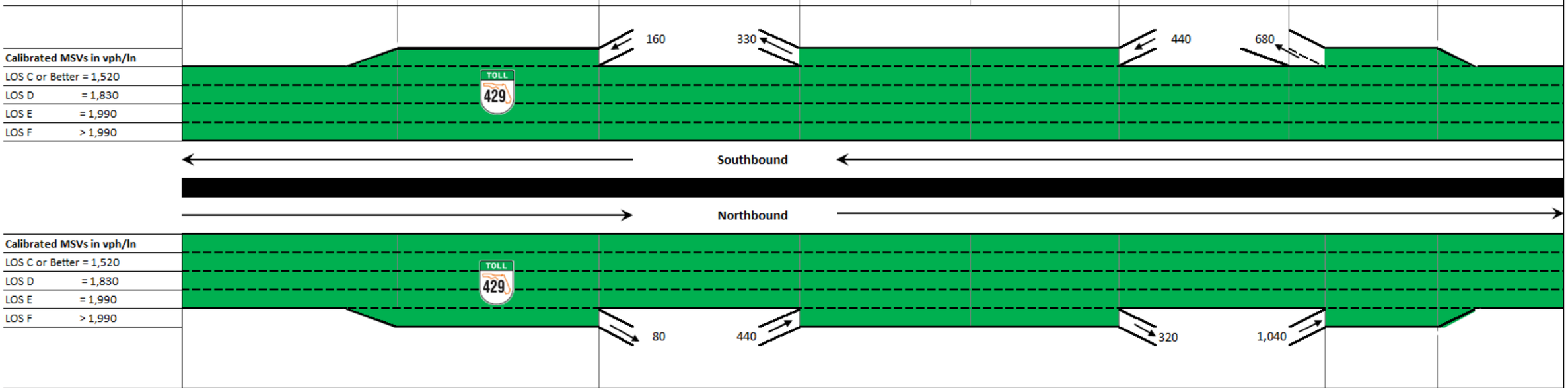


Type	Upstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192 on-ramp_Basic	Downstream of US-192 On Ramp_Merge	Downstream of US-192_Basic
Input Demand (vph)	2,280	2,280	1,780	2,700	2,700
Model (vph)	2,278	2,275	1,766	2,655	2,666
Processed Demand	100%	100%	99%	98%	99%
Speed (mph)	72	72	72	70	71
Density (pcpmpl)	8	7	6	8	10
Demand over Capacity (d/c)	0.29	0.23	0.22	0.27	0.34
Estimated LOS	A	A	A	A	A

LOS = A-C / Uncongested LOS = D / Light Congestion LOS = E / Moderate Congestion LOS = F / Heavily Congested

Figure 6.8
2030 AM Build w/Livingston Road Interchange Design Hour Vissim Freeway Performance Results

Type	Downstream of Livingston_Basic	Downstream of Livingston_Merge	Upstream of Livingston on-ramp_Basic	Upstream of Livingston off-ramp_Diverge	Downstream of US-192 on-ramp_Merge	Downstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192_Basic
Input Demand (vph)	2,360	2,360	2,200	2,530	2,530	2,090	2,770	2,770
Model (vph)	2,353	2,353	2,200	2,529	2,531	2,095	2,769	2,769
Processed Demand	100%	100%	100%	100%	100%	100%	100%	100%
Speed (mph)	71	71	72	71	71	72	71	72
Density (pcpmpl)	9	7	8	7	8	6	8	10
Demand over Capacity (d/c)	0.30	0.24	0.28	0.25	0.25	0.26	0.28	0.35
Estimated LOS	A	A	A	A	A	A	A	A

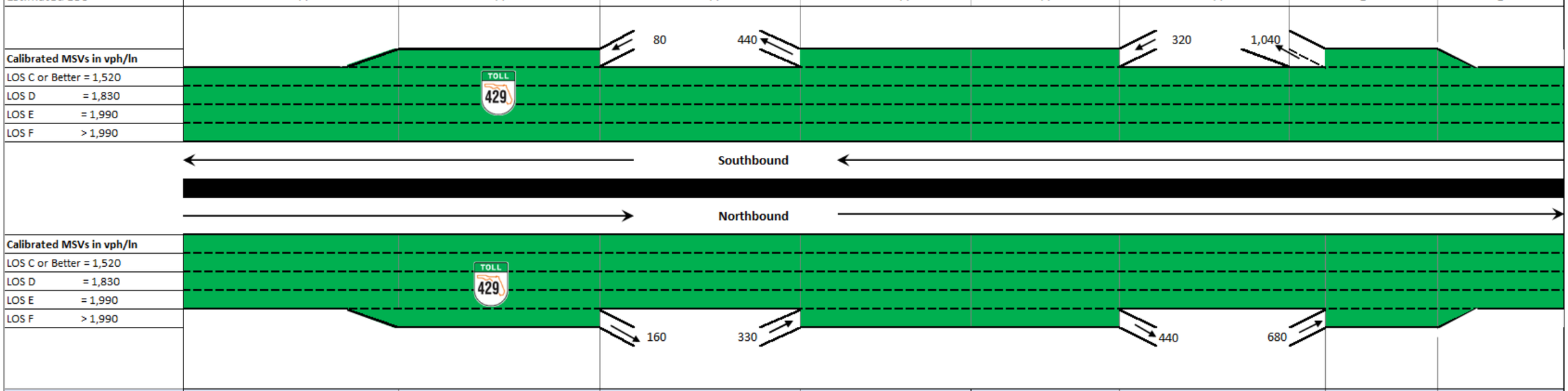


Type	Upstream of Livingston_Basic	Upstream of Livingston_Diverge	Downstream of Livingston off-ramp_Basic	Downstream of Livingston on-ramp_Merge	Upstream of US-192 off-ramp_Diverge	Upstream of US-192 on-ramp_Basic	Downstream of US-192 On Ramp_Merge	Downstream of US-192_Basic
Input Demand (vph)	2,010	2,010	1,930	2,370	2,370	2,050	3,090	3,090
Model (vph)	2,007	2,005	1,919	2,357	2,358	2,036	3,091	3,092
Processed Demand	100%	100%	99%	99%	99%	99%	100%	100%
Speed (mph)	72	72	72	71	72	72	69	71
Density (pcpmpl)	7	6	7	7	7	7	9	11
Demand over Capacity (d/c)	0.25	0.20	0.24	0.24	0.24	0.26	0.31	0.39
Estimated LOS	A	A	A	A	A	A	A	B

LOS = A-C / Uncongested LOS = D / Light Congestion LOS = E / Moderate Congestion LOS = F / Heavily Congested

Figure 6.9
2030 PM Build w/Livingston Road Interchange Design Hour Vissim Freeway Performance Results

Type	Downstream of Livingston_Basic	Downstream of Livingston_Merge	Upstream of Livingston on-ramp_Basic	Upstream of Livingston off-ramp_Diverge	Downstream of US-192 on-ramp_Merge	Downstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192_Basic
Input Demand (vph)	2,960	2,960	2,880	3,320	3,320	3,000	4,040	4,040
Model (vph)	2,930	2,929	2,856	3,292	3,294	2,989	4,023	4,040
Processed Demand	99%	99%	99%	99%	99%	100%	100%	100%
Speed (mph)	71	71	71	71	71	71	71	71
Density (pcpmpl)	11	9	11	10	10	9	12	15
Demand over Capacity (d/c)	0.37	0.30	0.36	0.33	0.33	0.38	0.41	0.51
Estimated LOS	A	A	A	A	A	A	B	B



Type	Upstream of Livingston_Basic	Upstream of Livingston_Diverge	Downstream of Livingston off-ramp_Basic	Downstream of Livingston on-ramp_Merge	Upstream of US-192 off-ramp_Diverge	Upstream of US-192 on-ramp_Basic	Downstream of US-192 On Ramp_Merge	Downstream of US-192_Basic
Input Demand (vph)	2,290	2,290	2,130	2,460	2,460	2,020	2,700	2,700
Model (vph)	2,286	2,286	2,125	2,451	2,451	2,005	2,667	2,674
Processed Demand	100%	100%	100%	100%	100%	99%	99%	99%
Speed (mph)	72	72	72	71	71	72	70	71
Density (pcpmpl)	8	7	8	7	7	7	8	10
Demand over Capacity (d/c)	0.29	0.23	0.27	0.25	0.25	0.25	0.27	0.34
Estimated LOS	A	A	A	A	A	A	A	A

LOS = A-C / Uncongested LOS = D / Light Congestion LOS = E / Moderate Congestion LOS = F / Heavily Congested

6.3.2 2050 No-Build and Build Alternatives – Freeway Analysis

The 2050 Design Year No-Build mainline/basic and ramp merge/diverge VISSIM analysis results are summarized in **Figures 6.10** and **6.11** for the northbound and southbound directions during the AM and PM peak design hour. Under No-Build conditions, the analysis results indicate the following:

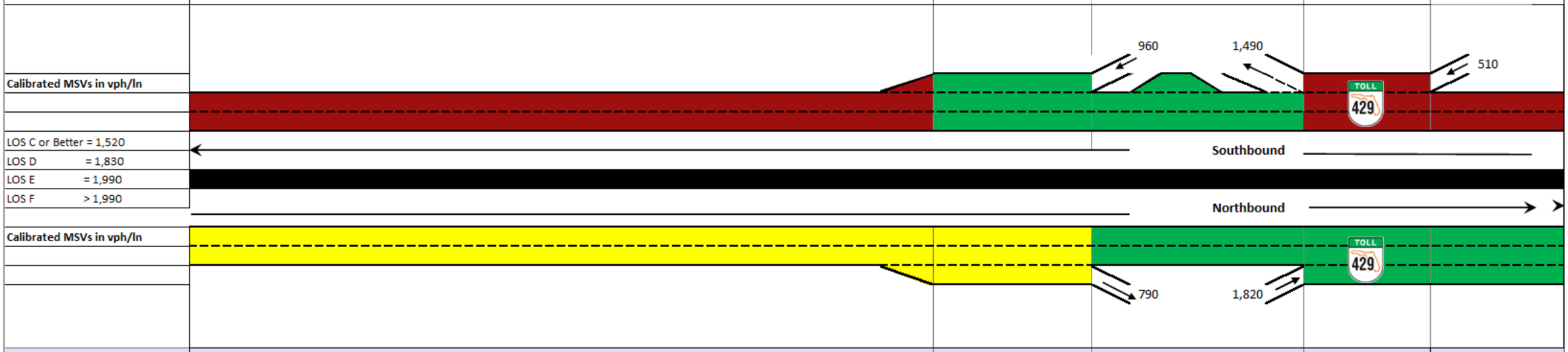
- For the AM design hour in the southbound direction, the segment upstream of the Western Way on-ramp and basic segment downstream of US 192 on-ramp operate at LOS F as the demands exceeds the capacity.
- Further, the southbound segment downstream of the Western Way on-ramp also operates at LOS F as the queue from the US 192 off-ramp backs up to the mainline.
- In the northbound direction, the segments upstream of US 192 off-ramp operate at LOS D due to heavy traffic demand.
- All the southbound and northbound segments in the PM operate similar to the AM except the northbound diverge segment upstream of US 192 which would operate at LOS E due to the queues from the off-ramp.

Figures 6.12 through **6.16** provide a summary of Design Year 2050 Build Alternative with and without the Livingston Road interchange analysis results for the SR 429 northbound and southbound directions. For the Build Alternative with and without the Livingston Road interchange, the results show that all mainline and ramp segments are projected to operate at LOS C or better during both the AM and PM design hours, except the basic segment of SR 429 southbound upstream of the US 192 off-ramp in the PM design hour which would operate at LOS D.

However, for the Build Alternative without the Livingston Road interchange, the diverge southbound segment upstream of the US 192 off-ramp would operate at LOS F during the PM post peak hour while operating at LOS D during the peak hour (see **Figure 6.14**). The queues back up to the SR 429 southbound mainline after the peak hour due to an accumulation of traffic and the inability of the southbound off-ramp terminal at US 192 to dissipate vehicle queues from the preceding peak hour period.

Figure 6.10
2050 AM No-Build Design Hour VISSIM Freeway Performance Results

Type	Downstream of US-192 On-ramp_Basic	Downstream of US-192_Merge	Dowstream of US-192-Off-ramp_Basic	Downstream of Western Way On-ramp_Weave	Upstream of Western Way On-ramp_Basic
Input Demand (vph)	4,210	4,210	3,250	4,740	4,230
Model (vph)	3,162	3,508	2,883	4,193	3,783
Processed Demand	75%	83%	89%	89%	89%
Speed (mph)	68	68	67	36	42
Density (pcpmpl)	23	17	19	60	54
Demand over Capacity (d/c)	1.06	0.71	0.65	0.79	1.06
Estimated LOS	F	B	C	F	F

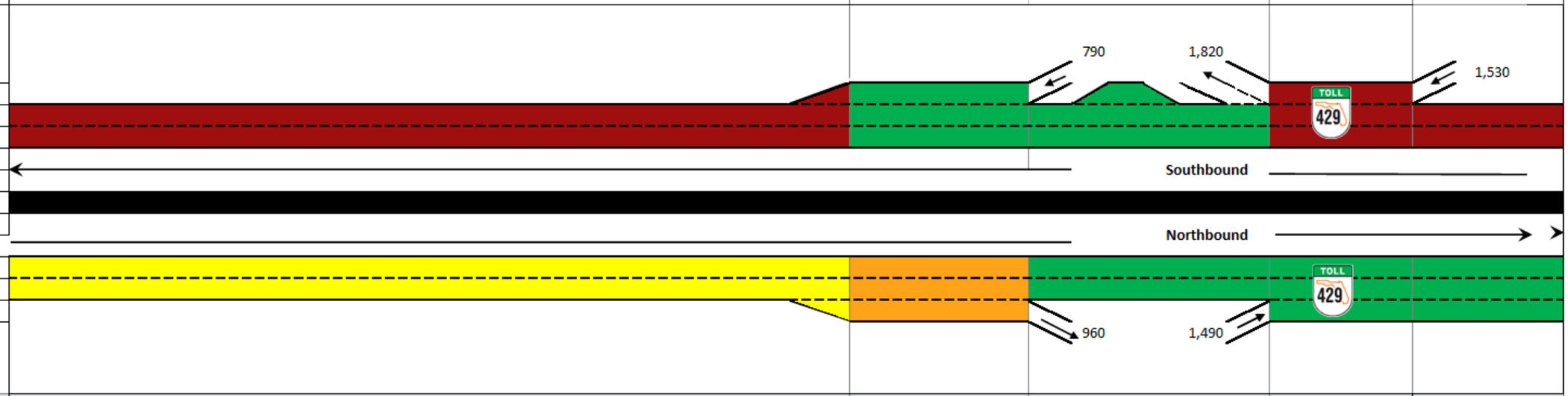


Type	Upstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192 on-ramp_Basic	Downstream of US-192 On Ramp_Merge	Downstream of US-192_Basic
Input Demand (vph)	3,440	3,440	2,650	4,470	4,470
Model (vph)	3,434	3,429	2,639	3,873	3,885
Processed Demand	100%	100%	100%	87%	87%
Speed (mph)	68	63	69	66	68
Density (pcpmpl)	27	27	20	21	23
Demand over Capacity (d/c)	0.86	0.58	0.67	0.75	0.75
Estimated LOS	D	D	C	C	C

LOS = A-C / Uncongested LOS = D / Light Congestion LOS = E / Moderate Congestion LOS = F / Heavily Congested

Figure 6.11
2050 PM No-Build Design Hour VISSIM Freeway Performance Results

Type	Downstream of US-192 On-ramp_Basic	Downstream of US-192_Merge	Dowstream of US-192-Off-ramp_Basic	Downstream of Western Way On-ramp_Weave	Upstream of Western Way On-ramp_Basic
Input Demand (vph)	5,050	5,050	4,260	6,080	4,550
Model (vph)	3,788	4,102	3,581	4,931	3,443
Processed Demand	75%	81%	84%	89%	76%
Speed (mph)	67	68	64	24	25
Density (pcpmpl)	28	20	25	72	75
Demand over Capacity (d/c)	1.27	0.85	0.86	1.02	1.14
Estimated LOS	F	C	C	F	F

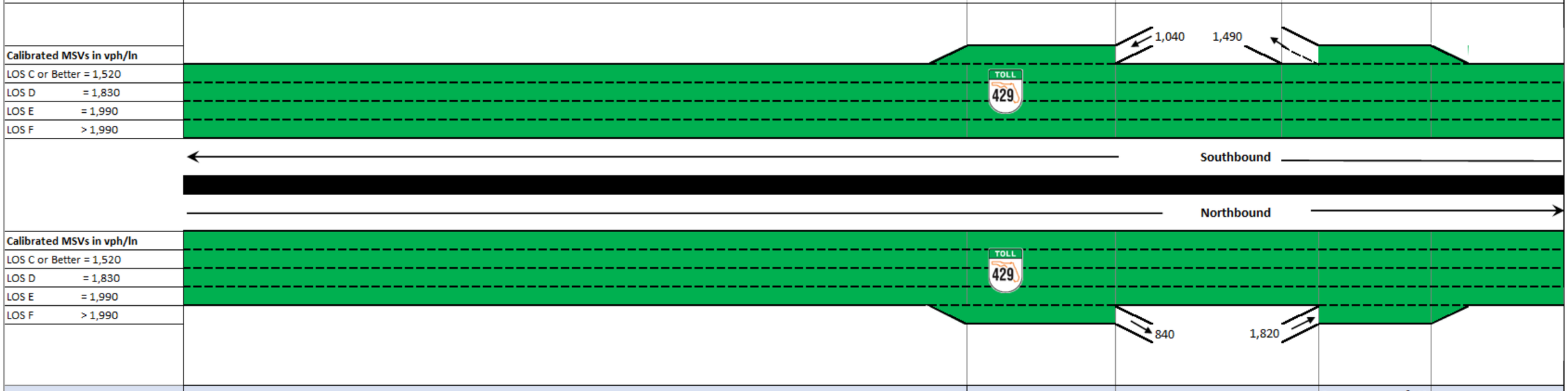


Type	Upstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192 on-ramp_Basic	Downstream of US-192 On Ramp_Merge	Downstream of US-192_Basic
Input Demand (vph)	3,920	3,920	2,960	4,450	4,450
Model (vph)	3,899	3,893	2,946	3,926	3,918
Processed Demand	99%	99%	100%	88%	88%
Speed (mph)	62	57	68	67	68
Density (pcpmpl)	34	35	23	21	24
Demand over Capacity (d/c)	0.98	0.66	0.74	0.75	0.75
Estimated LOS	D	E	C	C	C

LOS = A-C / Uncongested LOS = D / Light Congestion LOS = E / Moderate Congestion LOS = F / Heavily Congested

Figure 6.12
2050 AM Build w/o Livingston Road Interchange Design Hour VISSIM Freeway Performance Results

Type	Downstream of US-192 on-ramp_Basic	Downstream of US-192 on-ramp_Merge	Downstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192_Basic
Input Demand (vph)	4,090	4,090	3,050	4,540	4,540
Model (vph)	3,869	3,860	3,022	4,511	4,537
Processed Demand	95%	94%	99%	99%	100%
Speed (mph)	71	70	71	58	70
Density (pcpmpl)	14	12	9	20	20
Demand over Capacity (d/c)	0.51	0.41	0.38	0.46	0.57
Estimated LOS	B	B	A	C	C

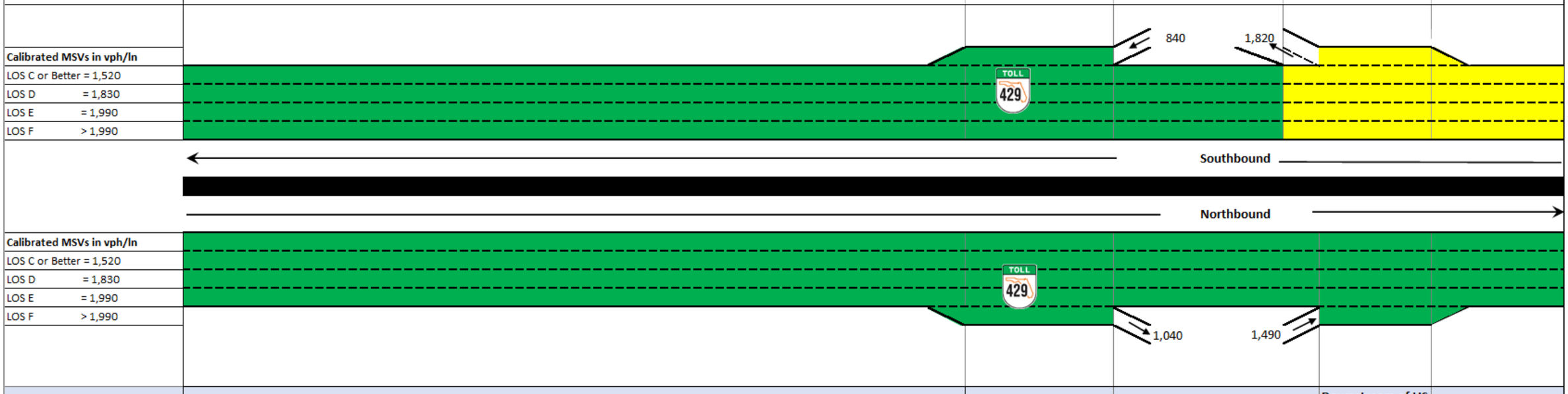


Type	Upstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192 on-ramp_Basic	Downstream of US-192 On Ramp_Merge	Downstream of US-192_Basic
Input Demand (vph)	4,110	4,110	3,270	5,090	5,090
Model (vph)	4,108	4,105	3,255	4,786	4,784
Processed Demand	100%	100%	100%	94%	94%
Speed (mph)	71	71	71	68	70
Density (pcpmpl)	15	12	12	15	18
Demand over Capacity (d/c)	0.52	0.41	0.41	0.51	0.64
Estimated LOS	B	B	B	B	B

LOS = A-C / Uncongested LOS = D / Light Congestion LOS = E / Moderate Congestion LOS = F / Heavily Congested

Figure 6.13
2050 PM Build w/o Livingston Road Interchange Design Hour VISSIM Freeway Performance Results

Type	Downstream of US-192 on-ramp_Basic	Downstream of US-192 on-ramp_Merge	Downstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192_Basic
Input Demand (vph)	5,790	5,790	4,950	6,770	6,770
Model (vph)	5,623	5,632	4,896	6,713	6,764
Processed Demand	97%	97%	99%	99%	100%
Speed (mph)	70	70	70	59	68
Density (pcpmpl)	21	17	15	27	31
Demand over Capacity (d/c)	0.73	0.58	0.62	0.68	0.85
Estimated LOS	C	B	B	D	D

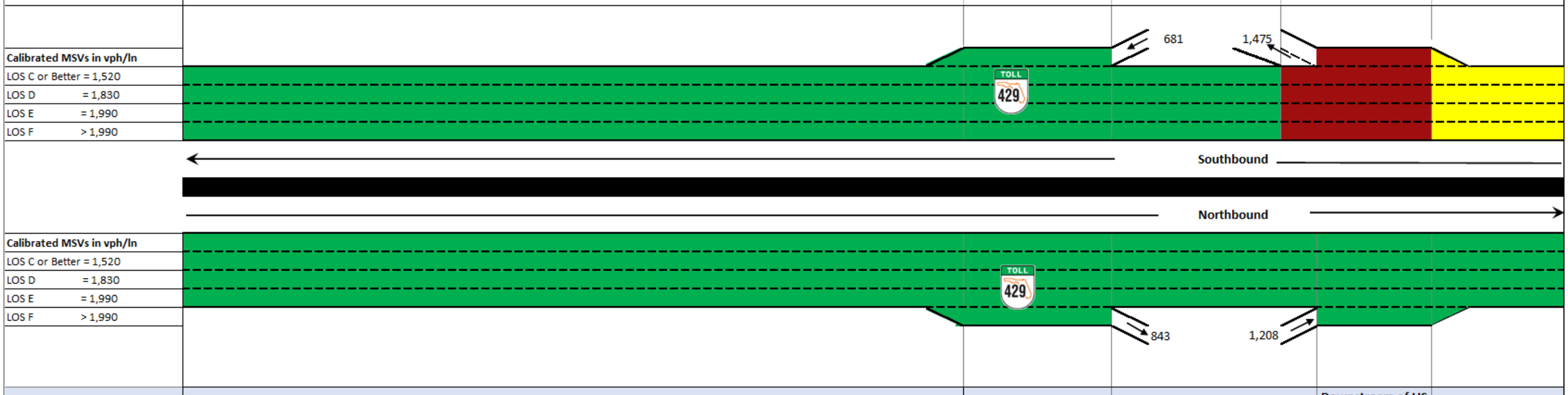


Type	Upstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192 on-ramp_Basic	Downstream of US-192 On Ramp_Merge	Downstream of US-192_Basic
Input Demand (vph)	4,030	4,030	2,990	4,480	4,480
Model (vph)	4,027	4,013	2,970	4,270	4,275
Processed Demand	100%	100%	99%	95%	95%
Speed (mph)	71	70	71	69	71
Density (pcpmpl)	15	12	11	13	16
Demand over Capacity (d/c)	0.51	0.41	0.38	0.45	0.56
Estimated LOS	B	B	A	B	B

LOS = A-C / Uncongested LOS = D / Light Congestion LOS = E / Moderate Congestion LOS = F / Heavily Congested

Figure 6.14
2050 PM Build w/o Livingston Road Interchange Design Hour VISSIM Freeway Performance Results (Post Peak Hour)

Type	Downstream of US-192 on-ramp_Basic	Downstream of US-192 on-ramp_Merge	Downstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192_Basic
Input Demand (vph)	4,693	4,693	4,012	5,488	5,488
Model (vph)	4,862	4,819	4,092	5,586	5,585
Processed Demand	104%	103%	102%	102%	102%
Speed (mph)	70	70	69	41	59
Density (pcpmpl)	18	15	12	47	33
Demand over Capacity (d/c)	0.59	0.47	0.50	0.55	0.69
Estimated LOS	C	B	B	F	D

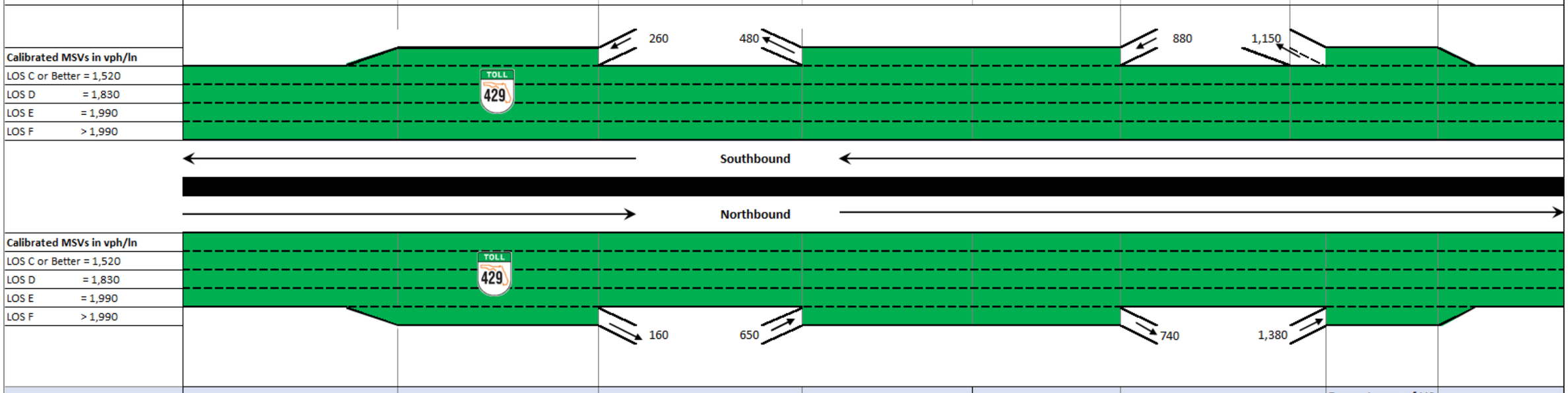


Type	Upstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192 on-ramp_Basic	Downstream of US-192 On Ramp_Merge	Downstream of US-192_Basic
Input Demand (vph)	3,267	3,267	2,424	3,631	3,631
Model (vph)	3,292	3,299	2,453	3,736	3,768
Processed Demand	101%	101%	101%	103%	104%
Speed (mph)	71	71	72	69	71
Density (pcpmpl)	12	10	9	11	14
Demand over Capacity (d/c)	0.41	0.33	0.30	0.36	0.46
Estimated LOS	B	A	A	B	B

LOS = A-C / Uncongested LOS = D / Light Congestion LOS = E / Moderate Congestion LOS = F / Heavily Congested

Figure 6.15
2050 AM Build w/Livingston Road Interchange Design Hour VISSIM Freeway Performance Results

Type	Downstream of Livingston_Basic	Downstream of Livingston_Merge	Upstream of Livingston on-ramp_Basic	Upstream of Livingston off-ramp_Diverge	Downstream of US-192 on-ramp_Merge	Downstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192_Basic
Input Demand (vph)	4,050	4,050	3,790	4,270	4,270	3,390	4,540	4,540
Model (vph)	3,940	3,934	3,692	4,160	4,159	3,371	4,520	4,537
Processed Demand	97%	97%	97%	97%	97%	99%	100%	100%
Speed (mph)	71	70	71	71	70	71	70	71
Density (pcpmpl)	15	12	14	12	13	10	14	20
Demand over Capacity (d/c)	0.51	0.41	0.48	0.43	0.43	0.43	0.46	0.57
Estimated LOS	B	B	B	B	B	A	B	C

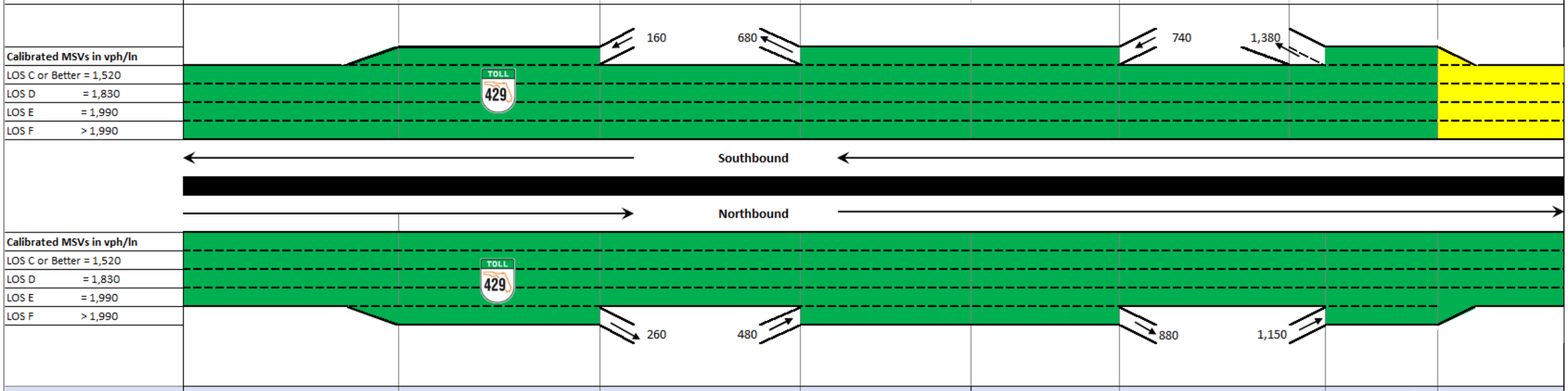


Type	Upstream of Livingston_Basic	Upstream of Livingston_Diverge	Downstream of Livingston off-ramp_Basic	Downstream of Livingston on-ramp_Merge	Upstream of US-192 off-ramp_Diverge	Upstream of US-192 on-ramp_Basic	Downstream of US-192 On Ramp_Merge	Downstream of US-192_Basic
Input Demand (vph)	3,960	3,960	3,800	4,450	4,450	3,710	5,090	5,090
Model (vph)	3,956	3,956	3,793	4,428	4,427	3,683	4,943	4,937
Processed Demand	100%	100%	100%	100%	99%	99%	97%	97%
Speed (mph)	71	71	71	70	71	71	68	70
Density (pcpmpl)	15	12	14	13	13	14	15	18
Demand over Capacity (d/c)	0.50	0.40	0.48	0.45	0.45	0.47	0.51	0.64
Estimated LOS	B	B	B	B	B	B	B	C

LOS = A-C / Uncongested LOS = D / Light Congestion LOS = E / Moderate Congestion LOS = F / Heavily Congested

Figure 6.16
2050 PM Build w/Livingston Road Interchange Design Hour VISSIM Freeway Performance Results

Type	Downstream of Livingston_Basic	Downstream of Livingston_Merge	Upstream of Livingston on-ramp_Basic	Upstream of Livingston off-ramp_Diverge	Downstream of US-192 on-ramp_Merge	Downstream of US-192 off-ramp_Basic	Upstream of US-192 off-ramp_Diverge	Upstream of US-192_Basic
Input Demand (vph)	5,610	5,610	5,450	6,130	6,130	5,390	6,770	6,770
Model (vph)	5,505	5,502	5,354	6,019	6,034	5,365	6,745	6,770
Processed Demand	98%	98%	98%	98%	98%	100%	100%	100%
Speed (mph)	70	69	70	70	70	70	69	69
Density (pcpmpl)	21	17	20	18	18	16	21	31
Demand over Capacity (d/c)	0.70	0.56	0.68	0.62	0.62	0.68	0.68	0.85
Estimated LOS	C	B	C	C	C	B	C	D



Type	Upstream of Livingston_Basic	Upstream of Livingston_Diverge	Downstream of Livingston off-ramp_Basic	Downstream of Livingston on-ramp_Merge	Upstream of US-192 off-ramp_Diverge	Upstream of US-192 on-ramp_Basic	Downstream of US-192 On Ramp_Merge	Downstream of US-192_Basic
Input Demand (vph)	3,990	3,990	3,730	4,210	4,210	3,330	4,480	4,480
Model (vph)	3,984	3,980	3,716	4,181	4,182	3,301	4,341	4,348
Processed Demand	100%	100%	100%	99%	99%	99%	97%	97%
Speed (mph)	71	71	71	70	71	71	69	71
Density (pcpmpl)	15	12	14	12	12	12	13	16
Demand over Capacity (d/c)	0.50	0.40	0.47	0.42	0.42	0.42	0.45	0.56
Estimated LOS	B	B	B	B	B	B	B	B

LOS = A-C / Uncongested LOS = D / Light Congestion LOS = E / Moderate Congestion LOS = F / Heavily Congested

6.3.3 No-Build and Build Alternatives – Intersection Analysis

Tables 6.13 and **6.14** provide a summarized comparison of the intersection analysis results for 2030 and 2050 No-Build and Build conditions, respectively. The detailed Vissim intersection results for 2030 and 2050 No-Build and Build conditions are provided in **Appendix G**. The intersection analysis results indicate the following:

Opening Year 2030 – No-Build Conditions

- The SR 429 southbound ramp terminal intersection at US 192 operates at LOS D during the AM and PM design hours. While the SR 429 northbound ramp terminal intersection at US 192 operates at LOS C during the AM and PM design hours.
- All study intersections along US 192 operate at LOS D or better during the AM design hour, except the intersection of West Orange Lake Boulevard that operates at LOS F. During the PM design hour, all intersections operate at LOS D or better, except the East Orange Lake Boulevard intersection that operates at LOS F.

Design Year 2050 – No-Build Conditions

- The SR 429 northbound and southbound ramp terminal intersections at US 192 operate at LOS E or worse in both the AM and PM design hours.
- All arterial intersections in the study area are estimated to operate at LOS D or worse during the AM design hour and at LOS F during the PM design hour.

Opening Year 2030 – Build Conditions

- The SR 429 northbound and southbound ramp terminal intersections at US 192 operate at LOS C or better during both the AM and PM design hours under the Build Alternative with and without the Livingston Road interchange.
- Regardless of the Livingston Road interchange, the intersections along US 192 at West Orange Lake Boulevard during the AM design hour, and East Orange Lake Boulevard during the PM design hour, operate at LOS E. All other US 192 arterial intersections in the study area are estimated to operate at LOS D or better during both the AM and PM design hours.

Design Year 2050 – Build Conditions

- The SR 429 southbound ramp terminal intersection at US 192 operates at LOS F during the AM and PM design hours without the Livingston Road interchange, while with the Livingston Road interchange it operates at LOS D. Whereas the SR 429 northbound ramp terminal intersection at US 192 interchange operates at LOS D or better during the AM and PM design hours with or without the Livingston Road interchange.
- For both with and w/o Livingston: the four US 192 signalized intersections in the study area are estimated to operate at LOS E or worse during AM design hour except for Inspiration Drive intersection that operates at LOS D during both AM and PM, and East Orange Lake Boulevard with Livingston interchange scenario. During PM design hour, the four intersections are estimated to operate at LOS F.

Table 6.13
Comparison of 2030 No-Build and Build Vissim Intersection Results

Arterial / Intersection	2030 AM			2030 PM		
	No-Build	Build w/o Livingston Road Interchange	Build with Livingston Road Interchange	No-Build	Build w/o Livingston Road Interchange	Build with Livingston Road Interchange
US 192 / West Orange Lake Boulevard	185/F	67/E	57/E	50/D	38/D	37/D
US 192 / SR 429 SB Ramps	42/D	30/C	23/C	48/D	26/C	16/B
US 192 / SR 429 NB Ramps	30/C	25/C	24/C	33/C	18/B	16/B
US 192 / East Orange Lake Boulevard	33/C	25/C	25/C	115/F	75/E	76/E
US 192 / Inspiration Drive	22/C	32/C	32/C	66/E	54/D	52/D
US 192 / Formosa Garden Boulevard	37/D	36/D	38/D	44/D	39/D	39/D
Cumulative Delay (seconds)	***349***	***216***	***199***	***355***	***250***	***236***
Percent Difference Compared with No-Build						
Cumulative Delay (%)	-	-38%	-43%	-	-30%	-34%

LOS A – C LOS D LOS E LOS F

Table 6.14
Comparison of 2050 No-Build and Build Vissim Intersection Results

Arterial / Intersection	2050 AM			2050 PM		
	No-Build	Build w/o Livingston Road Interchange	Build with Livingston Road Interchange	No-Build	Build w/o Livingston Road Interchange	Build with Livingston Road Interchange
US 192 / West Orange Lake Boulevard	714/F	309/F	199/F	481/F	111/F	99/F
US 192 / SR 429 SB Ramps	266/F	85/F	37/D	288/F	112/F	39/D
US 192 / SR 429 NB Ramps	60/E	50/D	30/C	84/F	51/D	37/D
US 192 / East Orange Lake Boulevard	67/E	67/E	46/D	220/F	187/F	191/F
US 192 / Inspiration Drive	41/D	42/D	37/D	242/F	185/F	142/F
US 192 / Formosa Garden Boulevard	66/E	72/E	55/E	374/F	207/F	86/F
Cumulative Delay (seconds)	***1213***	***626***	***405***	***1690***	***853***	***593***
Percent Difference Compared with No-Build						
Cumulative Delay (%)	-	-48%	-67%	-	-50%	-65%

LOS A – C LOS D LOS E LOS F

6.3.4 No-Build and Build Alternatives – Queue Performance Analysis

Opening Year 2030 – No-Build and Build Conditions

The maximum approach queue lengths are not significant at the SR 429 off-ramps at US 192 for No-Build and Build conditions. However, the eastbound queues on US 192 during the AM design hour and westbound queues on US 192 during the PM design hour are substantial for the No-Build Alternative as shown in feet in **Table 6.15**.

Particularly, the No-Build eastbound queue in the AM design hour is drastic with a length of more than 10,000 feet due to the bottleneck created at the SR 429 northbound ramp terminal intersection. Eastbound left-turn lane storage is not sufficient to accommodate the heavy traffic demand resulting in the blockage of the eastbound through lanes on US 192 that causes a queue to extend all the way back to West Orange Lake Boulevard. Whereas the Build Alternative has an additional through lane and increased left-turn storage lane that reduces queuing.

Table 6.15
2030 Vissim Queue Comparison Results

Arterial / Intersection	Approach	Maximum Approach Queue (feet)					
		No-Build		without Livingston		with Livingston	
		AM	PM	AM	PM	AM	PM
US 192 / West Orange Lake Boulevard	Eastbound	11,998	854	2,372	708	2,014	657
US 192 / SR 429 SB Ramps	Southbound	686	717	468	644	284	359
US 192 / SR 429 NB Ramps	Northbound	260	389	288	250	231	219
US 192 / Formosa Garden Boulevard	Westbound	424	1,425	374	1,180	393	1,020

Design Year 2050 – No-Build Conditions and Build Conditions

- The southbound off-ramp queue for the No-Build Alternative backs up to the mainline and extends well beyond the VISSIM network coded as reflected in **Figure 6.17**, which shows a 2.73-mile queue that is the length of the network.
- Even with the Build Alternative without the Livingston Road interchange, the queues are expected to back up to the mainline during the PM design hour. However, queues will not back up to the mainline under the Build Alternative with the Livingston Road interchange.
- The eastbound queues on US 192 during the AM design hour and westbound queues on US 192 during the PM design hour are worst for all the scenarios with a slight reduction in queue lengths with the Build Alternative with the Livingston Road interchange.
- Maximum queue lengths in miles by intersection approach are shown in **Table 6.16** for the year 2050 AM and PM design hours.

Figure 6.17
2050 Southbound Off-Ramp at US 192 Queue Comparisons

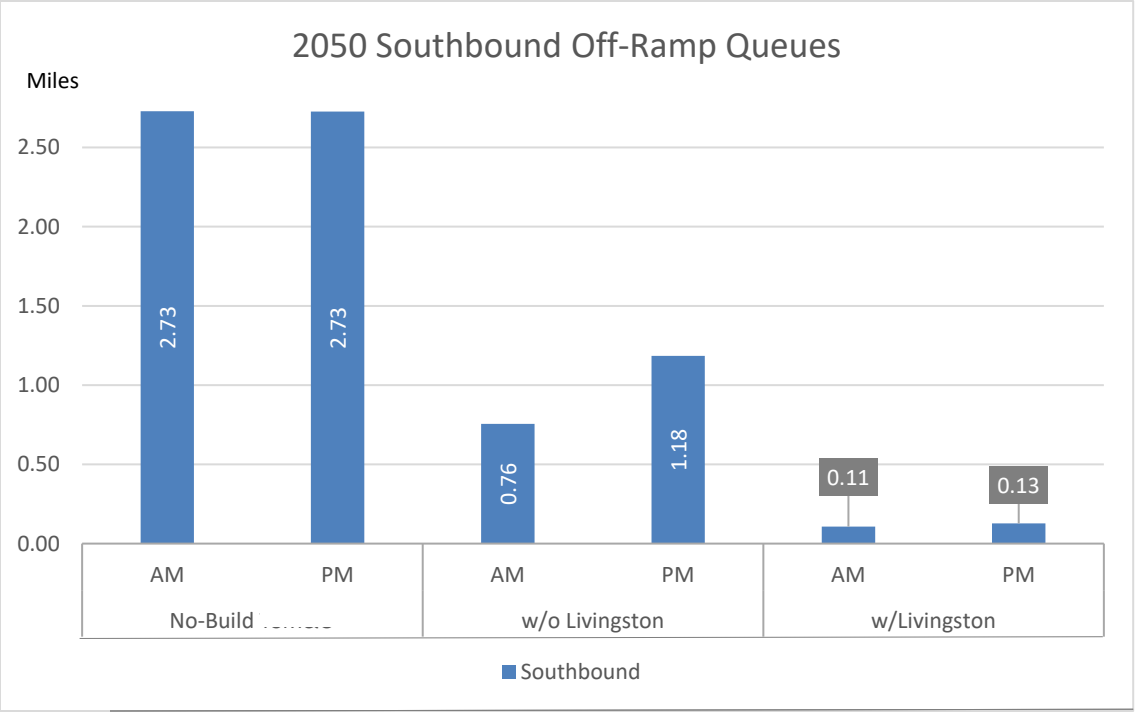


Table 6.16
2050 VISSIM Queue Comparison Results

Arterial / Intersection	Approach	Maximum Approach Queue (feet)					
		No-Build		without Livingston		with Livingston	
		AM	PM	AM	PM	AM	PM
US 192 / West Orange Lake Boulevard	Eastbound	15,259	15,259	15,259	2,165	14,890	1,531
US 192 / SR 429 SB Ramps	Southbound	14,414	14,414	4,013	6,230	581	686
US 192 / SR 429 NB Ramps	Northbound	1,003	2,851	686	686	581	475
US 192 / Formosa Garden Boulevard	Westbound	950	9,926	845	9,926	686	4,541

One of the main reasons for the increased queueing in eastbound traffic at 192/West Orange Lake is due to the Eastbound left (EBL) traffic at the SR 429 Northbound Ramp arterial. The EBL traffic blocks the through lanes resulting in heavy queues. For 2050 PM, firstly eastbound traffic at W Org Lake is close to 2030 AM. Further, the westbound traffic and northbound traffic at SR 429 Northbound Ramp intersection is too high to provide more green time for eastbound left movement. Hence, the 192/West Orange Lake would experience worst queues (2.89 miles) like 2030 AM. All the node MOEs are included in the **Appendix G**.

6.3.5 No-Build and Build Alternatives – Network Performance Analysis

For the mainline, interchange ramps and the intersections, VISSIM analysis results show that the Build Alternative with the Livingston Road interchange provides improved operational performance compared to the No-Build Alternative and the Build Alternative without the Livingston Road interchange. The enhanced operations under the Build Alternative with the Livingston Road interchange are also reflected within the study area using the network-wide performance results shown in **Tables 6.17** and **6.18** for years 2030 and 2050, respectively. Travel time comparisons are shown in **Figures 6.18** and **6.19** for years 2030 and 2050, respectively.

Table 6.17
2030 VISSIM Network Performance Comparisons

Performance Measure	2030 AM			2030 PM		
	No-Build	Build without Livingston Road Interchange	Build with Livingston Road Interchange	No-Build	Build without Livingston Road Interchange	Build with Livingston Road Interchange
Total Travel Time (hour)	5,631	4,906	4,859	5,581	5,385	5,299
Total Delay Time (hour)	2,104	1,079	990	1,691	1,250	1,167
Average Delay (seconds/vehicle)	179	89	80	125	91	84
Average Speed (mph)	37	45	46	41	44	45
Delay Latent (hour)	1	0	0	2	0	0
Demand Latent (vehicle)	3	0	1	3	1	1
Stops Total	118,502	58,863	57,685	98,613	74,267	68,853
Vehicles arrived	42,693	43,707	44,650	49,535	49,788	50,484
Percent Difference Compared with No-Build						
Total Travel Time (%)	-	-13%	-14%	-	-4%	-5%

Table 6.18
2050 VISSIM Network Performance Comparisons

Performance Measure	2050 AM			2050 PM		
	No-Build	Build without Livingston Road Interchange	Build with Livingston Road Interchange	No-Build	Build without Livingston Road Interchange	Build with Livingston Road Interchange
Total Travel Time (hour)	12,726	9,606	8,114	18,490	11,840	10,104
Total Delay Time (hour)	8,083	4,413	2,791	13,169	5,967	4,046
Average Delay (seconds/vehicle)	489	272	156	676	294	195
Average Speed (mph)	22	32	39	18	30	35
Delay Latent (hour)	9,659	965	1	12,046	4,787	1,433
Demand Latent (vehicle)	21,420	1,999	3	26,161	10,518	3,021
Stops Total	819,691	371,256	196,354	1,372,696	543,273	317,491
Vehicles arrived	55,171	62,440	64,884	63,988	73,824	75,037
Percent Difference Compared with No-Build						
Total Travel Time (%)	-	-25%	-36%	-	-36%	-45%

Figure 6.18
2030 VISSIM Travel Time Comparisons

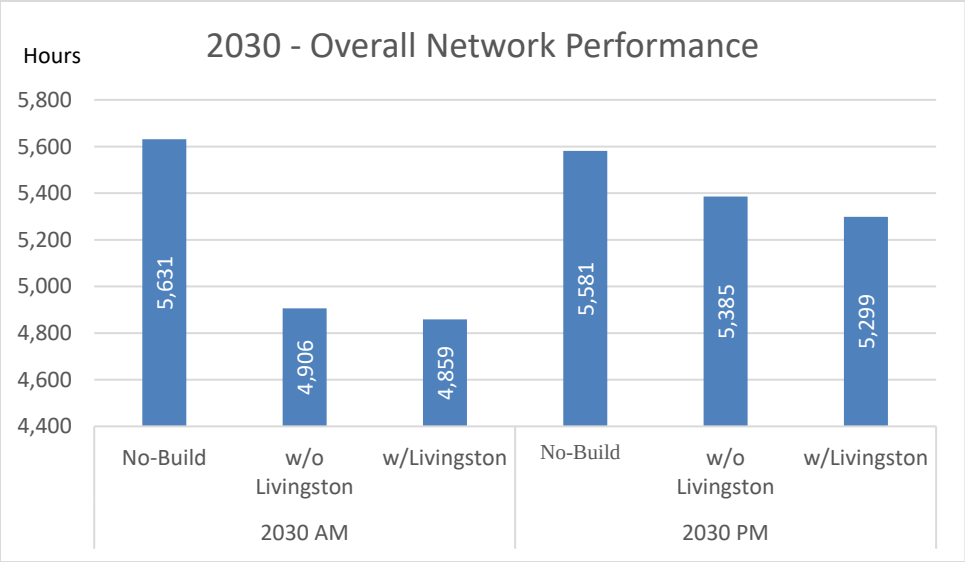
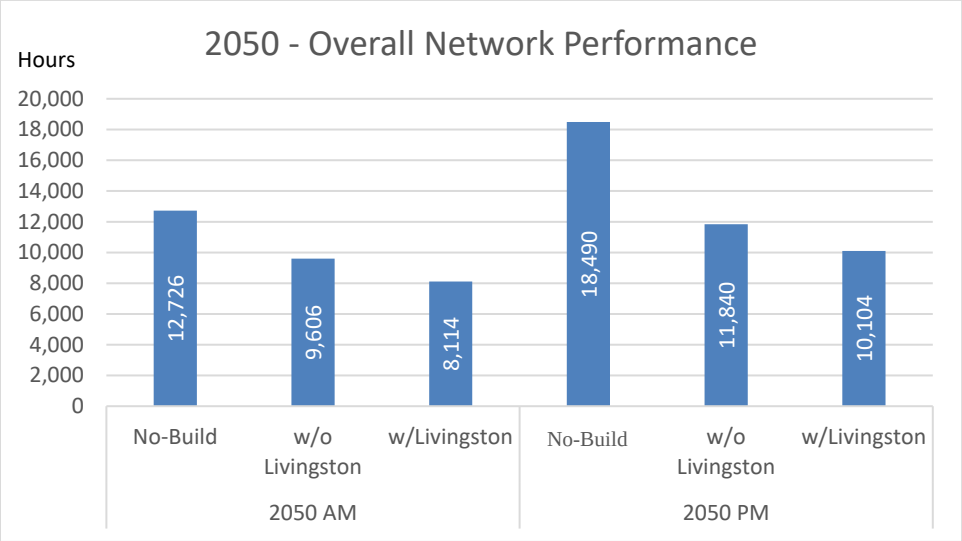


Figure 6.19
2050 VISSIM Travel Time Comparisons



Network wide performance measures for the Build Alternative with and without the Livingston Road interchange shows a minimal difference under 2030 opening year. For 2050, without the Livingston Road interchange, traffic demand on US 192 would be high enough to cause queues to back-up (approximately 1.2 miles) to the mainline from the southbound off-ramp terminal. While with the interchange, the queues would not affect the SR 429 mainline. Further, with the Livingston Road interchange a 15 percent to 18 percent reduction in the network's total travel time and a reduction in average delay per vehicle of 40 percent is estimated when compared to without the Livingston Road interchange. Therefore, inclusion of the new full reliever interchange improves the operations at the US 192 interchange by rerouting traffic to the Livingston Road interchange.

6.3.6 User Benefit Analysis

A user benefit over a 21-year project life span of the Build Alternative with and without Livingston Road interchange was estimated using projected reduction in network travel time. Fuel consumption and emissions were not included. Based on 2022 dollars, the estimated user benefit is $72 million for travel time saving from year 2030 to 2050. Therefore, inclusion of the new full reliever interchange improves the operations at the US 192 interchange by rerouting traffic to the Livingston Road interchange. Relief in congestion, redistribution of traffic, and modified ramp segments are expected to result in a reduced number of potential crashes at US 192 interchange. The table used to estimate the user benefit is presented in **Appendix I**.

6.4 FUTURE SAFETY EVALUATION

A future conditions safety analysis was conducted to study the impacts of the proposed Build Alternative within the AOI. The study area focused on the SR 429 freeway segments, ramp terminals and ramp segments, Sinclair Road, Livingston Road, US 192, Western Way and Seidel Road arterial segments, and major intersections along the arterials. The analysis was conducted using the predictive methods in Chapters 12 and 19 of the Highway Safety Manual (HSM), and Interchange Safety Analysis Tool (ISATe), which apply a combination of Safety Performance Factors (SPFs), Crash Modification Factors (CMFs), and calibration factors to estimate frequency and cost of crashes for each segment and intersection. Note that the resulting predictions should be used with caution if the input AADTs (highlighted cell in the HSM tools) exceed the range of data used to develop one or more of the SPFs. The growth rates were estimated based on 2030 and 2050 AADTs.

The following crash severity level costs were used for the crash cost savings analysis (Source: FDOT 2022 Design Manual Crash Cost Table 122.6.2):

- Fatal (K) $10,890,000
- Severe Injury (A) $888,030
- Moderate Injury (B) $180,180
- Minor Injury (C) $103,950
- Property Damage Only (O) $7,700

The No-Build and Build Alternatives were evaluated, and the predicted number of crashes and associated costs were compared for the 2030 to 2050 analysis period. The results of the safety analysis are summarized in **Table 6.19**. It is important to note that the safety analysis tools available to date are deterministic in nature and estimate future crashes mainly based on AADT and roadway characteristics. These tools do not account for vehicle interactions (driver behaviors). The No-Build Alternative is expected to have extensive congestion and queues that may potentially impact crashes especially along SR 429. Consequently, cost savings would be higher than reported. Nevertheless, the overall predicted crashes are lower for the Build Alternative compared to the No-Build Alternative due to added capacity along SR 429. The Build Alternative enhanced ramp reconfigurations are anticipated to provide safer operations with less traffic congestion and smoother merging/diverging movements. Relief in congestion, redistribution of traffic, and modified ramp segments are expected to result in a reduced number of potential crashes. The results of the safety analysis are summarized in **Table 6.19** and detailed analysis tables are provided in **Appendix I**.

The following intersections are anticipated to experience improved safety under Build conditions. The reduction in the number of projected crashes is due to the anticipated diversion of traffic related to the new interchange at Livingston Road.

- Sinclair Road and both ramp terminals
- US 192 and both ramp terminals
- US 192 and East Orange Lake Boulevard
- US 192 and Inspiration Drive
- US 192 and Formosa Gardens Boulevard

The Build Alternative has additional merge and diverge segments with new access points at Livingston Road and along the freeway when compared to the No-Build Alternative, which results in a higher percentage of potential crashes. However, the overall predicted number of crashes is lower for the Build Alternative as compared to the No-Build Alternative. Based on these results, the Build Alternative is predicted to have a 21-year crash cost savings of approximately ***$10 Million*** compared to the No-Build Alternative, in 2022 present value.

Table 6.19
2030 to 2050 Predicted Number of Crashes and Cost Savings

Site	No-Build		Build	
	$N_{predicted}$*	2022 Present Value	$N_{predicted}$*	2022 Present Value
Western Beltway				
Freeway Segments	3,457.49	$310,792,420	3,217.52	$291,083,450
Sinclair Road Ramp Segments	33.58	$2,569,379	28.95	$2,214,929
Sinclair Road Ramp Terminals	114.71	$11,879,846	110.64	$11,411,850
US 192 Ramp Segments	59.00	$4,496,517	54.02	$4,116,748
US 192 Ramp Terminals	479.88	$50,324,436	410.34	$43,070,647
Livingston Ramp Segments	-	-	33.23	$2,547,767
Livingston Ramp Terminals	-	-	61.81	$6,509,253
Western Way Ramp Segments	160.07	$12,196,406	200.28	$15,244,250
Western Way Ramp Terminals	212.97	$21,906,711	279.40	$29,082,413
Seidel Road Ramp Segments	32.01	$2,429,316	33.68	$2,556,196
Seidel Road Ramp Terminals	86.79	$8,679,912	145.79	$15,167,061
SUBTOTAL:	**4,636.50**	**$425,274,943**	**4,575.65**	**$423,004,565**
US 192 Segments				
West Orange Lake Boulevard to SB Ramps	163.87	$19,463,716	154.81	$18,393,890
NB Ramps to East Orange Lake Boulevard	21.65	$2,573,389	18.89	$2,250,371
East Orange Lake Boulevard to Inspiration Drive	186.33	$22,165,406	165.98	$19,767,172
Inspiration Drive to Formosa Gardens Boulevard	280.61	$33,351,083	248.69	$29,597,666
US 192 Intersection				
US 192 and West Orange Lake Boulevard	462.62	$55,193,583	519.68	$61,775,476
US 192 and East Orange Lake Boulevard	508.92	$60,473,040	373.79	$44,441,974
US 192 and Inspiration Drive	371.87	$44,149,090	338.21	$40,187,386
US 192 and Formosa Gardens Boulevard	535.82	$63,677,587	508.33	$60,414,386
SUBTOTAL:	**2,531.69**	**$301,046,894**	**2,328.38**	**$276,828,321**

*Predicted Crashes; Sources: FDOT 2022 Design Manual Crash Cost Table 122.6.2 HSM Crash Distribution for Florida Table 122.6.4

Table 6.13 (continued)
2030 to 2050 Predicted Number of Crashes and Cost Savings

Site	No-Build		Build	
	$N_{predicted}$*	2022 Present Value	$N_{predicted}$*	2022 Present Value
Formosa Garden Boulevard and Livingston Road Segments				
Formosa Gardens Boulevard, US 192 to Livingston Road	115.56	$13,606,427	147.69	$17,342,423
Livingston Road, Formosa Garden Boulevard to Ramp Terminal	-	-	16.79	$1,971,367
Formosa Garden Boulevard and Livingston Road Intersection				
Formosa Gardens Boulevard and Livingston Road	49.84	$5,833,268	135.76	$15,894,168
SUBTOTAL:	**165.40**	**$19,439,695**	**300.24**	**$35,207,958**
Western Way Segments				
Flagler Avenue to Flamingo Crossings Boulevard	337.65	$3,600,696	337.65	$3,600,696
Flamingo Crossings Blvd to Ramp Terminal	343.35	$3,399,605	343.35	$3,461,865
Western Way Intersections				
Western Way and Flagler Avenue	129.01	$15,126,741	129.01	$15,126,741
Western Way and Flamingo Crossings Boulevard	215.01	$25,232,575	218.29	$25,616,688
SUBTOTAL:	**1025.03**	**$47,359,617**	**1028.30**	**$47,805,991**
Seidel Road Segments				
Avalon Road to Ramp Terminal	23.36	$2,716,337	22.50	$2,639,049
Ramp Terminal to Lakeshore Pointe Drive	27.34	$3,210,468	27.34	$3,210,468
Seidel Road Intersections				
Seidel Road and Avalon Road	299.94	$35,027,620	303.48	$35,454,400
Seidel Road and Lakeshore Pointe Drive	219.95	$25,855,872	219.95	$25,855,872
SUBTOTAL:	**570.59**	**$66,810,298**	**573.27**	**$67,159,789**
TOTAL	***8929.21***	***$859,931,447***	***8805.85***	***$850,006,623***
Crash Cost Savings	***$9,924,824***			

*Predicted Crashes; Sources: FDOT 2022 Design Manual Crash Cost Table 122.6.2 HSM Crash Distribution for Florida Table 122.6.4

The widening of the Western Beltway (SR 429) PD&E Study (FPID: 446164-1) expected to be completed by Spring 2023. Design, Right of Way (ROW), and Construction phases are not funded in the Turnpike Five Year Work Program (2023 thru 2027).

A conceptual signing and marking plan, in accordance with the *Manual on Uniform Traffic Control Devices (MUTCD)*, was prepared for the Build Alternative and is shown in **Appendix J**. The purpose of the signing plan is to demonstrate that advanced signing will be provided to safely guide drivers entering and/or exiting the SR 429 interchanges under the proposed Build configuration. The conceptual signing plan also identifies existing signs that will need to be relocated and new signs to be installed as a result of the proposed alternative's construction. The signing plan provided in the SIJR is conceptual in nature and shall be subject to final design for construction.

A discussion of the access modifications with respect to conformance with the Federal Highway Administration (FHWA) policy points related to access is provided below. SR 429 is not, however, part of the interstate system.

1. 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, and ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (Title 23, Code of Federal Regulations (CFR), paragraphs 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, should 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 should 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 should 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 operational analysis conducted for the SIJR confirmed that the proposed modifications to existing interchanges and the addition of a new interchange at Livingston Road are not expected to have adverse impacts on safety and operations on SR 429. The list of modified intersections and new interchange are as follows:

- Sinclair Road and SR 429 both ramp terminals (added a traffic signal at the southbound ramp terminal and provided capacity improvements to both ramp terminals)
- Connector Road and SR 429 northbound ramp terminal (added a traffic signal and provided capacity improvements)
- Livingston Road ramp terminal (added a new T-ramp interchange)
- Livingston Road and Formosa Gardens Boulevard intersection (added a traffic signal and provided capacity improvements)
- US 192 and West Orange Lake Boulevard intersection (a traffic reduction is expected due to the new Livingston Road interchange)
- US 192 and SR 429 northbound and southbound ramp terminals (provided capacity improvements)
- US 192 and East Orange Lake Boulevard (provided capacity improvements)
- US 192 and Inspiration Drive (a traffic reduction is expected due to the new Livingston Road interchange)
- Formosa Gardens Boulevard (a traffic reduction is expected due to new Livingston Road interchange rerouting traffic)
- Western Way and SR 429 both ramp terminals (added traffic signals at both ramp terminals and provided capacity improvements)
- Seidel Road and Avalon Road (provided capacity improvements)
- Seidel Road and SR 429 both ramp terminals (added traffic signals at both ramp terminals and provided capacity improvements)

Overall, Synchro results estimate the Build Alternative to reduce total intersection control delay by 77 percent and 71 percent within the AOI during the 2050 design year AM and PM peak hours, respectively, when compared to the No-Build Alternative. Therefore, the inclusion of a new full reliever interchange on SR 429 at Livingston Road improves the overall delay at the study intersections by dispersing surface street traffic demand.

A user benefit over a 21-year project life span of the Build Alternative with and without the Livingston Road interchange was estimated for US 192 study area using projected reduction in network travel time. Fuel consumption and emissions were not included. Based on 2022 dollars, the estimated user benefit is $72 million for cumulative travel time savings from year 2030 to 2050. Therefore, inclusion of the new full reliever interchange improves the operations at the US 192 interchange by rerouting traffic to the Livingston Road interchange. Relief in congestion, redistribution of traffic, and modified ramp segments are expected to result in a reduced number of potential crashes at the US 192 interchange.

The projected failing freeway mainline conditions under the No-Build Alternative are expected to increase future crash risk within the project corridor. This potential for increased crash risk is alleviated by the capacity improvements proposed in the Build Alternative. Overall, the Build Alternative will not only divert traffic from the congested interchanges but will also improve the operations, safety, and accessibility to the SR 429 facility both in terms of regional connectivity and emergency evacuation.

2. ***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, such as managed lanes (e.g., transit or high occupancy vehicle and high occupancy toll lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided by the proposed design, the report should include a full-interchange option with a comparison of the operational and safety analyses to the partial-interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements on ramps, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.***

In addition to the proposed operational improvement alternatives at the existing interchange locations at Sinclair Road, US 192, Western Way and Seidel Road, a proposed new interchange location was developed at Livingston Road. The Preferred Alternative is a T-Ramp full access interchange configuration on SR 429 at Livingston Road.

The existing and proposed access locations will be designed to conform to the American Association of state Highway and Transportation Officials (AASHTO) and Florida's Design Manual (FDM) design standards. If the need for design exceptions or variations arises, they will be processed per FHWA and FDOT standards.

The Build Alternative meets the future traffic demands with no significant environmental impacts.

No modification of access to businesses within the AOI are proposed. Regional access will be enhanced by the additional accessibility to/from SR 429 resulting from the proposed new Livingston Road interchange. The proposed modifications to the existing interchanges also enhance access between the local arterial network and SR 429.

Based on the preliminary design performed as part of the PD&E Study, it is anticipated that a border width variation will need to be prepared. The border width variations are anticipated for the realigned ramps as well as short portions of SR 429 due to the widening. The variations will be processed during the design phase of the project per FHWA and FDOT standards.

Florida's Turnpike Enterprise (FTE) conducted a Project Development and Environment (PD&E) Study (FPID: 446164-1-22-01) to evaluate the widening of the Western Beltway (SR 429) from I-4 to Seidel Road and improving the interchanges within the study limits. The project is located within Osceola and Orange Counties in Central Florida.

The purpose of the project is to increase capacity on the SR 429 mainline and at the interchanges within the study limits, accommodate existing and future traffic demand, enhance safety, improve travel time reliability, and enhance emergency evacuation. This Systems Interchange Justification Report (SIJR) documents traffic forecasts, lane requirement evaluations, traffic operations analysis, and a safety evaluation for the No Build and proposed Build Alternatives.

The existing (2020) conditions Synchro traffic analysis indicated that several intersections within the Area of Influence (AOI) are operating at Level of Service (LOS) E or F in one or both AM and PM peak hours in year 2020. Several turning movements at the intersections along US 192 experience unacceptable LOS F due to the heavy through traffic on the arterial during the peak hours. Existing conditions VISSIM analysis showed that the southbound diverge area located immediately upstream of the off-ramp to US-192 to have a speed of 30 mph during the PM peak hour. This operating speed is consistent with field observations and is substantially lower than the posted speed limit. During the PM peak hour, the queue at the southbound off-ramp frequently spills back to the mainline and causes severe congestion on the mainline.

A total of 156 crashes were reported along the SR 429 mainline from I-4 to Seidel Road during the five-year analysis period from 2014 through 2018. The mainline crashes were mostly off-road (49 percent) and rear-end (25 percent). A total number of seven fatal crashes were reported, two occurred along the SR 429 mainline between the Sinclair Road and US 192 interchanges, three along the SR 429 ramps (I-4 westbound on-ramp, northbound off-ramp to Sinclair Road and southbound off-ramp to US 192), and one each at the US 192 intersections of East Orange Lake Boulevard and Blake Lake Road/Inspiration Drive. Four out of the seven fatal crashes were of the off-road crash type. The high crash intersections are on US 192 at Inspiration Drive and Formosa Gardens Boulevard.

The future No-Build network was updated to include planned and programmed improvements within the study area. These improvements were considered in developing the traffic and interchange concepts and were included in the future traffic analysis:

- Florida's Turnpike/SR 91 mainline widening (FPID: 435784-1) from four to eight lanes. This project extends from SR 50 in Clermont to the Orange County/Lake Countyline. The project is expected to be completed by year 2023.
- Florida's Turnpike/SR 91 mainline widening (FPID: 435785-1) from four to eight lanes. The limits for this project are from the Orange County/Lake County line to Hancock Road in Minneola. It is expected to be completed by year 2024.
- Florida's Turnpike/SR 91 mainline widening (FPID: 435786-1,-2,-3) from four to eight lanes. The limits for this project are from Hancock Road in Minneola to Obrien Road and from Obrien Road to US 27/SR 19 (North). It is expected to be completed by year 2026.
- Western Beltway/SR 429 widening from four to six lanes by CFX from Tilden Road to John Land Apopka Expressway/SR 414. It is expected to be completed by year 2024.
- Poinciana Parkway from Ronald Reagan Parkway to south of US 17/92 and from south of US 17/92 to County Road 532/Osceola Polk County Line Road. It is expected to be completed by year 2025.

- Poinciana Parkway from Ronald Reagan Parkway to Cypress Parkway/CR 580, widening from an undivided two-lane roadway to a divided four lane expressway. It is expected to be completed by year 2023.
- I-4 from County Line Road to west of US 27 and from west of US 27 to west of Kirkman Road/SR 435, widening to 10 lanes (including managed lanes).
- Lake/Orange Expressway (SR 516), a new four lane limited access expressway from US 27 to Western Beltway/SR 429. It is expected to be completed by year 2023.
- Southport Connector Expressway, a divided four lane tolled expressway from Poinciana Parkway to Canoe Creek Road with a full interchange at the Florida's Turnpike/SR 91. PD&E Study completion date 2023
- Avalon Road from US 192 to McKinney Road, widening from two to four lanes.

Transportation System Management and Operations (TSM&O) measures have been implemented at the southbound off-ramp to US 192. The TSM&O considerations include roadway geometric improvements at the ramp terminal intersection and the two southbound off-ramps to US 192 from SR 429. These TSM&O improvements are not expected to satisfy the need for additional capacity on SR 429, improved access to the surface streets, and relief of traffic congestion within the interchanges. Therefore, this PD&E Study and the SIJR did not consider a standalone TSM&O Alternative. Most of the freeway segments along SR 429 are expected to operate over capacity under the No-Build Alternative, which indicates that the SR 429 mainline needs to be widened to eight lanes. Note that the Southbound off-ramp improvements at US 192 are part of this PD&E study and have been advanced as the TSM&O alternative. The TSM&O improvements are within FTE's system and will be included in the work program.

There is only one Build Alternative for the mainline widening of SR 429 that widens SR 429 from four lanes to eight lanes for the length of the project. All Electronic Tolling (AET) will be implemented prior to the widening. An auxiliary lane will be provided on SR 429 in both the northbound and southbound directions between the US 192 and the new Livingston Road interchange. Under Build conditions, operational performance along SR 429 improved compared to No-Build conditions and SR 429 is anticipated to operate at an acceptable LOS D or better.

The Preferred Build Alternative includes the new interchange on SR 429 at Livingston Road. The PTV VISSIM microsimulation software was used to evaluate traffic operations for the US 192 corridor with and without the Livingston Road interchange. Networkwide performance measures for the Build Alternative without the Livingston Road interchange shows traffic demand on US 192 would be high enough to cause queues to spillback from the southbound off-ramp terminal onto the mainline for a distance of approximately 1.2 miles. While with the new reliever interchange on SR 429 at Livingston Road, queue spillback onto the mainline is fully eliminated. With the new SR 429 at Livingston Road interchange, network travel time and average delay are estimated to be reduced by as much as 18 and 40 percent, respectively.

Under Build conditions, it is estimated that the reduction of delay based on Synchro results for the study area will range between 71 and 77 percent during 2050 peak periods. This reduction for the study area network is due to the anticipated diversion of traffic from US 192 to the proposed new interchange at Livingston Road, added capacity and new traffic signals at unsignalized ramp terminals. The following improvements are provided under the Build Alternative:

- Sinclair Road and SR 429 ramp terminals (added a traffic signal at the southbound ramp terminal and provided capacity improvements at both ramp terminals)
- Connector Road and SR 429 northbound ramp terminal (added a traffic signal and provided capacity improvements)

- Livingston Road ramp terminal (added a new T-ramp interchange)
- Livingston Road and Formosa Gardens Boulevard intersection (added a traffic signal and provided capacity improvements)
- US 192 and West Orange Lake Boulevard intersection (a traffic reduction is expected due to the new Livingston Road interchange)
- US 192 and SR 429 both ramp terminals (provided capacity improvements)
- US 192 and East Orange Lake Boulevard (provided capacity improvements)
- US 192 and Inspiration Drive (a traffic reduction is expected due to the new Livingston Road interchange)
- Us 192 and Formosa Gardens Boulevard (a traffic reduction is expected due to new the Livingston Road interchange)
- Western Way and SR 429 both ramp terminals (added traffic signals and provided capacity improvements)
- Seidel Road and Avalon Road (provided capacity improvements)
- Seidel Road and SR 429 both ramp terminals (added traffic signals and provided capacity improvements)

The Build Alternative is predicted to have a 21-year crash cost savings of approximately $10 million compared to the No-Build Alternative.

A user benefit over a 21-year project life span of the Build Alternative with and without Livingston Road interchange was estimated using projected reduction in network travel time. Fuel consumption and emissions were not included. Based on 2022 dollars, the estimated user benefit is $72 million for travel time from year 2030 to 2050. Therefore, inclusion of the new full reliever interchange improves the operations at the US 192 interchange by rerouting traffic to the Livingston Road interchange. Relief in congestion, redistribution of traffic, and modified ramp segments are expected to result in a reduced number of potential crashes at the US 192 interchange.

The analysis showed that the proposed modifications to the existing SR 429 interchanges and new interchange on SR 429 at Livingston Road meet the requirements for the Federal Highway Administration's (FHWA) two policy points. First, the operational and safety analysis conducted for this SIJR confirmed that the proposed improvements under the Build Alternative do not have an adverse impact on the operations and safety of SR 429 or the local street network and improves traffic operations through the design year. Second, the proposed accesses connect to public roads only and will provide for all traffic movements.

The widening of the Western Beltway (SR 429) PD&E Study (FPID No. 446164-1-22-01) is expected to be completed by Spring 2023. Design, Right of Way (ROW), and Construction phases are not funded in the Turnpike Five Year Work Program (2023 through 2027).